DETERMINANTS OF UTILISATION OF UNIVERSITY OF IBADAN AGRICULTURAL RESEARCH OUTPUTS AMONG BENEFICIARIES IN SOUTHWESTERN, NIGERIA

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A DISSERTATION IN THE DEPARTMENT OF AGRICULTURAL EXTENSION AND RURAL DEVELOPMENT

SUBMITTED TO THE FACULTY OF AGRICULTURE

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF PHILOSOPHY

OF THE

UNIVERSITY OF IBADAN

OCTOBER, 2018

ABSTRACT

Agricultural development depends to a large extent on the utilisation of Agricultural Research Outputs (AROs). Several AROs have been generated by Departments in the Faculty of Agriculture and Forestry, University of Ibadan (UI). However, acceptance and utilisation of these AROs by end users had been bedeviled with various challenges. Information on utilisation of UI AROs by end users is scanty. Therefore, determinants of utilisation of UI AROs among beneficiaries in Southwestern Nigeria were investigated.

A three-stage sampling procedure was used. Purposively, the States (Oyo and Osun) and communities (Ilora, Egbeda, Mokola, Akinyele, Iwo and Ile-ogbo) where UI AROs were disseminated were selected. Thereafter, beneficiaries were stratified into crop and livestock enterprises. Finally, 194 beneficiaries were randomly selected across the agricultural enterprises proportionate to size. Using structured questionnaire, data were collected on respondents' personal (sex, age, marital status, household size and educational level) and enterprise characteristics (farm size, years of farming/processing experience, monthly income, source of labour), knowledge and attitude to utilisation, level of utilisation, benefits derived and constraints to utilisation of UI AROs. Indices of knowledge (low, 7.00-13.82; high, 13.83-19.00), attitude (unfavourable, 39.00-55.58; favourable, 55.59-77.00), level of utilisation (low, 5.00-19.62; high, 19.63-45.00) and benefits derived (low, 8.00-12.38; high; 12.39-18.00) from UI AROs were generated. Data were analysed using descriptive statistics, Chi-square, Pearson product moment correlation and multiple regression at $\alpha_{0.05.}$

Respondents' age, household size and monthly income were 40.05±5.48 years, 4.04±1.25 and ₦32,299.50±₦26,241.60, respectively. More than half (55.7%) practiced commercial agricultural production and had 7.9±5.3 years of farming experience.

Source of labour for 62.9% was family and 90.7% had no access to extension services. Respondents' knowledge was high (67.0%), while 59.8% had favorable attitude to UI AROs. Utilisation of Integrated Farming System (IFS) (55.8%), neem extract for pest control (55.8%), Sweet Potato Granule (SPG) (57.9%), Sweet Potato Flour (SPF) (55.6%), Moringa powder (52.9%) and ruminant block meal (55.6%) were high. However, level of utilisation of UI AROs was highest (26.53±3.21) in IFS compared to SPF (21.78±3.15) and ruminant block meal (19.52±2.53) but least in neem extract (13.46±4.38). Benefits derived from utilising UI AROs was high for 62.4%. Constraints to utilisation of UI AROs were insufficient capital (0.84±0.63), technical expertise requirements (0.83±0.73) and labour intensiveness of innovations (0.67±0.68). Respondents' marital status (χ^2=5.99), sex (χ^2=3.92), level of education (χ^2=30.69); age (r=0.23) and income (r=0.79) were significantly related to UI AROs utilisation. Respondents' attitude (r=0.67, knowledge (r=0.32) and benefits derived (r=0.80) were significantly related to utilisation of UI AROs. UI AROs utilisation was determined by beneficiaries' educational qualification (β=0.46), years of farming or processing experience (β=0.27), scale of production (β=0.33), knowledge (β=0.45), attitude towards UI AROs (β=0.61) and constraints to its use (β=-0.21).

Utilisation of University of Ibadan agricultural research outputs was high for innovations disseminated and was determined by respondents' knowledge, attitude and constraints encountered.

Keywords: Research outputs utilisation, Moringa powder, Sweet potato flour, Integrated farming system

Word count: 464

DEDICATION

I dedicate this research work to God Almighty, the Author and Finisher of my Faith who saw me through the thick and thin of this programme and also to my wonderful parents Dr and Mrs F.A Okanlawon for their financial, moral and spiritual support throughout the programme.

ACKNOWLEDGEMENTS

I give all glory, honor and adoration to God for his sustaining grace throughout the progamme and for the successful completion of this research work.

My sincere appreciation goes to my supervisor and mentor Dr Sarafat A. Tijani for her guidance, patience, love and understanding, most importantly for the unhindered mentoring she has given me during the course of this programme, I pray that God will continually be your strength and shield and also see your children through all their endeavors in Jesus Name, Amen.

I am also indebted to my Head of Department, Prof. L. A Akinbile, for his support and encouragement given to ensure that this research work comes out its best. I also thank all my esteemed Lecturers in the department; Profs. A. A. Ladele, A. E. Adekoya, M. K. Yahaya, J. O Oladeji, Stella O. Odebode, M. G. Olujide, O. B. Oyesola, Pipy O. Fawole and Drs B. R. Olajide, O. T. Yekinni, K. A. Thomas, O. S. Fadairo, I. O. Badiru, Mojisola F. Oyewole, Olufolake E. Adelakun, N. Sangotegbe and Oluwaseun A. Adeleke for their encouragement and for impacting necessary knowledge that made this programme a success. May God elevate you all in your career in Jesus name, Amen.

I cannot but thank the administrative staff of the department for their efforts and efficiency to ensure we all graduated without any delay. May God reward you all abundantly in Jesus name, Amen.

I am particularly grateful to my loving and caring parents for the incomparable support I have always been receiving from them, words cannot just express my appreciation and I pray they shall eat the fruits of their labour in due season in Jesus name, Amen. I also thank my wonderful siblings (DAT) who had been very supportive during the course of the programme, I pray God Almighty will elevate, promote and move you to greater heights in all your accomplishments in Jesus name, Amen.

I cannot but express my profound gratitude to Prof. Nkiru T. Meludu for her encouragement and support especially for the wealth of knowledge and discipline she instilled on me. May all your children also achieve purpose in life in Jesus name, Amen.

I am indeed grateful to Mrs Joseph, Mrs Ikujuni, Mr. W. Adejumo, Mr P. Olanrewaju, Mr. T. Abolade, Dr. Temitope Salaam, Mr M. K. Sanusi, Mrs Yinka Oresanya, Miss Folusho Aina, Damilola Iyiola, Awoyemi Funmilayo, Mrs Taiwo Olanike, Mrs Temilorun Anifowose, Mrs Florence Adeloye and a host of other colleagues that I cannot list their names here who had been very helpful at one point or the other to ensure that this research work was a success, A big THANK YOU to you all. God will crown all our efforts with good success in Jesus name, Amen.

And finally, to my special friend, Kehinde Ologundudu for his support and encouragement. You are you in a million.

A million thanks to you all for being there when I needed your help, God bless you all. Amen.

CERTIFICATION

This is to certify that this research work was carried out by Oluwatoyin Mayowa, OKANLAWON under my supervision in the Department of Agricultural Extension and Rural Development, Faculty of Agriculture, University of Ibadan, Ibadan, Oyo State, Nigeria

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LIST OF ACRONYMS/ABBREVIATIONS

AKIS	Agricultural Knowledge and Information System
ARCN	Agricultural Research Council of Nigeria
AROs	Agricultural Research Outputs
ANOVA	Analysis of Variance
CGIAR	Consultative Group on International Agricultural Research
DMRT	Duncan Multiple Range Test
DRUSSA	Development Research Uptake in Sub-Sahara Africa
F	Frequency
FAO	Food and Agricultural Organization
FGD	Focus Group Discussion
FTE	Full Time Employees
IFS	Integrated Farming System
LGA	Local Government Area
MDG	Millennium Development Goal
MP	Moringa Powder
NARP	National Agricultural Research Project
NARS	National Agricultural Research System
P	Probability level
PPMC	Pearson Product Moment Correlation
RBM	Ruminant feed block meal

SDG	Sustainable Development Goal
SE	Standard Error
SPF	Sweet potato flour
SPG	Sweet potato toasted granule
UI	University of Ibadan
UN	United Nations
UNDP	United Nations Development Programme

CHAPTER ONE

1.0 INTRODUCTION

1.1 Agriculture and Research

Agriculture as the backbone of community development has been proved to bring about agricultural development through the generation of gainful employment, increased production of raw materials for industries, increased food for export and income for beneficiaries (Oladele, 2011). Generally, agricultural research efforts aim at contributing to existing knowledge and improving the quality of life through achievement of food self-sufficiency leading to food security. Ballantyne (2009) attested that almost all countries in Africa lack adequate agricultural information dissemination strategies, and where it is available, governments pay lip service to its implementation. In order to proffer solution to these inadequacies, the United Nations Organization in 2010 came up with the Millennium Development Goals (MDG) to address most African problems which has translated into Sustainable Development Goals (SDG) in 2015 to ensure more objectives are achieved in eradicating hunger and food insecurity in Africa till 2030. For instance, SDG goals number one and two focuses on reduction of poverty and zero hunger respectively which calls for a sustainable agricultural production (United Nations Development Programme (UNDP), 2018). Poverty eradication as the first goal is important to Nigeria since poverty is one of the social problems that have been bedeviling the country over the years. More so, its reality has been manifested in many severe incidences, despite the immense human, natural, economic and development potentials the country is blessed with (Bolarin and Ayanlade, 2010). The weak level of technology component of agriculture in Nigeria is manifested in the dismal performance of the agricultural sector and deepening poverty. Report from the Central Bank of Nigeria and the National Population Commission indicates that while the Nigerian population has been growing at 3% per annum, food production has been increasing at only 1.5% per annum in the last five years. In addition, 70% of Nigerians are living below poverty line (UNDP, 2018).

Braidek (2017) noted that most of the agricultural information and innovations in Nigeria are generated from research institutes as to where a farmer can find improved

agricultural inputs, best application methods, credit facilities, transaction costs, labour supply as well as demand, distribution, selling options, agricultural insurance, market price and quality requirements". Having adequate and well-presented information will improve the efficiency of rural development, policies, projects and programmes. Agricultural innovation generation and dissemination should be the basic component of rural development programmes. Oladele (2011) observed that adequate agricultural information about new technology is a key factor that can greatly improve agricultural advancement in developing countries as it tends to help inform farmer's decision-making regarding land, labour, livestock, capital and management. This is meant for all types of beneficiaries involved in farming and post-harvest activities. Agricultural research has generally assumed a particular causal pathway from research to improved production in order to reduce poverty. Some researches in the past focused on increasing food staples in irrigated and high potential areas where they perceive productivity returns would be highest but production increase in high potential areas do not necessarily benefit poor beneficiaries. This is because many of the rural dwellers live in areas that lack infrastructure to take advantage of improved technologies. It is also because many of the rural dwellers lack the control of land, water, labor, credit, or other essential assets necessary to take advantage of improved technology (Chauhan, 2009). Effective and efficient delivery system of essential information and technology services to beneficiaries helps to facilitate their active role in decision-making towards improved agricultural production, processing, trading, and marketing (Food and Agricultural Organization of the United Nations (FAO, 2009). University as a research institute generates a pool of research findings on regular basis but the dissemination outlets often employed for disseminating such innovations do not often ensure their utilisation or utilisation by end users and in some cases where the innovations are adopted, it might not be sustainable for a long period of time.

University of Ibadan (UI) had generated several agricultural research outputs from the Faculty of Agriculture in order to fulfill the Institution's mission to expand the frontiers of knowledge through provision of excellent conditions for learning and research and also to contribute to the transformation of the society through creativity and innovation. Many of these had not been effectively disseminated to the end users. However, some of the research outputs that had been disseminated which this study considered the determinants of utilisation by the end users in the study area included:

- Production of neem extract for pest control from Agronomy and Crop Protection and Environmental Biology Departments to Akinyele L.G.A. farmers of Oyo State.
- Processing and packaging of Moringa Powder (MP) by Agricultural Extension and Rural Development Department to Aiyedire L.G.A beneficiaries of Osun State.
- Fish-rice-poultry Integrated Farming System (IFS) from Fisheries and Aquaculture Department to fish farmers in Ibadan North L.G.A beneficiaries of Oyo State.
- Ruminant Block Meal (RBM) from Animal Science to Iwo L.G.A ruminant farmers of Osun State.
- Domestication of grasscutter from Wildlife and Ecotourism Department to Egbeda L.G.A farmers of Oyo State.
- Processing and packaging of Sweet potato flour by Agricultural Extension and Rural Development Department to Afijio L.G.A beneficiaries of Oyo State.
- Processing and packaging of Sweet potato granules by Agricultural Extension and Rural Development Department to Afijio L.G.A beneficiaries of Oyo State.

1.2 Statement of Research Problem

For agricultural development to be achievable and sustainable, there is need for generation of new technologies and research outputs that will improve agricultural production as well as quality of life of the rural people (Braidek, 2017). Despite the history of agricultural research in Nigeria as far back as the eighteenth and nineteenth century, the anticipated outcome into food self-sufficiency had not been completely realized (Oladele, 2011). However, in recent years, there had been a rise in the development of agricultural research as the number of research institutes and institutions keep increasing. Although, many of these agricultural technologies developed by researchers are yet to be effectively utilized by the end users who are usually farmers (Oladele, 2011). Washington, Wirimayi and Shepherd (2012) also observed that impact of agricultural technology had not been felt among the rural populace for agricultural development and improved production. The contribution of research institutes and institutions in the generation of technologies is therefore paramount and cannot be overemphasized as it is a very relevant way of ensuring increased agricultural production in Nigeria.

In accordance with University of Ibadan's vision to generate relevant research outputs for meeting societal needs and ensure academic research activities are directed towards knowledge creation and innovation dissemination to achieve industrial development, it had generated numerous agricultural research outputs through the Faculty of Agriculture over the years to fulfill its mandate. However, despite the numerous innovations generated, there had not been desired results that is commensurate with the efforts of the institution in the national agricultural production as low agricultural production still abounds. Oladele (2011) observed that most of the agricultural research outputs generated from research institutes and institutions often end in journals and publications for promotion of researchers or even lie fallow on researchers' shelves without making desired impact on the end users and the immediate community for necessary development. Ballantyne, (2009) attested to this fact that agricultural innovations developed are of little or no value until they can be put to use for the economic and social well-being of the people involved. This necessitates the need for ensuring proper dissemination of developed agricultural research technologies through acceptable medium for efficient utilisation by the eventual end users.

In order to ensure disseminated agricultural technologies are properly utilized by end users, there is the need to further investigate the determining factors that are responsible for their efficient utilisation. Although a number of factors have been identified by some researchers to be influencing farmers' utilisation of disseminated agricultural technologies, however, they vary depending on the nature of technology disseminated, affordability, and practicability, among others. Faleyimu, Akinyemi and Agbeja (2010) and Agbongiarhuoyi *et al* (2013) observed that many small scale farmers would have loved to increase their production but the constraint have always been limited access to modern technologies designed to boost their agricultural production. This is because the process of increasing the efficiency of agricultural production through agricultural modernization depends mainly on the extent to which farmers can incorporate improved agricultural technologies into their farming operations. According to Odoemenem and Obinne (2010), small-scale farmers in Nigeria need to transform their agricultural production systems from solely traditional inputs with low productivity to the one based on modern inputs with higher production.

However, despite the various identified factors responsible for farmers' utilisation of some agricultural research innovations in some other parts of the country, dearth of information still exists on key determinants of the utilisation of University of Ibadan

disseminated agricultural research outputs. Therefore, the determinants of University of Ibadan agricultural research outputs among beneficiaries in Southwestern, Nigeria where most of the agricultural innovations had been disseminated was investigated. Hence, the study seeks to answer the following research questions:

1. What are the personal characteristics of the beneficiaries in the study area?
2. What are the enterprise characteristics of the beneficiaries in the study area?
3. How knowledgeable are the respondents about the disseminated agricultural research outputs from University of Ibadan?
4. What is the attitude of respondents towards utilisation of University of Ibadan agricultural research outputs?
5. What is the level of utilisation of University of Ibadan agricultural research outputs among beneficiaries in the study area?
6. What are the benefits derived by the respondents from utilising University of Ibadan agricultural research outputs?
7. What are the constraints hindering respondents from utilising University of Ibadan agricultural research outputs?

1.3 Objectives of the Study

The main objective of the study is to investigate the determinants of utilisation of University of Ibadan agricultural research outputs among beneficiaries in Southwestern, Nigeria.

The specific objectives of the study were to:

1. identify the personal characteristics of the beneficiaries in the study area.
2. determine the enterprise characteristics of the beneficiaries in the study area.
3. ascertain the knowledge of respondents on the disseminated agricultural research outputs from the Institution.
4. examine the attitude of respondents to the disseminated agricultural research outputs from the Institution.
5. determine the level of utilisation of UI agricultural research outputs among beneficiaries in the study area.
6. investigate the benefits derived by respondents in utilising the disseminated agricultural research outputs.
7. identify the constraints encountered by respondents' in the utilisation of the disseminated agricultural research outputs.

8. discover the factors affecting utilisation of UI agricultural research outputs among beneficiaries in the study area.

1.4 Hypotheses of the Study

The following hypotheses stated in the null form were tested:

$H_0$1: There is no significant relationship between beneficiaries' enterprise characteristics and utilisation of UI agricultural research outputs.

$H_0$2: There is no significant relationship between beneficiaries' knowledge and utilisation of UI agricultural research outputs.

$H_0$3: There is no significant relationship between beneficiaries' attitude and utilisation of UI agricultural research outputs.

$H_0$4: There is no significant relationship between benefits derived by beneficiaries and utilisation of UI agricultural research outputs

$H_0$5: There is no significant difference among beneficiaries' utilisation of UI agricultural research outputs across the agricultural enterprises in the study area.

1.5 Significance of the Study

Agricultural technology transfer and dissemination is necessary for the development of agricultural production in Nigeria. Agriculture progresses as beneficiaries accepts new technologies from researchers and the extent to which they adopt such innovations as well as the speed at which they do so is determined by many factors in which the medium or approach of such dissemination is always a principal factor (Oladele, 2011). Due to unavailable, unreliable and untimely information about agricultural innovations, beneficiaries are forced to take wrong decisions as regards their agricultural production thereby jeopardizing their sustenance and ultimately, national growth. Braidek (2017) maintained that most of the agricultural information and innovations in Nigeria are generated from universities and research institutes where farmers can find improved agricultural inputs, best application methods, credit facilities, transaction costs, labour supply as well as demand, distribution, selling options, agricultural insurance, market price and quality requirements. Uganneya, Ape and Udensi (2013) also observed that agricultural technologies generated by research institutions do not either address the real needs of the end users or that they are never even known by the end users which is due to lack of appropriate link between researchers and the eventual end users (beneficiaries). This is responsible for low agricultural production and insufficient raw materials for industries which had necessitated importation of raw and processed agricultural materials from other

neighboring countries. This study will therefore help to find out the factors responsible for low utilisation of disseminated agricultural technologies leading to low agricultural production.

It will also provide policy framework and facilitate the formulation and implementation of agricultural policies in research institutes; to help mobilize and assist stakeholders involved in research dissemination and utilisation for development at the grassroots level. This study will also be an eye opener for the general public on the importance of research development and the need for proper dissemination to the end users that will result to utilisation for effective agricultural, community and national development.

1.6 Scope of the study

This study investigated the determinants of utilisation of University of Ibadan agricultural research outputs among beneficiaries in Southwestern, Nigeria. Non-beneficiaries of the disseminated agricultural research outputs were not considered for the study.

1.7 Limitation of the study

The agricultural research outputs considered were disseminated to beneficiaries in only two states in the South-West, Nigeria. If more states were involved, more beneficiaries would have benefitted from such research outputs.

1.8 Definition of Terms

The main concepts of this study are the following:

Determinants: This is defined as something that strongly influences an individual's action or behavior on information received. They are factors responsible for the utilisation of disseminated University of Ibadan agricultural research outputs.

Agricultural Research Outputs: This is referred to as new agricultural novelty, technology or invention developed by an expert and disseminated to end users to improve agricultural production. These are agricultural technologies developed from the University of Ibadan and had been disseminated to farmers in some adopted communities.

Researchers: These are scientists that develops or generates scientific facts, ideas or technologies and disseminate the information to the end users through appropriate

media to achieve specific purpose/goal. They are agricultural researchers from the University of Ibadan.

Research Institutes/Institutions: These are organisations or establishments where scientific ideas, information and technologies are generated/developed and disseminated to end users to proffer solution(s) to certain problem(s). University of Ibadan and agricultural research institutes belong to this category.

Dissemination: The process of spreading/diffusing information, ideas or technology(ies) to a target audience/end user to influence their skill, knowledge and attitude thereby solving certain problems. It is a media through which developed agricultural research outputs are transferred to the end users for improved agricultural production.

Utilisation: This is the act and manner in which something (information) is effectively used to derive certain benefits or to improve the state of something. This is the act of practicing new agricultural methods or ideas that had been disseminated to the end users.

Integrated Farming: This is an agricultural production that involves the cultivation of crops and livestock production simultaneously on the same piece of farmland for effective and optimum productivity. The Fish-rice-poultry integrated farming involves the cultivation of rice and fish farming on the same piece of land with a poultry farm nearby for generation of fish feed and organic manure.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Agricultural research in Nigeria

Agricultural research in Nigeria started more than 100 years ago with the establishment of a botanical garden in Lagos during the late 19th century. By 1903, the Forestry and Botanical Department (renamed Agricultural Department) for Southern Nigeria was created. By 1912, the latter was divided into Northern and Southern regions. By 1914, the Forestry and Veterinary Departments were created. The Fishery Department evolved in 1951. In a nutshell, by the 70's and 80's, different research institutes and departments of agriculture had emerged. Presently, Nigeria has the largest and most elaborate National Agricultural research systems in Sub-Saharan Africa. By 2006, the government set up an umbrella body known as the Agricultural Research Council of Nigeria (ARCN) which was established to address the challenges faced by the agricultural research system. ARCN's mission is to achieve significant improvements on agricultural productivity, marketing and competitiveness through generation of appropriate technologies, policy options and knowledge management of the research Institutes (Opara, 2008).

Agriculture in Nigeria has been predominated in the hand of the rural beneficiaries who farm at the subsistence level, most of the food produced in the nation today are directly from these rural areas, hence, research will go a long way in improving the lot of these rural beneficiaries as well as improve the food situation of our country (Adesiyan, 2014). Akinnagbe and Ajayi (2010) opined that beneficiaries know that food production in the continent has not been keeping pace with population growth and that crops' technological advances abound which could appreciably improve the situation. This implies that if Agriculture must develop, research is of paramount importance; of which is its perception by the beneficiaries themselves. Research can have beneficial impact at all stages in Agricultural development continuum from food production through post-harvest losses and marketing (Adesiyan, 2014).

Akinnagbe and Ikaegbu (2013) discovered that the need for agricultural research in Nigeria had always been informed by frequently mentioned problem of poor productivity resulting in incessant low production and food shortage which could be tackled with improved agricultural research. For agricultural research to be relevant and sustainable, it must attract desirable investment for its sustenance which as a matter of fact, must tackle users' priority, problems and need to be relevant to the end users.

Nigeria has arguably the largest and most complex National Agricultural Research Systems (NARS) in sub-Saharan Africa, with the largest network of agricultural universities and faculties of agriculture and veterinary medicine in general universities, as well as CGIAR (Consultative Group on International Agricultural Research) facilities. However, Nigeria's NARS is also relatively unstable and is beset by numerous unique challenges that warrant special attention. Some issues affecting agricultural research as speculated by Akinnagbe and Ikaegbu (2013) are as follows:

2.1.1 Research staff instability: The research staff instability index (or the ratio of the number of staff who have left NARS to the total number of staff) indicates high staff turnover in most institutes over short periods, contributing to unsustainable research programmes. According to Ragasa, Babu, Abdullahi and Abubakar (2010), the human resources management of NARS must go beyond traditional concerns with scale and staffing level adequacy to the analysis of staff instability and turnover.

2.1.2 Governance instability: The governance instability index (or the ratio of the number of members of the governing board who have been removed or who have retired over a given period) shows high board turnover. Most institutes show little or no institutional memory in their governing bodies. Board members are appointed not so much for their sustained professional input over time but more as political patronage. Institute governance is thus severely affected, because board members are unable to provide the critical mass professional advice, integrity, and transparency required to guide institute management.

2.1.3 Democratic policy: Civil society has, after many years of military rule, developed a military dependency syndrome, meaning researchers and beneficiaries of agricultural research have come to depend on the military and its narrow band of advisers for all initiatives in agricultural research policy and programmes. Development of civil society

capacity is critical for it to play the required advocacy roles on behalf of agricultural research.

2.1.4 University–Research institute linkages: There are currently weak linkages between the governments, higher education institutes engaged in agricultural research and the end users. The weak capacity of higher education agencies conducting agricultural research in terms of Full-Time Employees (FTEs) is often cited. The newly established Universities of Agriculture were designed to play a vanguard role in developing linkages, but anecdotal evidence suggests that weak research–university and inter-university collaboration persists. Several attempts have been made, and others are underway, to strengthen the system (such as the World Bank–funded National Agricultural Research Project [NARP], 1994–1999), but all have met with limited success. In 2006, Agricultural Research Council of Nigeria (ARCN) was established and assigned the statutory function of coordinating, supervising, and regulating all agricultural research, training, and extension in Nigeria. This council signifies an opportunity to create the necessary reforms that will move agricultural research and production forward for the benefits of Nigeria's resource-poor beneficiaries (Ragasa Babu, Abdullahi and Abubakar, 2010).

2.2 Impact of agricultural research on rural dwellers and agricultural production

The extent to which agricultural research has reduced poverty has become an increasing concern of policy makers, donors, and researchers. Until recently, poverty reduction was a secondary goal of agricultural research. The primary focus was on increasing food supplies and reducing food prices, a strategy that was successful in substantially increasing the yields of important food staples. When increased productivity is combined with increased agricultural employment, lower food prices, and increased off-farm employment, agricultural research can be credited with significant reductions in rural poverty. This has been the case particularly in Asia and Latin America, where the vast majority of the developing world population and the world's poor live. However, the paths of causality are complex and highly contingent. The benefits do not necessarily materialize for poor people, and some effects can be negative (Maru, 2008).

Despite the contributions of agricultural research, poverty still abounds even in countries that have national surpluses. For many developing countries, simply growing more food is no longer a pressing national objective. Food security at the national level has

been achieved through some combination of production and trade. Lawallro, Boadi, Oladokun and Kalusopa (2014) also observed that the challenge of agricultural research now lies in developing strategies that will explicitly address the needs of the rural people. Agricultural research has generally assumed a particular causal pathway from research to improved production to reduced poverty. The fact is, however, that there are various effects on various types of poverty that are generated by various ways of producing food. In the past, researchers focused on increasing food staples in irrigated and high potential areas where they perceived productivity returns would be highest. However, increase in production in high potential areas do not necessarily benefit rural farmers. This is because many of the rural beneficiaries live in areas that lacks basic infrastructure to take advantage of improved technologies and also because many of the beneficiaries even if resident in high potential areas lack the control of land, water, labor, credit, or other critical assets necessary to take advantage of improved technologies; the context within which agricultural research undertaken is changing rapidly (Oladele, 2011). Under market liberalization, where markets function as intended, improvements in agricultural productivity in any one country will not generate large indirect impacts on poverty through food price reductions. In addition, in many countries, agriculture has shrunk significantly in its economic importance relative to other sectors, and both the poor and non-poor are diversifying their income sources so that farm income and agricultural wage earnings often account for minority shares of total household income (Maru, 2008). Thus the direct effects of agricultural production on employment and poverty may not be as significant as they once were, though they often generate related activities such as providing inputs, processing outputs, or maintenance of capital goods. Some types of agricultural research are becoming more privatized with the advent of biotechnology and stronger assertion of intellectual property rights over genetic resources. But research on many crops and livestock that poor people in developing countries grow and eat is not attractive to the private sector.

2.3 Agricultural research-technology transfer

The links between agricultural research and technology transfer in developing countries are generally recognized as a major bottleneck in agricultural technology systems and have received inadequate attention in the past (Chauhan, 2009). A basic concept in this

paper is that research and extension should not be seen as separate institutions which must somehow be linked. Instead, scientists involved in basic, strategic, applied and adaptive research, together with subject matter specialists, village-level extension workers and farmers, should be seen as participants in a single Agricultural Knowledge and Information System (AKIS). An AKIS is a set of agricultural organizations and/or persons, and the links and interactions between them, engaged in such processes as the generation, transformation, transmission, storage, retrieval, integration, diffusion and utilisation of knowledge and information, with the purpose of working in synergy to support decision making, problem solving and innovation in a given country's agriculture or a domain thereof. Linkages between beneficiaries, extension agents, and research systems in Africa are weak. Often researchers have little interaction with extension services and beneficiaries, and do not reflect their priorities in the research agenda. In some cases the national research programme is defined by donors or individual researchers and may have little relation to national objectives or beneficiaries' needs. The lack of linkages has led to beneficiaries' adopting less than 10 percent of the crop varieties that they are offered in some cases (Ugwu and Kanu, 2011). In other cases, beneficiaries never learn about new technologies developed in the research systems because effective mechanisms to transfer innovations from research to the extension system do not exist. Finally, the extension services have often failed to reach beneficiaries because their communication strategies are not sometimes effective. Thus, extension services often miss the farmers who would benefit the most from good advice especially rural farmers who are responsible for the great majority of agricultural output in most African countries (Ugwu and Kanu, 2011).

Within the context of the agricultural industry, and particularly from the perspective of those involved in primary production, the term ‘Tech Transfer’ has often meant the delivery or dissemination of the latest information on best management practices, or perhaps a presentation on the newest technological tools. This involves the transformation of knowledge into use through synthesis, exchange, dissemination, dialogue, collaboration and brokering among researchers and research users. The term ‘Tech Transfer’ is becoming increasingly associated with the activities focused towards moving a concept along the research-development-commercialization process; ultimately leading to tangible products and technologies farmers can choose from the marketplace. The transfer of knowledge

from research into farming practice is a constant requirement for the industry to develop new ways of working and thinking. It is crucial to realizing the value of innovative research. Ministry of Agriculture research funding has, by design, focused on applied research and development projects with the potential for on-farm application within a short time frame. Occasionally, ministry programmes will support more basic or theoretical research if there is the potential for a significant innovative advance and benefit to the industry (Braidek, 2017).

Contrary to popular belief, publishing research results in an academic journal will not guarantee that those results are noticed or that someone will continue development into a tangible product that will reach the end user. Full development requires reaching out to and collaborating with development and commercial partners. Successful collaborations are formed among researchers across different universities or industries in order to advance the knowledge in a particular field or to further develop a technology. The ultimate goal of research is to have it put to meaningful use in real-world settings. The knowledge translation section of Ministry grant applications, where the researcher describes how he/she will move towards that end, has become increasingly important in past years.

2.4 Value addition of agricultural products

Value-addition refers generally to manufacturing processes that increase the value of primary agricultural commodities. Value-added agriculture may also refer to increasing the economic value of a commodity through particular production processes, e.g., organic produce, or through regionally-branded products that increase consumer appeal and willingness to pay a premium over similar but undifferentiated products. It means adding value to a raw product by taking it to at least the next stage of production and this is usually created by focusing on the benefits associated with the agribusiness product or service that arise from:

Quality — does the product or service meet or exceed customer expectations?
Functionality — does the product or service provide the function needed of it?
Form — is the product in a useful form?
Place — is the product in the right place?
Time — is the product in the right place at the right time?

Ease of possession — is the product easy for the customer to obtain?
A product must have one or more of these qualities to generate additional value.

Food processing has received much attention from policymakers and politicians who thought it as a way to rural development and to industrialize an economy. The processing of staple food crops, in particular, is thought to provide an opportunity for increasing demand and the utilization of a food crop and generating incomes for smallholder farmers. However, value adding and processing will incur additional costs and require additional investments in capital and human resources. To be commercially successful, there must be a sufficient market for the product and the product must be cost and price competitive with its close substitutes. Any product development idea must be carefully scrutinized first against other alternative options before limited resources are put into research and development of the product. It is essential to improve the welfare of the rural and urban people by diversification and expansion of agricultural produce/products for efficient utilization. This can be achieved by reducing processing costs and improving processes, making more effective use of farm produce/products, identifying new uses and product markets, and facilitating the adoption of improved varieties by identifying materials with superior postharvest traits –all contributing to increased rural employment and value addition, reduced rural poverty, greater opportunities for women and enhanced food security (Ladele, Meludu and Ezekiel, 2014).

2.5 Factors affecting farmers' utilisation of agricultural innovation

Howley, Donoghue and Heanue (2012) viewed through a broad cross disciplinary lens that the utilisation of agricultural technology depends on a range of personal, social, cultural and economic factors, as well as on the characteristics of the innovation itself. They further revealed that education level, capital, income, farm size, access to information, positive environmental attitudes, environmental awareness and utilisation of social networks are generally positively, associated with the utilisation of best management practices.

Narrowing the disciplinary focus, the agricultural economics literature on technology utilisation emphasizes the role of fixed and variable costs and heterogeneity, whether in terms of structural farm factors such as size or land quality, or the characteristics of

beneficiaries in terms of human capital (Ragasa *et al.*, (2010). The characteristics of the technology itself are also an important influence on beneficiaries' technology utilisation and usage decisions. In particular, the relative complexity, risk and investment characteristics of technologies significantly affect their utilisation and diffusion. Looking at the differences between capital-intensive and management-intensive technologies, Howley, *et al.*, (2012) also found out that age, size and specialization in dairy production increased the likelihood of adopting a capital-intensive technology, whereas education and size of operation positively impacted the decision to adopt a management-intensive technology. In this context, the risk preferences of beneficiaries are also important in influencing the technology utilisation decision, especially if capital-intensive technology costs are irreversible *(*Howley, *et al*, 2012*)*. Other parts of the social science literature emphasize the role of distance and geography in the utilisation of agricultural technologies. In this case, any significant travel costs involved in the initial learning about a technology and subsequently establishing it might reduce the likelihood of that technology's utilisation. More recently, some economists and other social scientists have focused more explicitly on farmers' motivations, values, objectives and behavioural influences in the context of technology utilisation.

2.6. University of Ibadan disseminated agricultural research outputs

Several agricultural research outputs had been generated from the Faculty of Agriculture of the Institution since its inception in over six decades and had been disseminated to end users (Development Research Uptake in Sub-Sahara Africa (DRUSSA), 2013). Some of the recently disseminated agricultural research outputs considered for the study included:

2.6.1 Fish-rice-poultry integrated farming system: This is an agricultural innovation from the Department of Fisheries and Aquaculture Management of the Institution which involves the production of fishes and poultry as well as rice cultivation on the same piece of land. This method of agricultural production known as 'Integrated Farming' (IF) is a whole farm management system which aims to deliver more sustainable farming. It is a dynamic approach which can be applied to any farming system around the world. Integrated Farming combines the best of modern tools and technologies with traditional practices according to a given site and situation. Integrated Farming is a whole farm

management approach that combines the ecological care of a diverse and healthy environment with the economic demands of agriculture to ensure a continuing supply of wholesome, affordable food. Integrated Farming is a practical way forward for agriculture that will benefit all society, and not just the farmer. Integrated Farming makes a vital contribution to sustainable development by adding consideration of economic, ecological and social objectives to the essential business of agricultural food production (DRUSSA, 2013). The University of Ibadan Integrated fish farming workshop was organized in 2013 where about 300 farmers benefitted from Oyo and Osun States environ. It had also helped to generate income for the Institution through the sale of fish and local rice produced. However, 120 fish farmers were trained in Ibadan North Local Government Area of Oyo State and considered for the study.

2.6.2 **Production of neem extract for pest control:** Neems' unique feature in terms of its insecticidal features has over 100 compounds with pesticidal properties which are used for managing over 500 types of insects such as ticks, whiteflies, thrips, leaf miners, caterpillars, aphids, scale insects, beetles, true bugs, mealy bugs and nematodes (Aderolu, Omoloye and Ojo, 2012). Neem acts as a broad spectrum repellent and insect regulator which causes deformities in the insect offspring which prevents insects from molting by inhibiting production of ecdysone an insect hormone (Olopade, 2015). Akinyele beneficiaries had been trained on the production and application of neem pesticide to prevent pest infestation on their vegetable crops. This has greatly improved their agricultural productivity and income since they do not have to spend their hard earned money on chemical pesticides which has adverse effects on the plant, consumers and the environment at large. Neem leaf extract had been reported to be very effective in the control of insects of leafy vegetables in Nigeria (Okunlola and Akinrinola, 2013). Olopade, (2015) also confirmed that the use of neem on the farm for the control of insect pests has obvious advantages; it is relatively cheap and easily available, its complex mixture of active ingredients which function differently on various parts of the insects life cycle and physiology makes it difficult for pests to develop resistance to it. A total of 130 beneficiaries were trained on this innovation from Akinyele Local Government Area of Oyo State on the use of neem extract for pest control.

2.6.3 Ruminant block meal: Ruminant lock meal is a solidified blend of ingredients based on the use of a high level of agro-industrial by-products. A series of feed block formulas have been developed, evaluated on-station and on-farm many of which had been adopted by small ruminant farmers (Bamigboye, 2013). The wide use of feed blocks throughout the world indicates their importance in the development of the livestock sector and improvement in farmer revenues. Its use allows a continuous and balance supply of nutrient to the animal. Moreover, its greatest value lies in its role as a cost-effective supplement and as a means for utilising several high-moisture content agro-industrial by-products thereby extending its shelf life and usefulness (Bamigboye and Babayemi, 2013). Forty five ruminant farmers were trained about innovation from Iwo Local Government Area of Osun State which increased to 67 ruminant farmers through diffusion of information by the beneficiaries as at the time of the data collection.

2.6.4 Domestication of grasscutter: Grasscutter commonly referred to as "Oya" among Yorubas is another animal becoming scarce by the day due to increasing human activities and environmental changes. Grasscutters are mainly herbivorous; require neither imported component of food nor expensive medical expenses if strict hygiene is maintained. They are easy and very cheap to raise. Gestation period of the grasscutter is about 154 days or five months (Ismail, 2014).

Domestication of grasscutter can earn the farmer a good source of income with relatively cheap capital and does not require a large expanse of land to practice. Another advantage of domesticating grass cutter is that Grasscutters are prolific reproducers and does not produce offensive smell, they can also be fed on forage and other agricultural produce. Twenty five beneficiaries were trained in Ile-Ogbo from the Faculty of Agriculture, University of Ibadan and were presented with cages in groups to start production. The major constraint facing the beneficiaries was pneumonia which led to the death of some animals (Olawoye, 2014). Forty-five beneficiaries benefitted from this innovation in Egbeda L.G.A of Oyo State from the Department of Ecotourism and Wildlife Management of the Faculty.

2.6.5 Processing and packaging of moringa powder: This is one of the activities under the faculty capacity-building project aimed at training rural women about the production, processing, marketing and even utilisation of *moringa oleifera*. Moringa oleifera is

marketed globally as a "superfood" with numerous benefits including contributing to muscle growth, skin health, improved immune system functioning, weight loss and as a natural source of nutrients. The Faculty trained 25 women and an agriculturalist residing in the community to assist the beneficiaries, male and female, with their production problems. He has been able to advise the women on the production, processing and marketing of the moringa that is now being sold in powder form. One of the identified problems was the difficulty in drying the moringa leaves during the rainy season. The project was able to give the women a locally fabricated dryer to overcome this constraint. With enlightenment about the nutritional and medicinal benefits of the product, moringa powder is now being sold and used not only locally, but also outside the community. Several people in the community have stated that their health has improved with the regular intake of *Moringa oleifera* as tea or mixed with their meal. The moringa plantation has now grown to about five thousand stands and the women reported that they are making a significant additional income which had increased the number of beneficiaries to 43 through information diffusion by the direct beneficiaries. With further capacity building, their group has become more effective in assigning work and obtaining profits equitably. Initially a quantity of a thousand packaging and labelling materials was supplied after which the women started to purchase their own. The project staff linked the women with the suppliers and, from their profit, the women were able to replace their materials and continue to sell their produce. From all indications, this has been a sustainable intervention (DRUSSA, 2013).

2.6.6 Processing and packaging of sweet potato flour: Adding value to sweet potato offers good potential for income generation and employment as well as for enhanced utilisation of the crops. This provides a means to reduce poverty, improve food security and nutrition by developing small and micro-enterprises commercializing sweet potato foods and feeds. Sweet potato has been diversified in various ways by researchers through processing into different forms for consumption. It was reported by Olapade and Ogunade, (2014) to be rich in carbohydrates, vitamin A and C as well as contain a significant amount of calcium and iron. Although, sweet potato has not gained as much popularity as other staple crops, it is reported to be the world's seventh most important food crop after wheat, rice, maize, irish potato, barley and cassava (Ray and Tomlins,

2010). Beneficiaries producing sweet potato and cassava flour processors were trained on how to add value to the crop by processing into flour to increase its shelf life and ensure all round consumption of the product. They were also taught how to package the products for improved productivity and increased income. Sweet potato flour can be produced locally without the use expensive drier and sealing machine for packaging. Sweet potato flour processing involves peeling the tuber and neatly wash in clean water. The use of knife or slicer can be used to slice the tuber into thin slices for quick sun/air drying. The dried slices will then be milled into flour and thereafter, packaged into airtight nylon to prevent contamination of product (Ladele, *et al.*, 2014). The flowchart on the process of producing sweet potato flour is shown on figure 2.1. Forty five women beneficiaries (mostly cassava flour processors) were trained on sweet potato flour production in Afijio Local Government Area of Oyo State.

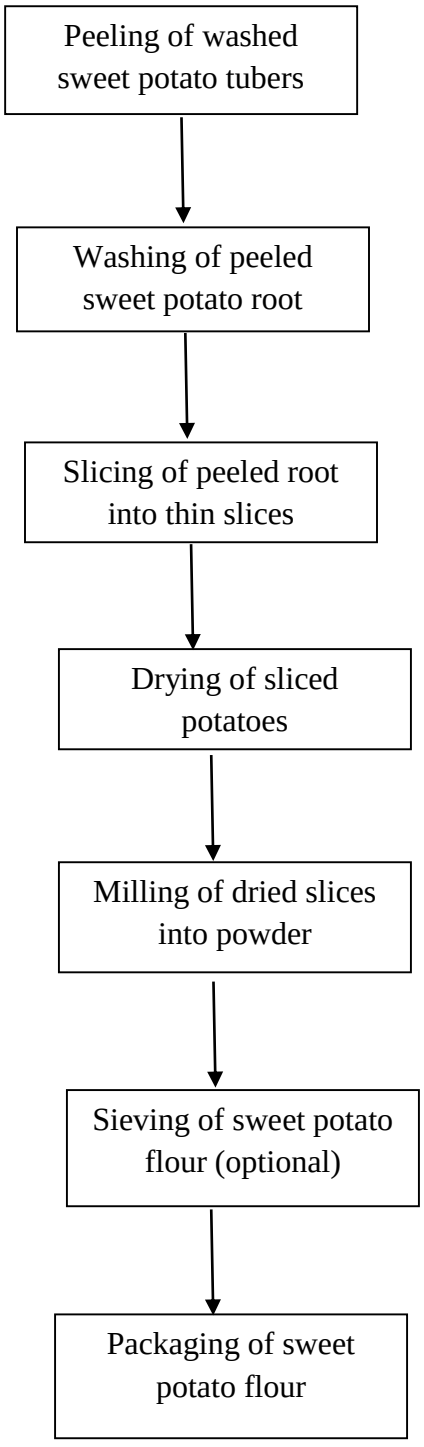

Figure 2.1: Flow chart showing the processing of sweet potato flour
Source: Ladele *et al*, (2014).

2.6.7 Processing and packaging of sweet potato toasted granule: Forty-eight garri women processors in Afijio local government area of Oyo state were trained on the processing of sweet potato toasted granules (also known as "spari") in order to further add value to the crop and also add to their source(s) of income, while increasing their skills on their agricultural production. Processing of sweet potato granule involves peeling, washing and grating of sweet potato roots before fermentation for 1-2 days. The fermented milled sweet potato roots will thereafter be sieved and toasted the same way as garri is produced from cassava (sweet potato garri "spari"). It is thereafter, sieved again (though optional) and packaged as desired but preferably in sealed nylons to avoid penetration of air which can make the product loose its taste and value if allowed. Fig. 2.2 illustrates the steps involved in the production of sweet potato granules. The product is as tasty as cassava garri and keeps well. The respondents were also taught how to package the products for all year round production and increase their income. Sweet potato toasted granules can be produced locally without the use of expensive facilities like electric sweet potato slicer and gas drier (Obayemi, 2014).

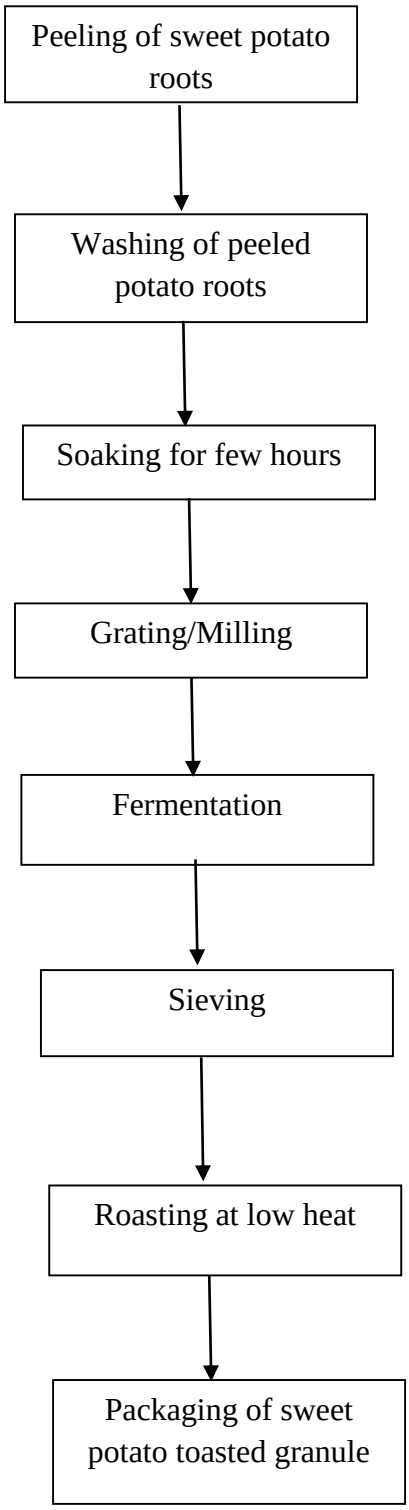

Fig 2.2: Processing stages of sweet potato toasted granules

Source: Obayemi, (2014)

CHAPTER THREE

3.0 THEORETICAL AND CONCEPTUAL FRAMEWORK

3.1 Theoretical framework

The following theories were considered relevant to this study focusing on the knowledge and utilisation of agricultural research outputs from the Institution. The theories are:

1. Diffusion of innovation theory
2. Utilisation theory

3.1.1 Diffusion of innovation theory

Diffusion of Innovation (DOI) theory developed by E. M. Rogers in 1962, is one of the oldest social science theories. It originated in communication to explain how, over time, an idea or product gains momentum and diffuses (spreads) through a specific population or social system. The end result of this diffusion is that people, as part of a social system, adopt a new idea, behavior, or product. Utilisation of a new idea, behavior, or product (i.e., "innovation") does not happen simultaneously in a social system; rather it is a process whereby some people are more apt to adopt the innovation than others. It is through this that diffusion is possible. The key to utilisation is that, the person must perceive the idea, behavior, or product as new or innovative. Researchers have found that people who adopt an innovation early have different characteristics than people who adopt an innovation later. When promoting an innovation to a target population, it is important to understand the characteristics of the target population that will help or hinder utilisation of the innovation. There are five established adopter categories, and while the majority of the general population tends to fall in the middle categories, it is still necessary to understand the characteristics of the target population.

When promoting an innovation, there are different strategies used to appeal to the different adopter categories (Fig. 3.1) (Adesiyan, 2014).

1. Innovators:- These are people who want to be the first to try the innovation. They are venturesome and interested in new ideas. These people are very willing to take risks, and are often the first to develop new ideas. Very little, if anything, needs to be done to appeal to this population. The category of people that falls into this category are just 2.5%.
2. Early Adopters:- These are people who represent opinion leaders. They enjoy leadership roles, and embrace change opportunities. They are already aware of the need to change and so are very comfortable adopting new ideas. They do not need information to convince them to change and their population constitutes 13.5% of adopters' category.
3. Early Majority:- These people are rarely leaders, but they do adopt new ideas before the average person. They typically need to see evidence that the innovation works before they are willing to adopt it. Strategies to appeal to this population include success stories and evidence of the innovation's effectiveness. They constitute 34% of the adopters' category
4. Late Majority:- These people are skeptical of change, and will only adopt an innovation after it has been tried by the majority. Strategies to appeal to this population include information on how many other people have tried the innovation and have adopted it successfully. They also constitute 34% of the adopters' category.
5. Laggards:- These people are bound by tradition and very conservative. They are very skeptical of change and are the hardest group to bring on board. Strategies to appeal to this population include statistics, fear appeals, and pressure from people in the other adopter groups. They constitute 16% of adopters' category.

This theory as illustrated on figure 3.1 explains the stages at which beneficiaries in the study area adopts and utilises the disseminated agricultural innovations in their respective adopted communities. This knowledge will therefore assist researchers to study them and

to better relate with the beneficiaries to ensure effective dissemination and proper utilisation of agricultural research innovations generated from research institutions.

3.1.2 Utilisation theory

Progressive utilisation theory is a socio-economic alternative model that promotes the welfare and development of every person, physically, mentally, and spiritually. It guarantees minimum necessities to the right to food sovereignty, sustainable agriculture, proper utilisation of natural and human resources, and economic democracy. The theory promotes an ecological and spiritual perspective that is universal and non-dogmatic. It ensures every individual has the right to the use of natural resources for their sustainability. The theory holistic model provides an overarching framework to effectively measure and compare policies for the greater good of all people, as well as the planet (Dada and Mariah, 2010). This theory as illustrated on figure 3.2 emphasizes that no individual or farmer should be denied the right of utilising available resources discovered from agricultural research innovations for better productivity.

This theory further expatiates the stages beneficiaries will undergo before the utilisation and adoption of disseminated agricultural research output(s) can effectively take place. This process will ensure efficient communication channel between the sender and receiver of such research output or innovation.

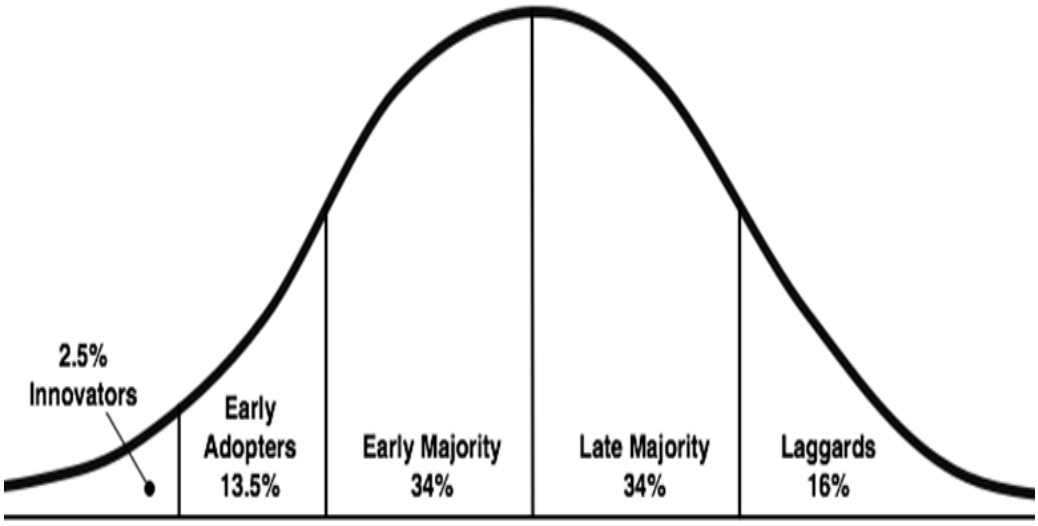

Fig. 3.1: Diffusion of Innovation Model

Source: Adesiyan, 2014

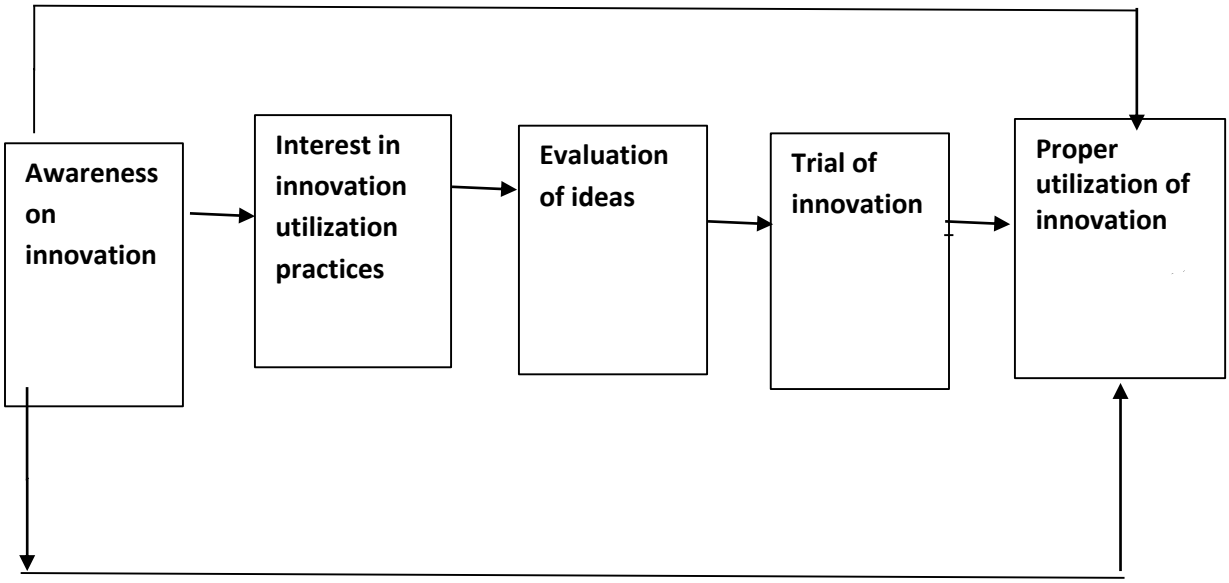

Fig 3.2: Innovation Utilisation Process

Source: Akinnagbe, Ikaegbu and Saddiq (2013)

3.2 Conceptual Framework

The conceptual framework (Fig. 3.3) is the schematic representation of the inter-relationships that exist between the independent, intervening and the dependent variables identified as important for this study. It indicated the sequence of inter-relationships among variables from the Utilisation of University of Ibadan agricultural research outputs by beneficiaries which is the dependent variable. The independent variables which included the personal and enterprise characteristics of the respondents, type of agricultural research outputs disseminated to respondents, their knowledge, attitude, benefits and constraints influencing beneficiaries' utilisation of University of Ibadan Agricultural research outputs. The framework is based on the premise that, the utilisation of University of Ibadan agricultural research outputs could be influenced by personal and enterprise characteristics of the respondents like the beneficiaries age, level of education, farm size and years of farming experience. Respondents' knowledge, attitude as well as the constraints influencing beneficiaries' utilisation also likely influenced their utilisation of such innovation. The indirect link of the intervening variables (University of Ibadan policies and relocation of beneficiaries) with the independent and the dependent variables shows that it might likely or not have an effect on the variables though their effect was not considered for this study.

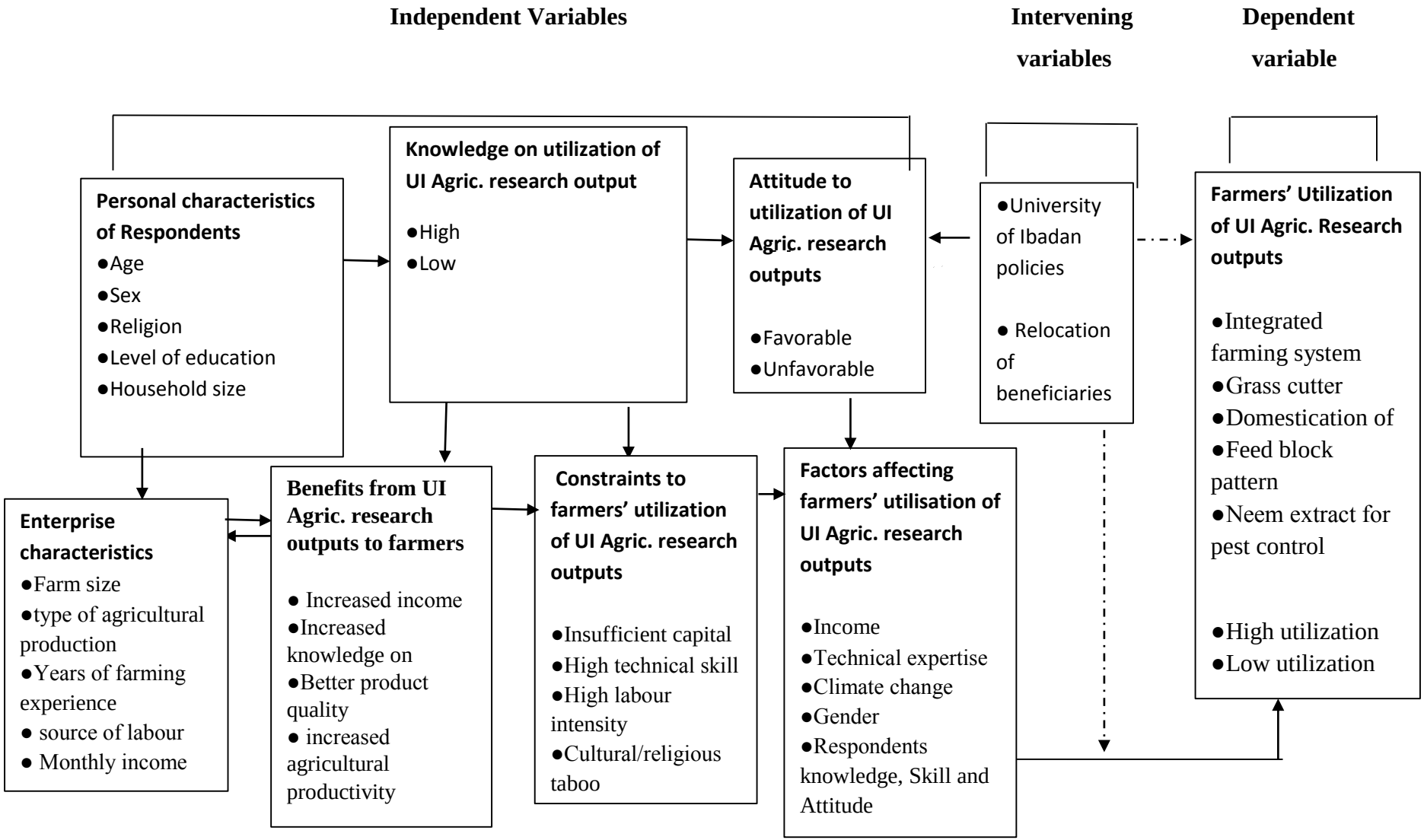

Fig 3.3: Conceptual Framework on Determinants of Utilisation of University of Ibadan Agricultural Research Outputs among Beneficiaries in Southwestern, Nigeria

CHAPTER FOUR

4.0 METHODOLOGY

4.1 Study Area

The study was conducted in South West, Nigeria. The zone lies between latitude $5^{0}8^{1}$ and $9^{0}10^{1}$ and has an area of 77,818 square kilometres (Faleyimu, Akinyemi and Agbeja, 2010). It is one of the six major geopolitical zones of Nigeria. The population of the zone is 27,581,982 (National Population Commission, 2006). The states in the southwest zone include: Ogun, Osun, Lagos, Oyo, Ondo and Ekiti states. From the south of the zone to the North, the ecology is characterized by fresh water swamp, tropical rainforest and derived savannah.

It is bothered by the Republic of Benin in the West, the Atlantic Ocean to the South, Edo and Delta State in the East and Kwara and Kogi States in the North. The climate in Southwest, Nigeria is tropical in nature and is characterised by wet and dry seasons. The mean annual rainfall ranges from 1,500mm to 3,000mm per annum while the mean monthly temperature ranges from $18 – 24^{0}$C during the rainy season and 30^{0}C - 35^{0}C during the dry season.

Agriculture is the main source of livelihood of the inhabitants of the zone therefore farmers predominate in this area with diverse farming systems dictated by ecology and culture of the people. They are also involved in different livelihood activities such as carpentry, blacksmitting, fishing, palm processing, transportation business, teaching among others Crops cultivated in the southern part of zone includes both arable and cash crops like maize, cassava, yam, vegetables, pepper, cocoa, kolanut, oil palm, plantain, and banana. The northern part, which is drier with lesser rainfall, contains shea butter, locust bean, cashew and mango plants.

The zone is also suitable for maize, cassava, millet and cowpea. Oyo and Osun States purposively selected for the study are predominantly Yoruba speaking area, although there are different dialects within the same state. The weather conditions vary between the two distinct seasons in Nigeria; the rainy season (April - October) and the dry season (November - March).

Oyo State was among the three states carved out of the former Western State of Nigeria in 1976. The state has 33 local government areas and it is known as the 'pace setter state'. Oyo State covers a total of 28, 249 square kilometres of land mass and it consists of old hard rocks and dome shaped hills. Oyo enjoys a similar dual climate condition to the rest of the South-Western states, with a rainy season and a dry season. The capital city is Ibadan and there are five major sub-divisions of Yoruba people in the State namely: Ibarapas, Ibadans, Ogbomoshos, Oke-Oguns, and Oyos. The climate is ideal for the cultivation of crops like maize, yam, cassava, millet, rice, plantain and cashew.

Osun is an inland state with Osogbo as its capital city. Osun State is known as the state of the Living Spring. It was created from the old Oyo State in August 1991. The state was named after the popular River Osun. The River Osun is a natural spring. Legend has that the goddess Osun transformed and became the River Osun. There are thirty Local Government Areas in Osun State. It is bounded in the north by Kwara State, in the east partly by Ekiti State and partly by Ondo State, in the south by Ogun State, and in the west by Oyo State. The people of this state are majorly farmers, traders, artisans. The artisans are popular for their works such as woven textiles, woven mats, and leather work. Some of the historical facts about the beginning and spread of the Yoruba race are traced to towns in Osun such as Ile-Ife, Osogbo, Ede, Ilesa, etc. One of the popular thing about Osun is the Osun Osogbo festival. This festival is one of the biggest and most popular festivals in Africa. It attracts people from all over the world every year.

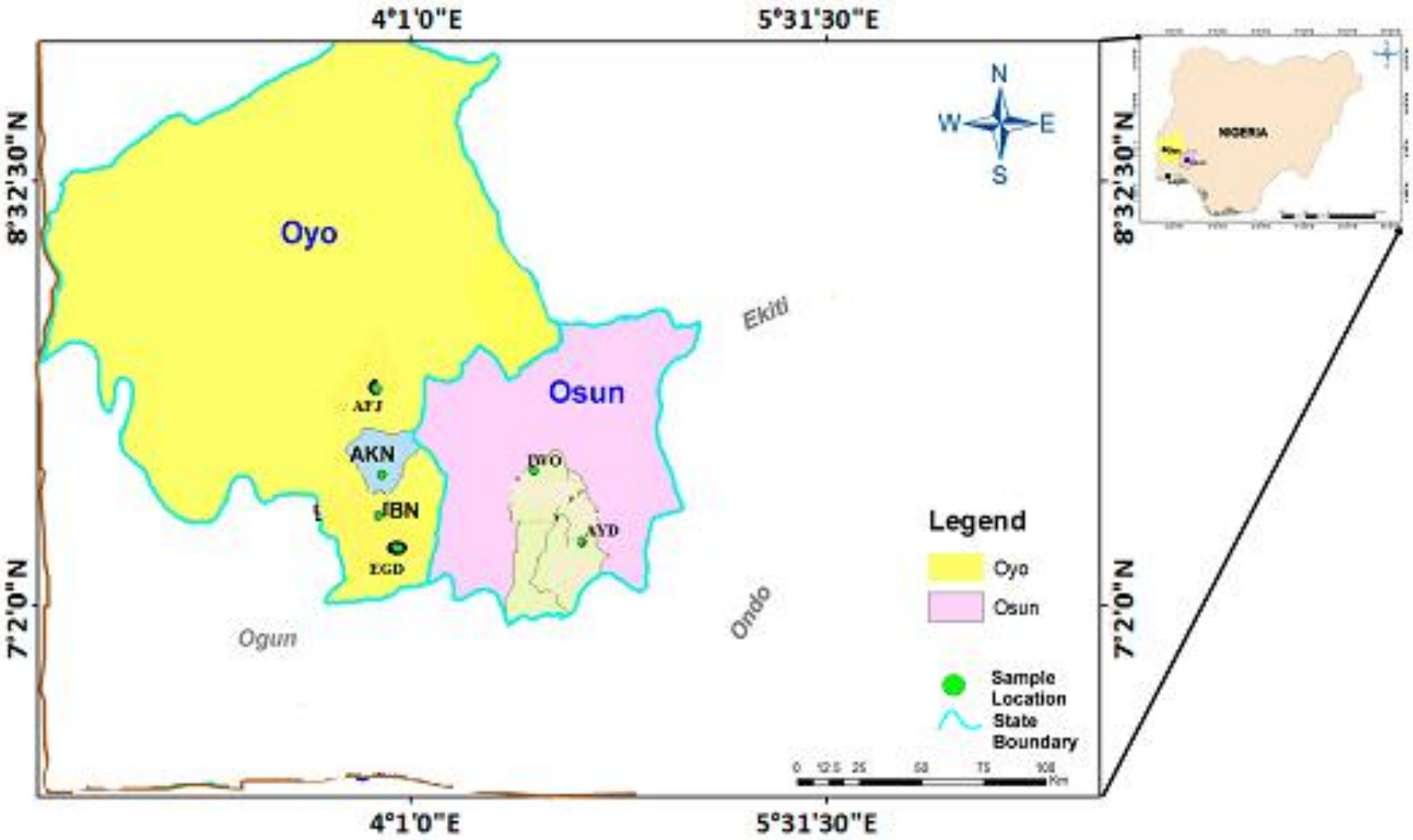

Figure 4.1: Map of South West, Nigeria showing selected states and LGAs

Source: Oyebade, 2014

4.2 Population of the study

The population of the study included beneficiaries of University of Ibadan agricultural research outputs in Southwestern, Nigeria.

4.3 Sampling procedure and sample size

Multistage sampling procedure was used to select the respondents for the study.

- The first stage involved purposive selection of the adopted communities and local government areas where University of Ibadan agricultural research outputs had been disseminated which were Ile Ogbo (Aiyedire L.G.A) and Iwo (Iwo L.G.A) from Osun State and Ajibode and Elekuru (Akinyele L.G.A), Mokola (Ibadan North L.G.A), Iyana Agbala (Egbeda L.G.A) and Ilora (Afijio L.G.A) from Oyo State.
- The second stage involved stratification of respondents from each of the selected communities into crop and livestock beneficiaries based on their agricultural enterprise to generate a concise list of crop and livestock beneficiaries of the disseminated innovation in their communities.
- The third stage involved the use of proportionate sampling technique which involved the selection of 40% of each agricultural enterprise beneficiaries belonged to give a total of 199 respondents out of which 194 were retrieved which formed the sample size for the study.

Total response rate = $\frac{194}{199} \times 100\% = 97.49\%$.

Table 4.1: Sampling procedure and sample size of respondents

States	Purposively selected L.G.As	Purposively selected communities	Agricultural enterprise	Total number of beneficiaries	40% of beneficiaries
Oyo	Akinyele	Ajibode Elekuru	Use of neem extract for pest control	130	52
	Ibadan North	Mokola	Fish-rice-poultry integrated farming system	120	48
	Egbeda	Iyana Agbala	Grasscutter domestication	45	18
	Afijio	Ilora	Sweet potato flour Sweet potato toasted granule	45 48	18 19
Osun	Iwo	Iwo	Ruminant feed block meal	67	27
	Aiyedire	Ile-Ogbo	Moringa powder	43	17
Total	6	7	7	498	199

4.4. Instrument for data collection

Both quantitative and qualitative methods were used to obtain data from respondents. Well-structured questionnaire and interview schedule were used to determine beneficiaries' personal and enterprise characteristics, knowledge, attitude, benefits and constraints influencing their utilisation of University of Ibadan agricultural research outputs in the study area. Seven Focus Group Discussions (FGD) were also conducted for the study, one for each agricultural enterprise to further support data obtained from the quantitative methods.

4.5 Validity of Instrument

The instruments for data collection were subjected to face and content validation by experts in the Departments of Agricultural Extension and Rural Development, Agronomy, Animal Science, Ecotourism and Wildlife as well as Fisheries and aquaculture of the University of Ibadan, Ibadan. This formed a basis of the inclusion of relevant items needed for measuring all variables correctly to achieve the objectives of the study.

4.6 Reliability of Instrument

The reliability of the instrument was tested using split half method. A reliability coefficient of 0.75 obtained confirmed that the instruments used for the study were reliable and considered appropriate for the study.

4.7 Measurement of variables

The independent and dependent variables of the study were operationalized as follows:

4.7.1 Independent variables: The Independent variables for this study were the selected personal and enterprise characteristics of respondents such as age, marital status, religion, educational qualification, farm size, years of farming experience, source of labour and monthly income. Other variables considered for the study included respondents' knowledge of UI AROs, attitude towards UI AROs, benefits derived from UI AROs and constraints influencing their utilisation of UI AROs in the study area.

4.7.1.1 Personal Characteristics

a) Age: The actual age of the respondents was asked in years.

b) Sex: The respondents were asked to indicate their sex whether male assigned as (1) or female assigned as (2).

c) Marital status: Respondents were asked if they were single, married, divorced, separated or widowed designated with assigned scores of 1, 2, 3, 4 and 5 respectively.

d) Household size: Respondents were asked their exact number of household size in persons.

e) Educational qualification: This was measured at ordinal level of measurement as respondents were asked to indicate their highest level of educational qualification with options of no formal education, informal education, primary education, secondary education and tertiary education with assigned scores of 1, 2, 3, 4 and 5, respectively.

f) Other income generating activities: Respondents were asked whether they were involved in other income generating activities like tailoring, carpentry, hairdressing, goldsmith, shoe maker, and others to select from.

4.7.1.2 Enterprise characteristics

a) Agricultural Enterprise: Respondents were asked to indicate the type of agricultural enterprise they were involved in which determined the type of agricultural innovation that was disseminated to them.

b) Farm size: Respondents were asked their exact number of farm size in acres.

c) Years of farming experience: Respondents were asked their exact number of farming experience in years.

d) Source of labour: Respondents were asked to indicate their mostly used source of labour with options given as family, hired and communal labour assigned 1, 2 and 3, respectively.

e) Monthly Income: Respondents' were asked to indicate their monthly income from their agricultural enterprise.

f) Scale of Production: Respondents were asked to indicate their scale of agricultural production whether subsistence, commercial or both assigned with scores 1, 2 and 3, respectively.

4.7.1.3 Respondents' knowledge of UI agricultural research outputs

The respondents were asked to respond either Yes or No to twenty one knowledge questions on their various agricultural enterprise which informed the type of innovation disseminated to them. "Correct" responses were scored 1 and 'Incorrect' responses were scored 0. The highest score was 21 while lowest score was 0. The mean of the scores were

used as benchmark to determine if beneficiaries' had high or low knowledge of the disseminated innovations. Respondents with scores above the mean were categorized to have high knowledge of the agricultural research output while those that have scores below the mean were categorized to have low knowledge of the disseminated University of Ibadan agricultural research outputs.

4.7.1.4 Respondents' attitude to UI agricultural research outputs

Respondents' attitude towards utilisation of UI AROs was measured by providing respondents with a list of nineteen positively and negatively worded statements to indicate appropriately their disposition to towards the utilisation of the disseminated University of Ibadan agricultural research outputs using 5 point likert-type scale of SA=Strongly Agree, A=Agree, U=Undecided, D=Disagree and SD=Strongly Disagree with the score of 5,4,3,2 and 1 for positively worded statements and reverse order for negatively worded statements. The highest score was 95 while the lowest attitude score was 19. The mean of the statements were determined and used to categorize their attitude into favorable and unfavorable attitude. The scores below the mean were regarded as unfavorable attitude while score above the mean were regarded as favorable attitude towards utilisation of the disseminated agricultural research outputs.

4.7.1.5 Benefits derived by respondents from utilisation of UI agricultural research outputs

Respondents were asked to select from a list of nine perceived benefits derived from utilising the disseminated agricultural research outputs in their various adopted communities. The benefits derived were measured using the scale of "To a great extent", "To a lesser extent" and "Not at all" assigned 2,1 and 0, respectively. The highest score was 18 while the minimum score was 0. The responses were ranked using the mean score to determine the most benefits derived by the respondents in utilising the disseminated agricultural research outputs in the study area.

4.7.1.6 Constraints to utilisation of UI agricultural research outputs by respondents

A list of ten perceived constraints to utilisation of UI agricultural research outputs were provided for the beneficiaries to select from which was measured in order of severity using a 3-point scale of 'Severe constraints', 'Mild constraint' and 'Not a constraint' assigned scores of 2,1 and 0, respectively. The constraints were thereafter, ranked in order of severity

using their mean which eventually determined the factors affecting the utilisation of the disseminated research outputs in the study area.

4.7.2 Dependent variable: The dependent variable of this study is the level of utilisation of University of Ibadan agricultural research outputs among beneficiaries in Southwestern, Nigeria. A list of twenty one agricultural practices from the disseminated agricultural research outputs in each community were asked from the beneficiaries and their frequency of utilisation was measured using "Always", "Occasionally" and "Never" assigned 2,1 and 0, respectively. The mean scores were used as benchmark to determine the respondents' level of utilisation as high or low. The highest score was 42, while the minimum score was 0. Scores above the mean were considered as having high utilisation, while the scores below the mean were regarded as having low utilisation of the disseminated UI agricultural research outputs.

4.8 Data Analysis

The data collected for the study were analysed using descriptive and inferential statistics. Descriptive statistical tools utilised included frequencies, percentage distribution, mean and standard deviation, while inferential statistical tools used included Chi square, Pearson Product Moment Correlation (PPMC), T-test, ANOVA and Multiple regression analysis to test the hypotheses as stated:

Hypothesis 1 – Chi-square and PPMC

Hypothesis 2 to 4- PPMC

Hypothesis 5 was tested using ANOVA and multiple regression analysis.

Multiple linear regression method was used to determine the dependent variable (level of utilisation of University of Ibadan research outputs). The determinants of utilisation of UI agricultural research outputs were modeled as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 \ldots\ldots\ldots\ldots\ldots$$

Where Y = Utilisation of U.I agricultural research output, β_0= constant term

$X_{1=}$ age (in years)

$X_{2=}$ sex (female = 1, male = 0),

$X_{3=}$ marital status (married = 1, otherwise = 0)

$X_{4=}$ Educational qualification (formal = 1, otherwise = 0)

$X_{5=}$ Household size (number of persons)

X_{6} = Years of experience (years)

X_{7} = Scale of production (commercial = 1, otherwise = 0)

X_{8} = knowledge (knowledge scores)

X_{9} = Attitude (attitude scores)

X_{10} = Constraints (constraints scores)

CHAPTER FIVE

5.0 RESULTS AND DISCUSSION

This chapter presents the research findings, interpretation and discussion as obtained from the collected data. The chapter has eight sections and the variables discussed were respondents' personal and enterprise characteristics, knowledge of utilisation of UI AROs, attitude to utilisation of UI AROs, benefits derived from utilisation of UI AROs, constraints to utilisation of UI AROs, level of utilisation of UI AROs and factors determining the utilisation of UI agricultural research outputs. Findings on the test of hypotheses were also elucidated.

5.1. Personal characteristics of respondents

The personal characteristics considered for this study included respondents' age, sex, marital status, religion, household size and educational qualification. These variables might influence beneficiaries' utilisation of disseminated agricultural research outputs in one way or the other which may eventually constitute the factors affecting the level of utilisation of such agricultural research outputs in the study area.

5.1.1 Sex of Respondents

Data on Table 5.1 reveals that many (62.0%) of the respondents were female. The major reason for this was that three agricultural enterprises (moringa, sweet potato flour and toasted granule) out of the seven agricultural enterprises considered for the study were women groups, while one of the livestock enterprise considered was also dominated by women (ruminant feed block meal). This suggests that women in the study area utilized more of the disseminated agricultural research outputs of University of Ibadan. This implies that some of the disseminated agricultural research outputs were gender specific and the processing of agricultural produce do not probably require much manpower.

This finding is in line with that of Mbanaso, Agwu, Anyawu and Onwubuya (2011) who found out that women were usually more involved in agro-processing related research outputs in South-West, Nigeria than their male counterparts.

5.1.2 Marital status of respondents

The distribution of respondents' marital status as indicated on Table 5.1 shows that most (89.0%) of the respondents were married. This was probably because of the age distribution of respondents and the female(s) likely got married earlier than their male counterparts. This result shows high level of marital stability among respondents in the study area and a reflection of high value placed on marriage in Africa, especially in the rural setting. This finding is in consonance with Ayelaagbe (2013) who also found out that majority (92.0%) of small scale farmers in Southwest, Nigeria were married and that marriage creates access to unpaid labour for farmers as it reduces their cost of production.

5.1.3 Age of respondents

The age distribution of respondents as presented in Table 5.1 revealed that the mean age of respondents was 40.05±5.48 years indicating that the respondents were still in their active and productive age as they still have strength to carry out farming activities. A higher percentage of the beneficiaries (69.0%) were within the age range of 30 and 49 years, 16.0% were within the age bracket of 50-59 years, while 12.0% and 3.0% were below thirty years and above sixty years, respectively. This result implies that most of the beneficiaries in the study area were within their productive age and have competences to utilise new technologies that will help improve their agricultural enterprise and also ensure food security. This finding is in line with that of Saka and Lawal (2009) who found out in a similar study that young beneficiaries adopt new technology faster than older ones because of their level of exposure and education which usually eventually results into improved agricultural production.

5.1.4 Religion

Majority (80.4%) of the respondents in the study area were Christians, 19.0% of them were Muslims, while very few (0.5%) were traditional worshippers. This implies that Christianity was the dominant religion of beneficiaries in the study area and that the respondents' religious practices was probably an avenue for dissemination of some of the

agricultural outputs as stated by sweet potato granule beneficiaries' group leader during an in-depth interview session that:

"……even our pastor's wife was involved in the production of sweet potato toasted granule and ensured we all practiced the innovation after it was disseminated by connecting us with some people that will help market our products". (Sweet potato toasted granule beneficiary from Ilora, Afijio LGA of Oyo State)

This result therefore agrees with Ogbonna and Umar-Shaaba (2011) in a similar study that religion is a major determinant of technology adoption and utilisation by beneficiaries in Nigeria.

5.1.5 Household size

Household size is associated with the number of people residing in a respondents' house comprising of immediate members of the family as well as other dependents living together. Data on Table 5.1 indicates that majority (71.1%) of the respondents had between 4 – 6 persons living in their household, few (25.8%) had more than six people, while a few (3.0%) had between 1-3 people. The mean household size of the beneficiaries was 4.04±1.25 which implies that beneficiaries will not have much mouth to feed and should be able to have access to more income from their agricultural enterprise. Another significance of household size in agriculture hinges on the fact that, there is availability of family labour for agricultural production and a higher possibility for domestic help (Amaza, Joseph and Yakubu, 2009).

This was also confirmed by one of the sweet potato flour beneficiaries during the FGD conducted that

"some *of us use our children, family members and neighbors for labor as we cannot afford hired laborers".* (Ilora, Afijio, LGA of Oyo State).

5.1.6 Educational qualification

Education plays a very important role in the development of any country and is also crucial for improved productivity in all sectors including agriculture. Both formal and informal education is important for increased agricultural production. It was further shown on Table 5.1 that 35.0% of the respondents had primary education, 23.0% had adult education, 29.0% had secondary education, while few, (13.9%) had tertiary education. This implies

that majority of the respondents were literate or could at least read and write which was a major factor for their understanding of the disseminated research outputs in their respective agricultural enterprise(s). This corroborated Ofuoku's (2011) claim that beneficiaries usually have one form of education or the other relative to their agricultural production, whether formal or informal.

Table 5.1: Distribution of respondents' personal characteristics (N=194)

Variables	F	%	Mean±SD
Sex			
Male	74	38.0	
Female	120	62.0	
Marital Status			
Single	21	10.8	
Married	173	89.2	
Age (in years)			40.05±5.48
< 30 years	24	12.4	
30-39	58	29.9	
40-49	76	39.2	
50-59	31	15.9	
60 and above	5	2.6	
Religion			
Christianity	156	80.4	
Islam	37	19.1	
Traditional	1	0.5	
Household size			4.04±1.25
1-3 persons	6	3.1	
4-6 persons	138	71.1	
above 6 persons	50	25.8	
Educational level			
No formal education	0.0	0.0	
Adult Education	44	22.7	
Primary Education	67	34.5	
Secondary Education	56	28.9	
Tertiary Education	27	13.9	

Source: Field Survey 2016

5.2: Enterprise Characteristics of respondents

The enterprise characteristics considered for this study included respondents' farm size, scale of agricultural production, farming or processing experience, monthly income from agricultural enterprise, source of labour, access to extension services, participation in farmer groups, number of animals reared (for livestock farmers) and other income generating activities.

5.2.1 Farm size

The mean farm size of the respondents in the study area as revealed in Table 5.2 was 1.6±0.9 acres which also confirmed that most of the respondents operated on a small scale as more than half of the respondents (58.0%) had farm size of between 1-2 acres, 20.0% had farm size of between 3-4 acres, 12.0% had above 4 acres, while minority (10.0%) had farm size below 1 acre. This result implies that most of the beneficiaries do not have access to required farmland due probably to the fact that majority of them were female and much more were into agro-processing more than those into crop production. This finding is in line with Oyebade, (2014)'s claim that most rural farmers in Nigeria usually cultivate about an hectare of farmland.

5.2.2 Scale of production

Respondents' scale of production refers to the quantity of agricultural produce/products been produced on a regular basis. Result as shown on Table 5.2 indicated that more than half of the respondents (56.0%) practiced their agricultural enterprise on commercial basis, while a few (7.2%) practiced subsistence agriculture. It was however noted that 37.0% of the respondents practiced both commercial and subsistence agriculture. This was supported by response of one of the neem extract beneficiaries during the focus group discussion that; "*We produce basically for income generation but also consume part of what we produce to feed our household."* (Male vegetable farmer at Akinyele LGA of Oyo State).
Garner and Ana (2014) also confirmed that agricultural production is a livelihood strategy for most rural farmers which ensure food security directly for the family and household.

5.2.3 Farming experience

Results from Table 5.2 indicated that respondents' mean years of farming/processing experience was 7.9±5.3, with most of the respondents (46.0%) having 1-5 years of farming or processing experience, 24.0% having between 6-10 years of experience and about 17.0% having farming or processing experience of between 11-15 years, while a few (13.0%) of them had above 15 years farming/ processing experience in their various agricultural activities in the study area. This result indicates that some of the beneficiaries started their agricultural enterprise after the innovation was disseminated, though some had been involved in similar agricultural enterprises (like sweet potato flour and granule processors, grasscutter and ruminant farmers) before the innovation was disseminated to them. Corroborating this finding, one of the Ruminant Block Meal beneficiaries during the focus group discussion said:

"*We got to know about the advantages of this new kind of farming by the researchers that came to train us and we decided to try it out''* (A female ruminant farmer from Iwo, Osun State).

5.2.4 Monthly income

Data obtained from the respondents (Table 5.2) revealed that the average monthly income of the respondents from their various agricultural production in the study area was ₦32,299.5 ±26241.6 as 41.0% of the respondents earned between ₦10,000 and ₦30,000 profit from their agricultural enterprise on monthly basis, 37.0% of them received between ₦30,000 and ₦50,000 profit. Few, (11.0%) of the respondents received above ₦50,000 gain, while a minority of the respondents (10.0%) received less than ₦10,000 gain from their agricultural enterprise. It is evident that most of the beneficiaries operated on small scale production due to insufficient resources that will be required for large scale production. Oyebade (2014) corroborated this in his study that, the majority of small scale farmers lack the capacity to meet standards required within the niche markets due to low income.

5.2.5 Source of labour

It was further revealed from Table 5.2 that the most utilized source of labor for agricultural production by respondents in the study area was family (63.0%) followed by hired labour

(30.4%) while few of the respondents made use of communal labor (6.7%). This affirmed the use of family/household members as source of labour for most of their agricultural activities because of support gotten from family members to reduce labour cost. This assertion was further confirmed by one of the sweet potato granule beneficiaries who asserted during focus group discussion that:

'Only few of us who had income from other source could afford hired labour, majority of us make use of family members or dependants for our agricultural enterprise". (A female sweet potato beneficiary from Ilora, Oyo State).

Garner and Ana (2014) affirmed this in their study that family labour is a critical resource for family farms as it offers a "comparative advantage" by saving more resources.

5.2.6 Access to extension services

It was evident from the result shown on table 5.2 that majority (91.0%) of the respondents in the study area did not have access to extension services because all the research outputs were disseminated directly to the end users by the researchers themselves. This suggests that the beneficiaries might not have been aware of such research outputs if the researchers had not disseminated directly to the end users. Audrey (2014) in his study found out that among the number of factors that influence the utilisation or extent of utilisation of agricultural technology, the presence of a change agent to inform the end users properly about the agricultural research output is very important in addition to the characteristics or attributes of such technology disseminated. It also depicts non-collaboration or deficiency of collaboration between technology generators (researchers) and technology transfer agents (extension agents), a situation that further reveals cacophony of extension activities in Nigeria.

5.2.7 Participation in farmer groups

A larger proportion of the respondents (95.0%) belonged to one farmer group or the other relevant to their agricultural production, while a few (5.0%) of the respondents did not belong to any farmer group as shown on Table 5.2. This indicated that the respondents were aware of the importance of the social organizations that will be of help to them in their agricultural production as this was the medium through which most of the agricultural technology was disseminated to beneficiaries. This assertion was supported by Akinnagbe

and Ajayi (2010) that farmers' group approach are emerging methodologies for technology validation and dissemination in Nigeria. It also enables them to have access to credit and financial opportunities as a group.

5.2.8 Number of animals reared

The average number of animals reared by livestock beneficiaries in the study area was 27 (Table 5.2). Thirty-one percent of the respondents reared between 6-10 animals, 26.0% reared between 1-5 animals, 24.0% reared 11-15 animals, about 13.0% of the respondents reared between 16-20 animals while just few (7.0%) reared more than twenty animals. This is an indication that the respondents were small scale farmers due to the small number of livestock reared. This agrees with the findings of Okunlola and Akinrinola (2013) who reported that small ruminants are usually owned by rural families or individuals and the number owned per group is small. It also confirms the assertion of Garner, *et al* (2014) that small ruminants are sometimes kept in addition to the main business of crop production.

5.2.9 Other income generating activities

Participation in more than one livelihood activity is essential for generating more streams of income. Data on Table 5.2 indicated that many of the respondents (41.0%) were traders apart from being involved in agricultural production, about 21.0% were artisans, 20.0% were civil servants, while few (19.0%) of the respondents were agro-processors. Some of the respondents during FGD affirmed that they needed more than one source of income to support their agricultural enterprise as well as to ensure its sustenance. Oyebade, (2014) further buttressed that diversification of income is desirable by farmers because it enables individuals and households more capabilities to improve livelihood security and to raise their living standards. Adesiyan, (2015) also noted that Nigeria as a country with over 140 million people is afflicted with alarming and shocking mass poverty where people cannot afford to live a decent life leaving several millions of Nigerians not to have the required amount of money or material possessions essential for their wellbeing and therefore, need to engage themselves in different livelihood activities. Oyebade (2014), also noted that rural households earn income from diverse allocations of their natural, physical and human capital assets among various income generating activities.

Table 5.2: Distribution of respondents according to enterprise characteristics (N=194)

Variables	F	%	Mean±SD
Farm size (acres)			1.6±0.9
<1	20	10.3	
1-2	112	57.7	
3-4	39	20.1	
> 4	23	11.9	
Scale of production			
Commercial	108	55.7	
Subsistence	14	7.2	
Both	72	37.1	
Farming experience			7.9±5.3
1-5 years	90	46.4	
6-10 years	47	24.2	
11-15 years	32	16.5	
> 15 years	25	12.9	
Monthly income			32,299.5±26,241.60
<10,000	20	10.3	
10,001-30,000	80	41.2	
30,001-50,000	72	37.1	
>50,000	22	11.3	
Source of labour			
Family	122	62.9	
Hired	59	30.4	
Communal	13	6.7	
Access to extension services			
Yes	18	9.3	
No	176	90.7	
Farmer group participation			
Yes	185	95.4	
No	9	4.6	
Number of animals			27.3
1-5	23	26.1	
6-10	27	30.7	
11-15	21	23.9	
16-20	11	12.5	
above 20	6	6.8	
Other income generating activities			
Civil Service	38	19.6	
Trading	80	41.2	
Artisan	40	20.6	
Agro-processing	36	18.6	

Source: Field Survey, 2016.

5.3: Respondents' knowledge on utilisation of UI agricultural research outputs

Respondents' knowledge were assessed on use of neem extract for pest control, on moringa powder processing, ruminant feed block meal, grasscutter production, fish-rice-poultry integrated farming system, sweet potato powder and sweet potato toasted granule processing in the selected communities of the study area.

5.3.1 Respondents' knowledge on utilisation of neem extract for pest control

Result on Table 5.3 revealed that majority (92.0%) of the farmers knew that ten (10) litres of water should be added to 1kg of neem leaves for effective neem extract solution, 86.7% affirmed that the use of watering can could be used for the application of neem extract, while 85% also attested to the fact that knapsack sprayer could be effectively used for the same purpose. It was further noted that 83.0% of them also knew that neem seed could be added to improve the effectiveness of the neem extract solution for pest control. Furthermore, 89.0% of the respondents knew that an extra addition of hot or dry pepper will improve the efficiency of the neem extract solution. Addition of wood ash to the neem extract solution also makes it more effective in repelling insects. This was affirmed by 81.0% of the vegetable farmers assessed.

However, Table 5.4 further reveals respondents' categorisation of respondents' knowledge which indicated that 63.5% of the farmers had high knowledge on the use of neem extract for pest control in the study area. This is an indication that the training given to the farmers on the use of neem extract for insect pest control was well understood and utilized. Asenso-Okyere and Davis (2009) claimed that knowledge about a new technology causes a positive change. This implies that the respondents' knowledge about the disseminated innovation suggests an improvement in their level of agricultural production.

Shannag, Capinera, and Freihat (2013) in a similar study also attested to the fact that crop farmers in Africa make use of neem as an indigenous knowledge or method for pest control.

Table 5.3: Distribution of respondents according to knowledge on utilisation of neem extract for pest control (n=52)

Neem Extract knowledge statements	Correct	
	F	%
Neem extract solution contains neem leaf, seed and bark	16	30.8
Application of Neem extract on the farm also increases soil fertility	20	38.5
Milling or grinding of neem leaf before soaking is a more effective method of neem extract solution for repelling insect on the farm	40	76.9
Neem seed can also be soaked in water with the leaf for concentrated neem extract solution	43	82.7
For effective neem extract solution, 10 litres of water is required to be added to 1kg of neem leaves	48	92.3
Little chemical insecticides/pesticides can be mixed with neem extract for better efficiency	4	7.7
Neem extract solution can be applied on cultivated crop at any time of the day	38	73.1
Neem extract solution is best applied to crops with the use of knapsack sprayer	44	84.6
Neem extract solution also helps to control weed	17	32.7
Neem extract solution application does not require any specific measurement	22	42.3
Neem leaves soaked in water for more than 2 weeks can be toxic to plants	9	17.3
Neem extract solution can be applied to cultivated crops at any stage	42	80.8
Crops can be harvested and consumed the same day neem extract solution is applied	46	88.5
Neem leaves can be boiled on fire for few minutes if it must be applied the same day	25	48.1
Application of hot or dry pepper to neem extract makes it more effective for pest control	46	88.5
Addition of wood ash makes neem extract more effective in repelling insects	42	80.8
Neem extract solution is not effective for tree and tuber crops	24	46.2
Neem plant can be cultivated on farmland instead of regular application of neem extract	38	73.1
Marigold plant is an alternative for repelling insect through the use of neem extract	29	55.8
Neem extract application only repels insect and do not kill them	41	78.8
Neem extract solution can also be applied with the use of watering can	45	86.5

Table 5.4: Categorisation of respondents' knowledge on utilisation of neem extract for pest control (n=52)

Knowledge category	F	%	Min.	Max.	Mean	S. D
Low (9-13.04)	19	36.5	9.00	18.00	13.05	2.023
High (13.05-18)	33	63.5				

Source: Field survey, 2016

5.3.2 Respondents' knowledge on Moringa Powder (MP) processing

All the respondents (100.0%) consented that Moringa Powder (MP) processing involved picking, drying and packaging of moringa leaves into bottles or nylon for consumption (Table 5.5). Majority (94.1%) of the respondents knew that packaging of MP could be done manually with the use of funnel, the same percentage of respondents knew that regular turning of moringa leaves when drying is essential to ensure even drying and also that moringa leaves must be air dried before processing into powder. Majority (94.1%) also knew that MP could either be pounded or milled with milling machine and that **c**ooking stoves could be used to oven dry moringa leaves especially during raining seasons and that MP need to be sieved after grinding to ensure fine texture respectively. Many of the respondents, (88.2%) also affirmed that moringa leaves can be rinsed with water before drying to eliminate dirt and germs and the same percentage knew that a drop of water purifier can be added to water for washing moringa leaves. It was also deduced from the table that a higher percentage of the respondents (70.6%) knew that MP can be preserved for as long as a year without losing its potency. These results affirmed that respondents' knowledge on MP production was very high. Their level of education is likely to be an added advantage for the high knowledge on MP production.

However, Categorisation of respondents' knowledge (Table 5.6) showed that respondents' knowledge on MP processing was high (70.6%), while few (29.4%) had low knowledge on M.P processing. This indicates that the training given to the farmers on MP processing was well understood which led to proper utilisation of the research output in the study area. Kola-Oladiji Fatoki, Tewogbade, Ojo, and Ayomide (2014) in their study affirmed that *Moringa oleifera* as a popular tree is used for indigenous agro forestry which has multiple uses with diverse potential in Africa and that the use of the tree is due to high knowledge of farmers about its benefits which had made it gain wide acceptance, recognition and usefulness among the various ethnicities in Southwestern Nigeria.

Table 5.5: Distribution of respondents according to knowledge on MP processing (n=17)

MP knowledge statements	Correct	
	F	%
Moringa powder can be obtained from moringa leaves and stem	3	17.6
MP processing involves picking, drying and packaging of moringa leaves	17	100
Addition of dry pepper to milled MP help prevents weevil growth	5	29.4
Packaging of moringa powder can be done manually with the use of funnel	16	94.1
Moringa leaves must be air dried before processing into powder	16	94.1
MP can be preserved for as long as a year without losing its potency	12	70.6
MP can be milled even when the leaf is not properly dried	4	23.5
Moringa leaves can be stored after drying for more than 1 year before grinding into powder without absorbing moisture	2	11.8
MP left exposed over 2 weeks becomes stale or sour in taste	2	11.8
Moringa leaves can be left dried on the plant before picking	1	5.90
MP is better packaged in nylon and plastic containers to prevent leakage	16	94.1
Preservatives can be added to milled moringa powder for longer shelf life	3	17.6
Regular turning of moringa leaves when drying is essential to ensure even drying	16	94.1
Exposure of MP to open air for a long period after milling encourages weevil growth in it	3	17.6
Moringa leaves can be rinsed with water before drying to eliminate dirt and germs	15	88.2
Cooking stoves can be used to oven dry moringa leaves especially during raining seasons	16	94.1
MP need to be sifted after grinding to ensure fine texture	16	94.1
A drop of water purifier can be added to water to wash moringa leaves before drying	15	88.2

Source: Field survey, 2016

Table 5.6: Categorisation of respondents' knowledge on MP processing (n=17)

MP Knowledge category	F	%	Min.	Max.	Mean	S.D
Low (11.-13.17)	5	29.4	11.00	15.00	13.18	1.33
High (13.18-15)	12	70.6				

Source: Field survey, 2016

5.3.3 Respondents' knowledge on Ruminant Block Meal (RBM)

Results as obtained from the respondents on Table 5.7 shows that all respondents (100.0%) knew that ruminant block meals could be prepared using cassava and gliricidia leaves and starch as binding agent, majority (88.9%) knew that preparation of ruminant block meal involves cooking of ingredients while 82.0% of them knew that feed block meal solidifies at room temperature in less than an hour of preparation. Many (77.8%) of the respondents knew that block meal preparation also contain local feeds like dry hay and grasses while few, 29.6% also knew that block meal is a complete diet for ruminants as it contains required nutrients essential for growth and reproduction. Meanwhile, 59.3% knew that RBM is weather resistant. On the other hand, 81.5% attested that ruminant block meal requires certain molds to form desired shape after solidification. Also, 81.5% of them attested that ruminant block meals solidifies at room temperature in less than an hour of preparation while 63.0% confirmed that ruminants can be fed with block meal on daily basis. These statements confirmed high knowledge of respondents on the use of ruminant feed block pattern in the study area.

It was however further revealed on Table 5.8 that respondents' knowledge of ruminant block meal was moderately high (55.6%). This implies that the training on the disseminated innovation was well understood by the respondents. Bamigboye, Babayemi and Adekoya (2013) attested that ruminant farmers in Iwo L.G.A were well informed about feed resources availability in quality and quantity at varying seasons for small ruminant production in the study area which indicated that they were knowledgeable about the production of Ruminant Block Meal in the study area.

Focus group discussion (FGD) result also indicated high knowledge of the disseminated research output through one of the respondents' assertion that…

"*I was able to practice the method several times because I understood the process of preparation of the block meal coupled with the fact that the ingredients can be found within my locality"* (A female respondent from Iwo, Osun State).

Table 5.7: Distribution of respondents according to knowledge on ruminant block meal (n=27)

Knowledge statements on ruminant feed block pattern	Correct	
	F	%
Block meals can also be consumed by non-ruminants	10	37.0
Blocks meals can be prepared using cassava and gliricidia leaves and starch as binding agent	27	100.0
Preparation of block meal involves cooking of food for ruminants	24	88.9
Block meal preparation also contains the use of local feeds like dry hay and grasses	21	77.8
Block meals cannot dissolve again once solidified	8	29.6
Block meal for ruminants has a prolonged shelf life up to a year without growing mould	3	11.1
The only pattern for preparing block meal is only by turning ingredients on fire till it solidifies	11	40.7
Feed block meal requires certain moulds or packages to form the desired shape after solidification	22	81.5
Proper solidification of ruminant block meal sometimes takes up to 2 weeks after preparation	4	14.8
Ruminant block meal not properly prepared affect animals' digestion	22	81.5
Feeding ruminants with block meal increases their productivity	14	51.9
Preparation of feed block meals do not require boiling of water before adding plant or animal sources required	5	18.5
Fermentation is required before solidification of block meals	5	18.5
Block meals can only be consumed by ruminants weighing up to 40 kg	5	18.5
Block meal is weather resistant as it can withstand harsh weather conditions	16	59.3
Block meal is a complete diet for ruminants as it contains all required nutrients essential for their growth and reproduction	8	29.6
Feed block meal solidifies at room temperature in less than an hour of preparation	22	81.5
Turning of feed block meal requires much strength	3	11.1
Preparation of ruminant feed block takes averagely an hour	5	18.5
Ruminants can be fed with block meal on daily basis	17	63.0
Gliricidia in block meals aids faster digestion	9	33.3

Source: Field survey, 2016

Table 5.8: Categorisation of respondents' knowledge on ruminant block meal (n=27)

Ruminant block meal knowledge category	F	%	Min.	Max.	Mean	S.D
Low (7-9.66)	12	44.4	7.00	14.00	9.67	1.98
High (9.67-14)	15	55.6				

Source: Field survey, 2016

5.3.4: Respondents' knowledge on grasscutter domestication

Findings from the research survey (Table 5.9) revealed that majority (94.4%) of the respondents knew that there was no known religious discrimination against grasscutter production, 89.0% of them knew that grasscutters could give birth to up to ten young ones at once domestication and the same percentage also knew that grass cutter domestication could be initiated with just 2 males and 6 females. Also, 89.0%) also knew that and that grasscutters infected with disease must be isolated to avoid disease spread, with the same percentage of respondents knowing that grasscutters are omnivorous. Results also shows that 83.0% of them knew that grasscutters could be reared with other domestic animals and that they do not need vaccination or treatment if kept in an hygienic environment. Majority (78.0%) of respondents agreed that grasscutters were neat animals and the same percentage will not eat in dirty environment and that they stop reproduction after three years. Majority (72.0%) of them also knew that the gestation period for grass cutter is five months (154 days), while 67.0% of them knew that grasscutters could be kept for hide and skin production with the same percentage of respondents knew that grasscutters are polygamy in nature and about 10 grasscutters can be kept in a room. These affirmative statements confirmed high knowledge of respondents on the domestication of grass cutter in the study area.

It was further indicated on Table 5.10 that knowledge of grasscutter beneficiaries was high (61.0%), while just few (39.0%) had low knowledge about grasscutter domestication in the study area. This implies that although, the respondents were involved in one agricultural enterprise or the other before the dissemination of the innovation, some of them still lacked basic knowledge about the practice probably due to low educational background of some of the respondents or inability to adopt new practices contrary to the indigenous knowledge they initially had about the agricultural production. Agbelusi, 2013 in a similar study also attested to the fact that grasscutter farming is on the increase because farmers are becoming aware of its nutritional and economic value.

Table 5.9: Distribution of respondents' knowledge on grasscutter domestication (n=18)

Knowledge statements on grasscutter domestication	Correct	
	F	%
Grasscutter domestication can only be done in houses or cages	16	88.9
Grasscutters are herbivores and feed mostly on grasses	10	55.6
Grasscutter domestication can be initiated with just 2 males and 6 females	16	88.9
Grasscutters can be reared with other domestic animals	15	83.3
Grasscutters can also be kept for hide and skin production	12	66.7
Grasscutters are polygamy in nature and about 10 grasscutters can be kept in a room	12	66.7
Grasscutter domestication help increase their productivity	9	50.0
Grasscutters do not need vaccination or treatment if kept in an hygienic environment	15	83.3
Grasscutter domestication requires a large expanse of farmland to practice	3	16.7
Grasscutter gestation period is 5 months (154 days)	13	72.2
Grasscutters can give birth to up to ten young ones at once	16	88.9
Grasscutters command high selling price than ruminant animals	5	27.8
Grasscutters are more nutritious than lean or poultry meat	14	77.8
Grasscutters must be vaccinated every 2 weeks to avoid disease outbreak	7	38.9
There is no known religious discrimination against grasscutter meat	17	94.4
Grasscutters infected with disease must be isolated to avoid disease spread	16	88.9
Grasscutters are omnivorous (feeds on both herbs and flesh)	16	88.9
Grasscutters are prolific like rabbits	12	66.7
Grasscutters are carnivorous	2	11.1
Grasscutters are neat animals and will not eat in dirty environment	14	77.8
Grasscutters stop reproduction after three years	14	77.8

Source: Field survey, 2016

Table 5.10: Categorisation of respondents' knowledge on grasscutter domestication (n=18)

Grasscutter knowledge category	F	%	Min.	Max.	Mean	S.D
Low (7-14.19)	**7**	38.9	7.0	17.00	14.2	2.65
High (14.2-17.0)	11	61.1				

Source: Field survey 2016

5.3.5. Respondents' knowledge on Integrated Farming System (IFS)

Research findings about the knowledge of farmers practicing IFS (Table 5.11) reveals that all the beneficiaries (100.0%) attested to the fact that integrated farming system involves the cultivation of crop with livestock production on the same piece of land. Almost all (97.7%) farmers knew that netting of fish pond is necessary to prevent predators and that rice field must be cultivated on lowland for easy cultivation. Also, majority (95.3%) of the farmers affirmed that poultry or pig house must be connected to a soak pit for sedimentation and that harvesting of IFS must be done with dragnet respectively. It was discovered from 93.0% of the farmers that livestock in IFS are always reared using intensive system and that harvesting of fishes is usually between 12 to 14 weeks (90.7%). Most of the respondents (97.1%) also attested that rice field should be cultivated on lowland for easy cultivation while (90.7%) attested that IFS involves the use of livestock (poultry/swine) dung to generate maggots for feeding fish as well as for rice cultivation. Also, 88.4% attested that containers are raised over surface water at stocking point while majority (93.0%) of the farmers also affirmed that rice must be able to retain water to a depth of 30cm.

On the other hand, Table 5.12 reveals that IFS beneficiaries had high knowledge (60.5%) about the Integrated farming practices while just few, 39.0% had low knowledge about IFS practices. This was due to the fact that many of the farmers trained about the agricultural research output were fish farmers and included the production of pig or poultry farming to their agricultural production which some of them were also familiar with and just needed to practice together on the same piece of land. This assertion was also confirmed by one of the respondents during the focus group discussion that…

"Though I have been a fish farmer for close to a decade now and had once practiced poultry farming, I have never thought of practicing the two enterprises together with rice production on the same piece of land. This innovation actually helps to manage available resources" (A male respondent from Ibadan North L.G.A, Oyo State).

Mustafa, Akinyemi, Adewale, Odeleye and Abdulazeez (2015) also found out that grasscutter domestication is now on the increase because the meat is known to be popular especially in Southwestern Nigeria and thus producing them under domesticated conditions

in higher numbers would be a good source of supplementing the country's inadequate protein needs which is dependent on conventional livestock (Cattle, Sheep, Goats, Pigs and Poultry).

Table 5.11: Distribution of respondents' knowledge on integrated farming system (n=43)

Knowledge statements on IFS	Correct	
	F	%
Integrated farming system involves the cultivation of crop with livestock production on the same piece of land	43	100.0
IFS involves the use of livestock (poultry/swine) dung to generate maggots for feeding fish as well as manure for rice cultivation	39	90.7
Integrated farming system can be practiced on any type of farmland (loamy, clayey or sandy)	38	88.4
Liming of pond helps to maintain soil PH to increase productivity	38	88.4
Pipes into the fish pond must be covered with fine meshes to prevent predators	40	93.0
Mechanization is not allowed for Integrated farming system	40	93.0
Use of feed supplement is not allowed in IFS	20	46.5
Fishpond serves as regular source of irrigation for rice	37	86.0
Juveniles are better stocked for faster growth than fingerlings	39	90.7
Rice must to able to retain water to a depth of 30cm	40	93.0
Harvesting of IFS must be done with dragnet	41	95.3
Changing of pond water is better done on monthly basis	19	44.2
Harvesting of rice cannot be done when fishes are stocked	30	69.8
Moringa leaves and pawpaw seeds can be used as antibiotics for fishes	20	46.5
Rice should be raised in nursery for about 2wks before transplanting	35	81.4
At stocking point containers are raised over surface water	38	88.4
Harvesting of fishes is usually between 12 to 14 weeks	39	90.7
Livestock in IFS are always reared using intensive system	40	93.0
Netting of fish pond is necessary to prevent predators	42	97.7
Rice field must be cultivated on lowland for easy cultivation	42	97.1
Poultry or pig house must be connected to a soak pit for sedimentation	41	95.3

Source: Field survey, 2016

Table 5.12: Categorisation of respondents' knowledge on IFS (n=43)

IFS knowledge category	F	%	Min.	Max.	Mean	S.D
Low (13.0-16.83)	17	39.5	13.0	19.00	16.84	1.68
High (16.84-19.0)	26	60.5				

Source: Field survey, 2016

5.3.6. Respondents' knowledge on Sweet potato flour

Data obtained on Table 5.13 indicated that majority (94.4%) of the respondents knew that sweet potato flour could be produced from all varieties of sweet potato and also that sweet potato can be consumed as gruel (pap) or solid food. Majority (88.9%) also attested that wire mesh or nets could be used for sundrying sweet potato in the absence of perforated trays while 83.3% of the respondents knew that washing of sweet potato is required before and after peeling potato roots to avoid dirt. Most of them (77.8%) also attested that milling of dried sweet potato chips is best done immediately after drying to prevent absorption of moisture. Majority (94.1%) of the respondents also affirmed that milling of dried sweet potato chips could be done with grinding machine while it was confirmed from 94.4 % of the respondents that sweet potato flour should better be sieved after milling or grinding for a finer texture.

Majority (77.8%) of the respondents had high knowledge on sweet potato flour processing while just few (22.2%) had low knowledge about the processing of sweet potato flour in the study area (Table 5.14). The reason responsible for this as disclosed during the FGD was that many of the respondents already had indigenous knowledge about some of the practices for cassava flour production before the innovation was disseminated to them and did not find it so difficult to apply such knowledge on sweet potato flour production. This was confirmed by a beneficiary in Ilora, Afijio L.G.A of Oyo State that…

*I consume sweet potato very well when it is in season because I heard it is nutritious but I did not know it could also be processed into flour and taken as gruel or pap (*A female beneficiary from Ilora, Oyo State).

Table 5.13: Distribution of respondents according to knowledge on sweet potato flour (n=18)

Knowledge statements on Sweet potato flour	Correct	
	F	%
Sweet potato flour can be produced from all varieties of sweet potato	17	94.4
Processing of sweet potato flour is similar to the processing of yam flour (elubo)	9	50.0
Fermentation of sweet potato is necessary after peeling to ensure reduction of sweet taste	17	94.4
Sweet potato flour can be consumed as gruel (pap) or solid food	17	94.4
The white colour of sweet potato can be retained using sodium metabisulphite	18	100.0
Milling of sweet potato flakes after drying can be done with grinding machine	17	94.1
Washing of sweet potato is essential before and after peeling to remove dirt	15	83.3
Drying of sweet potato must be done at temperature below 50^0C to retain nutritional contents	13	72.2
Discoloration of sweet potato flour can be prevented by soaking in water immediately after peeling	16	88.9
Milled sweet potato flour are better packaged in plastic containers and nylon	4	22.2
Sweet potato flour can be white, yellow or orange in color depending on the sweet potato type	4	22.2
The thickness of sweet potato flakes to be dried must be uniform and not more than 2 mm for easy drying	14	77.8
Sweet potato toasted flour need to be sifted after milling for a fine texture	17	94.4
Diabetic patients cannot consume sweet potato flour because of high sugar content	16	88.9
Sweet potato to be sulphited must not be left for more than 10 minutes in sulphite water before draining	14	77.8
Processing of sweet potato into flour retain its vitamin and mineral contents	18	100.0
Perforated aluminum trays are better used to drain water from sweet potato flakes for easy drying	16	88.9
Drying of sweet potato flakes with dryer should not exceed 48 hours at constant temperature below 60^0C	14	77.8
Hand peeling of sweet potato can be done using any sharp object	5	27.8
Wire mesh or nets can be used for sun drying sweet potato in the absence of perforated trays	16	88.9
Milling of dried (cripsy) sweet potato should be done immediately after removal to prevent absorbing of moisture at room temperature	14	77.8

Source: Field survey, 2016

Table 5.14: Categorisation of respondents' knowledge on SPF (n=18)

SPF knowledge category	F	%	Min.	Max.	Mean	S.D
Low (14.0-17.16)	4	22.2	14.0	19.00	17.17	1.20
High (17.17-19.00)	14	77.8				

Source: Field survey, 2016

5.3.7. Respondents' knowledge of on sweet potato toasted granule

The knowledge of respondents on sweet potato toasted granule (Table 5.15) showed that all the respondents (100.0%) attested to the fact that processing of sweet potato granules is similar to the processing of cassava granules (garri). Majority (94.7%) of the respondents also knew that sweet potato toasted granules has high fiber content and that all sweet potato types can be used for sweet potato toasted granule. Majority (89.5%) of the respondents also knew that open fire is best used for toasting sweet potato granule and that sweet potato toasted granules should be sieved after toasting for a finer texture. Many of the respondents (84.2%) also knew that fermentation takes at least two days in processing of sweet potato to toasted granules just as in garri production. All these responses affirmed that the indigenous knowledge of the women processors on garri processing assisted in understanding that similar processes were also involved in sweet potato granule production. Many (68.4%) of the respondents also attested that the taste of sweet potato depends on the duration of fermentation while majority (94.7%) attested to the fact that sweet potato toasted granule has high fibre content.

Knowledge category of respondents as revealed in Table 5.16 indicated that majority (68.4%) of the women processors had high knowledge about the processing of sweet potato toasted granule while just 31.6% of them had low knowledge about the innovation. This was due to the fact that there was no much difference in the processing of sweet potato toasted granule disseminated to them and the processing of cassava granule (garri) they were initially processing which enhanced their knowledge.

Obayemi (2014) corroborates this finding that knowledge of cassava granule (garri) processing aids faster understanding of sweet potato toasted granule production and increases the utilisation of sweet potato thereby increasing agricultural production.

Table 5.15: Distribution of respondents according to knowledge on sweet potato toasted granule (n=19)

Knowledge statements on Sweet potato granules	Correct	
	F	%
Sweet potato toasted granules has high fiber content	18	94.7
Processing of sweet potato granules is similar to the processing of cassava granules (garri)	19	100.0
In processing of sweet potato to toasted granules, fermentation takes at least two days	16	84.2
Sweet potato toasted granules can serve as a supplement to cassava granules (garri)	8	42.1
The colour of sweet potato granules is the same as that of cassava granules (garri)	4	21.1
Sieving of sweet potato is necessary before and after toasting	16	84.2
It is not essential to wash sweet potato after peeling when preparing sweet potato toasted granules	18	94.7
Toasting of sweet potato granules must be done on low heat	9	47.4
Taste of sweet potato toasted granules depends on duration of fermentation	13	68.4
Toasting of sweet potato can be done with brush or short broom	14	73.7
All sweet potato types can be used for sweet potato toasted granule	18	94.7
Open fire is best used for toasting sweet potato granule	17	89.5
Sweet potato toasted granules need to be sieved after toasting for a fine texture	17	89.5
Peeling of sweet potato can be done with any sharp object	11	57.9
Fermentation is the soaking of sweet potato after peeling before milling	9	47.4
Sweet potato toasted granules cannot be consumed in form of garri or eba	12	63.2
Sweet potato granule can be fried instead of toasted	2	10.5
Sweet potato granules have a longer shelf life than cassava garri	4	21.1
Red oil can be used to rob the toasting pan before toasting sweet potato granules to enhance its appearance	7	36.8
Toasting of sweet potato has reduced the vitamin and mineral contents of sweet potato	3	15.8
Milling of sweet potato can be done immediately after peeling without soaking	11	57.9

Table 5.16: Categorisation of respondents' knowledge on SPG (n=19)

SPG knowledge category	F	%	Min.	Max.	Mean	S.D
Low (9.0-13.10)	6	31.6	9.00	17.00	13.11	2.02
High (13.11-17.00)	13	68.4				

Source: Field survey, 2016

5.3.8: Categorisation of respondents' knowledge on University of Ibadan agricultural research outputs (N=194)

The overall knowledge category of respondents on UI agricultural research output is shown on Table 5.17. Many of the respondents (67.0%) had high knowledge about the disseminated research outputs, while 33.0% of the beneficiaries had low knowledge about UI agricultural research outputs. This further confirmed that the beneficiaries had a good understanding of the various research outputs disseminated in their communities as some of them were already involved in similar agricultural enterprise with almost the same practices involved. Their education background also influenced their high knowledge on the disseminated agricultural research output. This was confirmed during the FDG conducted with the beneficiaries where some of them affirmed that…

'Though some of us had been involved in similar agricultural enterprise before the innovation was disseminated to us but we decided to give it a trial because we believed it will help improve our agricultural production and earn us more income". (A female sweet potato toasted granule processor at Ilora, Oyo State).

Saka and Lawal, (2009) also attested to the fact that farmers' knowledge of any agricultural technology enhances their utilisation of such technology for improved agricultural productivity.

Table 5.17: Categorisation of respondents' overall knowledge of UI agricultural research outputs (N=194)

Knowledge level	F	%	Min.	Max.	Mean	S.D
Low (7.0-13.53)	64	33.0	7.00	19.00	13.54	2.90
High (13.54-19.0)	130	67.0				

Source: Field survey, 2016

5.4: Respondents' attitude to utilisation of UI agricultural research outputs

Respondents' attitude to the disseminated agricultural enterprise was assessed to utilisation of neem extract for pest control, moringa powder processing, ruminant feed block meal, grasscutter domestication, fish-rice-poultry integrated farming system, sweet potato flour and sweet potato toasted granule processing in the study area.

5.4.1: Respondents' attitude to utilisation of neem extract for pest control

The attitude of vegetable farmers to the use of neem extract for pest control as shown on Table 5.18 reveals that more than half (58.0%) of the farmers strongly agreed that neem extract solution can be best applied with the use of watering can for easier application while 42.0% agreed on the use of alternative methods for the application of neem extract solution. More than half of the vegetable farmers (54.0%) agreed that neem extract application for insect pest control is an organic agricultural practice as it does not involve the use of chemical pesticides. A little above average (52.0%) disagreed that neem extract solution has offensive odour, 50.0% of the respondents also disagreed that the preparation of neem extract is time consuming and labour intensive.

However, Table 5.19 further revealed that 60.0% of neem extract beneficiaries had favorable attitude towards utilisation of neem extract for pest control, while 40.0% of them had unfavorable attitude towards it in the study area. This implies that respondents' high knowledge and benefits derived from the innovation influenced their attitude.

One of the vegetable farmers from Akinyele LGA asserted during the FGD that….

"I have heard that some plants repel insects and pests but I did not know that the neem tree I have close to my farm could really be of help to this extent until I decided to try it out." (A male vegetable farmer from Akinyele LGA)

Table 5.18: Distribution of respondents' attitude to utilisation of neem extract

Attitude statements on neem extract for pest control	SA		A		U		D		SD		Mean
	F	%	F	%	F	%	F	%	F	%	
Neem extract application for pest control has increased my agricultural production	21	40.4	25	48.1	6	11.5	6	0.0	0	0.0	4.29
Neem extract application for pest control is capital intensive	0	0.0	0	0.0	4	7.7	32	61.5	16	30.8	1.77
Preparation of neem extract is time consuming	0	0.0	0	0.0	4	7.7	26	50.0	22	42.3	1.66
Neem extract application for pest control contradicts my religious belief	0	0.0	1	1.9	6	11.5	26	50.0	19	36.5	1.81
Preparation and application of neem extract for pest control is labor intensive	0	0.0	1	1.9	9	17.3	26	50.0	16	30.8	1.91
Neem extract application also increases the shelf life of my agricultural products	2	3.8	6	11.5	15	28.8	23	44.2	6	11.5	2.52
Neem extract application had enhanced my agricultural skill for pest control	13	25.0	26	50.0	12	23.1	0	0.0	1	1.9	3.96
Neem extract application is not a sustainable method for pest control as it is not effective during rainy seasons	0	0.0	0	0.0	8	15.4	23	44.2	21	40.4	1.75
Re-application of neem extract solution can be carried out on monthly basis for more efficiency	4	7.7	5	9.6	15	28.8	22	42.3	6	11.5	2.60
Neem extract solution has a foul and repelling smell and can discourage farmer's usage for pest control	0	0.0	0	0.0	3	5.8	26	50.0	23	44.2	1.62
Application of neem extract also help prevent rodents on the farm	0	0.0	1	1.9	14	26.9	26	50.0	11	21.2	2.09
Application of neem extract for pest control involves rigorous training	1	1.9	2	3.8	8	15.4	25	43.1	16	30.8	1.98
Neem insecticide application is an organic agricultural practice	13	25.0	28	53.8	10	19.2	1	1.9	0	0.0	4.02
Application of neem extract for pest control is easier for subsistence crop production	5	9.6	10	19.2	10	19.2	13	25.0	14	26.9	2.59
Neem extract application kills all insects that touches the cultivated crop	0	0.0	0	0.0	11	21.2	23	44.2	18	34.6	1.87
Neem extract solution has an offensive odour	1	1.9	0	0.0	1	1.9	23	44.2	27	51.9	1.56
Neem extract solution application is toxic to some plants	1	1.9	1	1.9	8	15.4	18	34.6	24	46.2	1.79
Application of neem extract solution enhances the growth of crops	0	0.0	2	3.8	21	40.4	23	44.2	6	11.5	2.37
Neem extract solution application is easier with the use of watering can	30	57.7	16	30.8	4	7.7	2	3.8	0	0.0	4.42

Table 5.19: Categorisation of respondents' attitude to utilisation of neem extract

Neem extract attitude category	F	%	Min.	Max.	Mean	S.D
Unfavorable (39.0-46.59)	21	40.4	39.0	57.0	46. 6	3.3
Favorable (46.6-57.0)	31	59.6				

Source: Field survey, 2016

5.4.2: Respondents' attitude to moringa powder processing

As revealed on Table 5.20, more than half of the respondents (53.0%) strongly agreed that MP production can help reduce the rate of unemployment, 71.0% agreed that well stored MP have a longer shelf life, 65.0% agreed that MP cannot be produced where moringa tree is not planted, 59.0% agreed that milled MP are preferred to pounded ones in texture and 41.0% also agreed that MP is a good export product. However, 65.0% of the respondents disagreed that moringa tree already infected with a disease can not be useful for moringa powder production while 59.0% disagreed that MP is a feminine business. Also, 82.4% strongly disagreed that MP production and processing requires high labor intensity and that it contradicts their religious belief respectively.

It was further revealed on Table 5.21 that majority of MP processors had favorable attitude (71.0%) towards the innovation while few (29.0%) had unfavorable attitude towards it in the study area. This result is also due to the fact that many of the respondents derived great benefits from the innovation which also influenced their attitude towards the utilisation of the research output.

Table 5.20: Distribution of respondents' attitude to utilisation of Moringa Powder

Attitude statements for Moringa Powder processing (n=17)	SA		A		U		D		SD		
	F	%	F	%	F	%	F	%	F	%	Mean
MP processing is a feminine enterprise	0	0.0	0	0.0	2	11.8	10	58.8	5	29.4	4.17
Moringa powder processing is capital intensive	0	0.0	0	0.0	1	5.9	7	41.2	9	52.9	4.47
MP processing is time consuming	0	0.0	0	0.0	1	5.9	3	17.6	13	76.5	4.47
MP production and consumption contradicts my religious belief	0	0.0	0	0.0	0	0.0	3	17.6	14	82.4	4.82
MP production and processing requires high labor intensity	0	0.0	0	0.0	1	5.9	2	11.8	14	82.4	4.76
MP is tasteless	0	0.0	4	23.5	3	17.6	6	35.3	4	23.5	3.58
MP production is difficult during rainy seasons as the leaves wont dry on time	0	0.0	2	11.8	3	17.6	2	11.8	10	58.8	2.05
MP has no known side effect	0	0.0	0	0.0	5	29.4	8	47.1	4	23.5	4.17
MP cannot be produced where moringa tree is not planted	1	5.9	11	64.7	4	23.5	1	5.9	0	0.0	2.29
Well stored MP have a longer shelf life	4	23.5	12	70.6	1	5.9	0	0.0	0	0.0	4.35
MP processing and packaging involves rigorous training	0	0.0	0	0.0	1	5.9	8	47.1	8	47.1	1.88
MP is better packaged in nylon and plastic containers for longer shelf life	0	0.0	0	0.0	2	11.8	11	64.7	4	23.5	4.17
Moringa tree already infected with a disease cannot be useful for MP production	0	0.0	0	0.0	3	17.6	11	64.7	3	17.6	4.00
Milled MP are preferred to pounded ones in texture	3	17.6	10	58.8	2	11.8	2	11.8	0	0.0	3.82
MP cannot be consumed by babies	2	11.8	6	35.3	5	29.4	3	17.6	1	5.9	3.23
MP cures all forms of ailments	5	29.4	7	41.2	4	23.5	1	5.9	0	0.0	2.70
MP production can help reduce the rate of unemployment	9	52.9	6	35.3	1	5.9	1	5.9	0	0.0	2.05
MP is a good export product	6	35.3	7	41.2	4	23.5	0	0.0	0	0.0	4.35
High Vit. C content boosts immunity against diseases	2	11.8	6	35.3	4	23.5	4	23.5	1	5.9	4.11

Source: Field survey, 2016

Table 5.21: Categorisation of respondents' attitude to utilisation of MP

MP Attitude category	F	%	Min.	Max.	Mean	S.D
Unfavorable (63.0-69.79)	5	29.4	63.0	75.0	69.8	2.9
Favorable (69.8-75.0)	12	70.6				

Source: Field survey 2016

5.4.3: Respondents' attitude to Ruminant Block Meal (RBM)

Data obtained on attitude of respondents towards utilisation of ruminant block meal (Table 5.22) revealed that more than half of the respondents (52.9%) strongly agreed that preparation of ruminant block meal is time consuming. Some of the respondents, 23.5% strongly agreed that only female farmers can utilize RBM because of the cooking procedure involved in its preparation while 17.6% strongly agreed that ruminant block meal preparation help to preserve plant and animal sources that would have been wasted within the environment. However, 35.3% of the respondents agreed that block meal is a complete diet for ruminants and contains all required nutrients essential for their growth, 64.7% agreed that ruminant block meal training requires rigorous training. Also, 41.2% of respondents agreed that preparation of ruminant block meal is relatively expensive while 23.5% of them agreed that feeding ruminant with block meal is not sustainable because it is difficult to prepare. Few of them, 35.3% also agreed that feeding ruminants with block meal increases their productivity.

On the other hand, 64.7% of the respondents disagreed that block meal solidification cannot be done at room temperature and that digestion of block meal is slow because of its heaviness. More than half (51.9%) of the respondents also disagreed that feeding of ruminants with block meal contradicts their religious belief while 47.1% disagreed that feeding ruminants with block meal is seasonal and can only be prepared at periods when the ingredients are available.

It was further shown on Table 5.23 that more than half of the respondents, 51.9% had favorable attitude to preparation of Ruminant Block Meal while 48.1% of them had unfavorable attitude to it in the study area. This is due to the fact many of the respondents found the research output a bit strenuous and only utilize it for selected ruminant animals like pregnant and little ruminants while some others utilise the innovation on selected days of the week because of their busy schedule. This was discovered during the FGD with the respondents in the study area that…

"My goats feed very well on the feed block meal but I am only able to prepare it for them during the weekends especially Sunday when I do not go to shop or market" (A female ruminant farmer from Iwo, Osun State).

Table 5.22: Distribution of respondents' attitude to utilisation of ruminant block meal

Attitude statements for RBM processing	SA		A		U		D		SD	
	F	%	F	%	F	%	F	%	F	%
Non-ruminants can also be fed with ruminant block meal	1	3.7	2	7.4	10	37.0	10	37.0	4	14.8
Cooking procedure involved in ruminant block meal preparation requires utilisation of more resources	1	3.7	3	11.1	7	25.9	12	44.4	4	14.8
Feeding ruminants with block meal contradicts my religious belief	0	0.0	0	0.0	1	3.7	14	51.9	12	44.4
Regular feeding of ruminants with block meal reduces their mortality rate	2	7.4	8	29.6	9	33.3	6	22.2	2	7.4
Ruminants fed with block meals have longer life span than others not fed with it	0	0.0	0	0.0	1	5.9	2	11.8	14	82.4
Feeding ruminant with block meal is not a sustainable feeding pattern as it is difficult to prepare	0	0.0	4	23.5	3	17.6	6	35.3	4	23.5
Ingredients for preparing block meal cannot be easily assessed	0	0.0	2	11.8	3	17.6	2	11.8	10	58.8
Feed block meal preparation is cheap and affordable	0	0.0	0	0.0	5	29.4	8	47.1	4	23.5
Feed block pattern requires rigorous training	1	5.9	11	64.7	4	23.5	1	5.9	0	0.0
Only female farmers can utilize ruminant feed block pattern because of the cooking procedure involved	4	23.5	12	70.6	1	5.9	0	0.0	0	0.0
Feeding ruminants with block meal is seasonal as it can only be prepared at periods when the ingredients are available	0	0.0	0	0.0	1	5.9	8	47.1	8	47.1
Block meal solidification cannot be done at room temperature	0	0.0	0	0.0	2	11.8	11	64.7	4	23.5
Digestion of block meal is slow because it is a heavy meal for ruminants	0	0.0	0	0.0	3	17.6	11	64.7	3	17.6
Block meal preparation for ruminants help utilize plant and animal resources that would have been wasted in the environment	3	17.6	10	58.8	2	11.8	2	11.8	0	0.0
Block meal is a complete diet for ruminants as it contains all required nutrients essential for their growth and reproduction	2	11.8	6	35.3	5	29.4	3	17.6	1	5.9
Feeding ruminants with block meal is capital intensive	5	29.4	7	41.2	4	23.5	1	5.9	0	0.0
Preparation of feed block meal for ruminants is time consuming	9	52.9	6	35.3	1	5.9	1	5.9	0	0.0
Some ruminants rejects the block meal because it is tasteless	6	35.3	7	41.2	4	23.5	0.0	0.0	0	0.0
Feeding ruminants with block meal increases productivity	2	11.8	6	35.3	4	23.5	4	23.5	1	5.9

Table 5.23: Categorisation of respondents' attitude to utilisation of ruminant block meal

RBM Attitude category	F	%	Min.	Max.	Mean	S.D
Unfavorable (45.0-52.59)	13	48.1	45.0	62.0	52.6	4.8
Favorable (52.6-62.0)	14	51.9				

Source: Field survey, 2016

5.4.4. Respondents' attitude to grasscutter domestication

The attitude of grass cutter farmers towards domestication of grasscutters in Egbeda L.G.A (Table 5.24) discloses that few (28.0%) of the farmers strongly agreed that domestication of grass cutter increases their productivity. Also half (50.0%) of the respondents agreed that domesticated grasscutters are sweeter in taste than those in the forest, 33.0% (agreed that grasscutters are more or less pets, and that domesticated grasscutters live longer than those not domesticated. Result on Table 5.14a further shows that a little above average (56.0%) disagreed that female grasscutters were more friendly than the males and that dark coloured grasscutters are wilder in nature than light colored ones (56.0%), half of the respondents (50.0%) disagreed that domesticating grasscutters is wasting of time and resources while 44.0% disagreed that feeding of grass cutter is capital intensive.

As shown on Table 5.25, half of the grasscutter beneficiaries (50.0%) had favorable attitude towards grass cutter production while the other half (50.0%) had unfavorable attitude towards it. This was because many of the grasscutter farmers were involved in the production of other livestock animals like poultry and rabbits which they also generate income from and sometimes also, consume at household level. Many of the respondents therefore, could not really attribute their utilisation of the research output to the benefits derived from it alone but also on livestock reared for income generation.

Agbelusi, (2013) in a similar study also observed that favourable attitude of farmers towards the adoption of grasscutter farming is an indication of improved production which can be influenced by farmers' knowledge and their years of experience in grasscutter production.

Table 5.24: Distribution of respondents' attitude to utilisation of grasscutter domestication

Attitude statements on Grass cutter Domestication	SA		A		U		D		SD	
	F	%	F	%	F	%	F	%	F	%
Feeding of grasscutters is capital intensive	0	0.0	1	5.6	3	16.7	8	44.4	6	33.3
Grasscutter domestication is mere wasting of time and resources	0	0.0	0	0.0	1	5.6	9	50.0	8	44.4
Grasscutter domestication contradicts my religious belief	0	0.0	1	5.6	1	5.6	6	33.3	10	55.6
Domestication of grass cutter increases their productivity	5	27.8	6	33.3	4	22.2	3	16.7	0	0.0
Domesticated grasscutters live longer than those in the forest	1	5.6	6	33.3	8	44.4	2	11.1	1	5.6
Grasscutter feeds can only be found in the forest	0	0.0	0	0.0	0	0.0	7	38.9	11	61.1
Grasscutters are not friendly animals	0	0.0	0	0.0	1	5.6	12	66.7	5	27.8
Domesticated grasscutters are sweeter in taste than those in the forest	2	11.1	9	50.0	5	27.8	2	11.1	0	0.0
Grasscutter domestication requires rigorous training	0	0.0	1	5.6	4	22.2	10	55.6	3	16.7
Only female grasscutters are easy to rear in cages	0	0.0	1	5.6	3	16.7	8	44.4	6	33.3
Grasscutters can never weigh more than 5kg no matter what they are fed with	1	5.6	2	11.1	5	27.8	7	38.9	3	16.7
Grasscutters prefer cages at room temperature	1	5.6	4	22.2	1	5.6	8	44.4	4	22.2
Grasscutters can be fed with household kitchen waste	0	0.0	1	5.6	6	33.3	8	44.4	3	16.7
Grasscutters are naturally shy	1	5.6	2	11.1	4	22.2	7	38.9	4	22.2
Female grasscutters are more friendly than the males	0	0.0	1	5.6	1	5.6	10	55.6	6	33.3
Dark coloured grasscutters are wilder in nature than light colored ones	0	0.0	1	5.6	4	22.2	10	55.6	3	16.7
Grasscutters find it difficult to survive in concrete pens than cages because of they need good ventilation	1	5.6	3	16.7	4	22.2	8	44.4	2	11.1
Grasscutters are more or less pets	1	5.6	6	33.3	4	22.2	5	27.8	2	11.1
Grasscutter meat have higher nutritional value than other domesticated animals	1	5.6	4	22.2	3	16.7	7	38.9	3	16.7

Source: Field survey, 2016

Table 5.25: Categorisation of respondents' attitude to utilisation of Grasscutter domestication

Grasscutter attitude category	F	%	Min.	Max.	Mean	S.D
Unfavorable (55.0-65.56)	9	50.0	55.0	74.0	65.7	4.7
Favorable (65.7-74.0)	9	50.0				

Source: Field survey, 2016

5.4.5. Respondents' attitude to utilisation of IFS

Research findings on attitude of farmers to IFS (Table 5.26) shows that some of the respondents (30.0%) strongly agreed that IFS help reduce pest infestation, less than half, (47.0%) agreed that IFS produces higher crop yield than other farming systems while 42.0% of the farmers agreed that IFS increases soil fertility through the usage of poultry dung for compost manure and that IFS agricultural products are always toxic free and usually has a unique taste. Result further shows that many (63.0%) of the farmers disagreed that IFS causes land degradation, more than half (56.0%) of the farmers disagreed that IFS cannot be practiced where there is constant rainfall to avoid loss of fishes and other livestock or crops grown. However, a little above half (54.0%) disagreed that IFS is only possible with subsistence farming and less than half (44.0%) disagreed that IFS contradicts their religious belief and that Nutrient uptake is slow in IFS respectively

It was further buttressed on Table 5.27 that a little above half of the respondents (53.5%) had favorable attitude towards utilisation of integrated farming system in the study area while almost half of the respondents (46.5%) had unfavorable attitude towards it despite the great benefits derived from the innovation. This is likely due to the fact that many of the respondents found it difficult to maintain the poultry cages or piggery with the fish pond due to high labour intensity and technical expertise required for the proper maintenance and utilisation of the research output.

It was also confirmed during the FGD conducted that,

I was a bit skeptical about the innovation when it was disseminated because I did not believe I could practice it successfully in this part of the country but was really amazed at the output when I decided to give it a trial…. (A male beneficiary from Ibadan North LGA of Oyo State).

Table 5.26: Distribution of respondents' attitude to utilisation of IFS

IFS Attitude statements	SA		A		U		D		SD		
	F	%	F	%	F	%	F	%	F	%	Mean
IFS is an organic agricultural practice	5	11.6	10	23.3	15	34.9	12	27.9	1	2.3	4.19
IFS is capital intensive	11	25.6	17	39.5	7	16.3	5	11.6	3	7.0	3.63
IFS is time consuming	12	27.9	15	34.9	10	23.3	5	11.6	1	2,3	3.77
IFS causes land degradation	0	0.0	0	0.0	5	11.6	27	62.8	11	25.6	4.14
IFS contradicts my religious belief	0	0.0	5	11.6	9	20.9	19	44.2	10	23.3	3.79
Fishes and crop produced using IFS are always more nutritious than those produced from other farming systems	5	11.6	17	39.5	11	25.6	6	14.0	4	9.3	3.30
IFS is highly labor intensive	1	2.3	2	4.7	8	18.6	18	41.9	14	32.6	3.98
IFS agricultural products are always toxic free and usually has a unique taste	5	11.6	18	41.9	10	23.3	8	18.6	2	4.7	3.37
IFS does not require a specific type of soil to be practiced	7	16.3	16	37.2	14	32.6	4	9.3	2	4.7	2.49
IFS reduces environmental pollution	4	9.3	14	32.6	13	30.2	10	23.3	2	4.7	3.19
IFS increases soil fertility through the usage of poultry dung for compost manure	3	7.0	18	41.9	12	27.9	7	16.3	3	7.0	3.26
IFS agricultural products usually have longer shelf life	4	9.3	11	25.6	11	25.6	12	27.9	5	11.6	2.93
IFS reduces pest infestation	13	30.2	7	16.3	19	44.2	4	9.3	0	0.0	3.65
IFS is more sustainable than other farming systems	11	25.6	17	39.5	7	16.3	5	11.6	3	7.0	4.05
IFS cannot be practiced where there is constant rainfall to avoid loss of fishes	1	2.3	1	2.3	5	11.6	24	55.8	12	27.9	2.33
IFS reduces pest infestation of crop cultivated on fish pond	0	0.0	4	9.3	13	30.2	19	44.2	7	16.3	4.23
IFS is only possible with subsistence farming	0	0.0	2	4.7	2	4.7	23	53.5	16	37.2	3.49
IFS produces higher crop yield than other farming systems	4	9.3	20	46.5	13	30.2	5	11.6	1	2.3	4.09
Nutrient uptake is slow in IFS	0	0.0	2	4.7	7	16.3	19	44.2	15	34.9	2.86

Source: Field survey, 2016

Table 5.27: Categorisation of respondents' attitude to utilisation of IFS

IFS Attitude category	F	%	Min.	Max.	Mean	S.D
Unfavorable (59.0-66.69)	20	46.5	59.0	76.0	66.7	4.3
Favorable (66.7-76.0)	23	53.5				

Source: Field survey, 2016

5.4.6. Respondents' attitude to utilisation of sweet potato flour

Research findings on Table 5.28 revealed that many (61.0%) of the women agreed that sweet potato flour can be easily digested when taken as gruel (pap), more than half (56.0%) of the respondents agreed that processing of sweet potato into flour is a way of adding value to the crop and that Sweet potato flour has a longer shelf life than yam flour (56.0%). However, majority (72.0%) of the processors disagreed that production of sweet potato flour is labor intensive, 67.0% of them disagreed that processing of sweet potato into flour is time consuming, 61.0% disagreed that SPF requires high capital t while 56% disagreed that there is no market for the sale of sweet potato flour.

Many of the beneficiaries, 61.1% had a favorable attitude towards the processing of sweet potato flour while 38.9% had unfavorable attitude towards the processing of sweet potato flour in the study area (Table 5.29). This is due to the fact that the respondents were already exposed to most of the stages involved in cassava flour production they were initially involved in before the dissemination of the innovation which means that their previous knowledge reinforced the utilisation of the disseminated agricultural research output.

Ladele *et al* (2015) confirmed that nutritional benefits derived from sweet potato flour was responsible for favorable attitude of producers and consumers to its utilisation in South-West, Nigeria.

Table 5.28: Distribution of respondents' attitude to utilisation of sweet potato flour

Attitude statements for Sweet potato flour	SA		A		U		D		SD		
	F	%	F	%	F	%	F	%	F	%	Mean
Processing of sweet potato into flour is a way of adding value to the crop	6	33.3	10	55.6	2	11.1	0	0.0	0	0.0	4.22
Processing of sweet potato flour is labour intensive	0	0.0	0	0.0	1	5.6	13	72.2	4	22.2	1.83
Processing of sweet potato into flour can boost household food security	0	0.0	0	0.0	2	11.1	9	50.0	7	38.9	1.72
Sweet potato flour has high nutritional value	4	22.2	7	38.9	4	22.2	2	11.1	1	5.6	3.61
Processing of sweet potato flour can help reduce the rate of unemployment.	6	33.3	8	44.4	3	16.7	1	5.6	0	0.0	4.06
Processing of sweet potato flour requires high technical skill	0	0.0	0.0	0.0	8	44.4	9	50.0	1	5.6	2.39
Processing of sweet potato flour is more of women business	2	11.1	3	16.7	7	38.9	6	33.3	0	0.0	3.06
Sweet potato flour is not acceptable to the public as yam flour	0	0.0	1	5.6	3	16.7	8	44.4	6	33.3	1.94
Processing of sweet potato flour requires high capital to start with	0	0.0	0	0.0	3	16.7	11	61.1	4	22.2	1.94
Processing of sweet potato into flour is time consuming	0	0.0	0	0.0	2	11.1	12	66.7	4	22.2	1.89
Processing of sweet potato flour is more valuable in the urban area than rural area	3	16.7	3	16.7	6	33.3	6	33.3	0	0.0	3.17
There is no market for the sale of sweet potato flour	0	0.0	0	0.0	0	0.0	10	55.6	8	44.4	1.56
The colour of sweet potato flour is unattractive	5	27.8	1	5.6	2	11.1	4	22.2	6	33.3	2.72
Sweet potato flour is a good export product	6	33.3	7	38.9	4	22.2	1	5.6	0	0.0	4.00
Sweet potato flour processing is easy and non-tasking	6	33.3	6	33.3	4	22.2	1	5.6	1	5.6	3.83
Sweet potato flour have a longer shelf life than yam flour	5	27.8	10	55.6	2	11.1	1	5.6	0	0.0	4.06
Sweet potato flour is more nutritious than yam flour	4	22.2	8	44.4	5	27.8	1	5.6	0	0.0	3.83
Sweet potato flour is more accepted by children because of its sweet taste	4	22.2	6	33.3	7	28.9	1	5.6	0	0.0	3.72
Sweet potato flour can be easily digested when taken as gruel (pap)	2	11.1	11	61.1	4	22.2	1	5.6	0	0.0	3.78

Table 5.29: Categorisation of respondents' attitude to utilisation of SPF

SPF Attitude category	F	%	Min.	Max.	Mean	S.D
Unfavorable (48.0-57.29)	7	38.9	48.0	63.0	57.3	3.7
Favorable (57.3-63.0)	11	61.1				

Source: Field survey, 2016

5.4.7. Respondents' attitude to utilisation of sweet potato toasted granules

Attitude of respondents towards processing of sweet potato toasted granule (Table 5.30) revealed that more than half of the respondents (52.6%) agreed that consumption of sweet potato toasted granules will increase with proper information about its health benefits and that it will help increase their income respectively. A good number of beneficiaries (47.4%) agreed that sweet potato toasted granule is a good export product. Almost half of the beneficiaries (47.4%) agreed that **s**weet potato toasted granules has high nutritional value and that processing of sweet potato into toasted granules help reduce bulkiness of raw product. Some of the beneficiaries (42.1%) also agreed that acceptability of sweet potato toasted granules can boost household food security among rural dwellers. On the other hand, many of the beneficiaries (63.2%) disagreed that processing of sweet potato to granules will reduce production of other products from sweet potato. More than half of the respondents agreed that sweet potato toasted granule processing can be done in a day while some of the beneficiaries (42.1%) disagreed that Sweet potato granules have a longer shelf life than cassava toasted granule.

As shown on Table 5.31, a little above half of the respondents (52.6%) had favorable attitude towards the utilisation of the research output while a little below half (47.4%) had unfavorable attitude towards utilisation of the research output. This is also likely due to the fact that the respondents' previous knowledge on the production of cassava granule (garri) influenced their attitude but did not reinforce its utilisation as much as sweet potato flour because of low market/demand for the product.

Obayemi (2014) in a similar study also attested that many (52.0%) of beneficiaries that benefitted from the innovation in Kwara State had favourable attitude to utilization of sweet potato toasted granule due to nutritional and financial benefits derived from it.

Table 5.30: Distribution of respondents' attitude to utilisation of sweet potato toasted granules

Attitude statements for Sweet potato granules	SA		A		U		D		SD		
	F	%	F	%	F	%	F	%	F	%	Mean
Processing of sweet potato into toasted granules helps reduce bulkiness of raw product	5	26.3	9	47.4	3	15.8	2	10.5	0	0.0	0.94
Processing of sweet potato toasted granule is labour intensive	0	0.0	0	0.0	2	10.5	11	57.9	6	31.6	0.63
Acceptability of sweet potato toasted granules can boost household food security among rural dwellers	4	21.1	8	42.1	7	36.8	0	0.0	0	0.0	0.76
Sweet potato toasted granules has high nutritional value	6	31.6	9	47.4	4	21.1	0	0.0	0	0.0	0.74
Processing of sweet potato granules can reduce the rate of unemployment.	9	47.4	6	31.6	2	10.5	1	5.3	1	5.3	1.15
Processing of sweet potato to toasted granules will help increase my income.	7	36.8	10	52.6	2	10.5	0	0.0	0	0.0	0.65
Processing of sweet potato to granules will reduce production of other products from sweet potato.	0	0.0	1	5.3	2	10.5	12	63.2	4	21.1	0.75
Sweet potato toasted granules is not acceptable because of its sweet taste	0	0.0	1	5.3	1	5.3	6	31.6	11	57.9	0.84
Consumption of sweet potato toasted granules will increase with proper information about its health benefits	6	31.6	10	52.6	2	10.5	1	5.3	0	0.0	0.81
Production of sweet potato granules will reduce consumption of cassava granules.	0	0.0	1	5.3	3	15.8	8	42.1	7	36.8	0.88
Conversion of sweet potato to toasted granules is a waste of sweet potato	1	5.3	4	21.1	4	21.1	7	36.8	3	15.8	1.16
There is improved market for the sale of sweet potato toasted granules	1	5.3	5	26.3	4	21.1	6	31.6	3	15.8	1.19
Unattractive colour of sweet potato toasted granules puts me off from accepting it.	0	0.0	2	10.5	3	15.8	8	42.1	6	31.6	0.97
Sweet potato toasted granule is a good export product	6	31.6	9	47.4	3	15.8	1	5.3	0	0.0	0.85
Sweet potato toasted granule processing can be done in a day	0	0.0	0	0.0	2	10.5	7	36.8	10	52.6	0.65
Sweet potato granules have a longer shelf life than cassava toasted granule	1	5.3	3	15.8	3	15.8	8	42.1	4	21.1	1.17
Cassava granules is far better than sweet potato granules in terms of uses	4	21.1	4	21.1	6	31.6	5	26.3	0	0.0	1.12
Sweet potato toasted granule consumption is well accepted by children than adults	0	0.0	3	15.8	7	36.8	5	26.3	4	21.1	1.02
Sweet potato toasted granules must be mixed with cassava granules to improve its palatability	0	0.0	1	5.3	1	5.3	6	31.6	11	57.9	0.84

Table 5.31: Categorisation of respondents' attitude to utilisation of SPG

SPG attitude category	F	%	Min.	Max.	Mean	S.D
Unfavorable (68.0-71.39)	9	47.4	68.0	77.0	71.4	3.2
Favorable (71.4-77.0)	10	52.6				

Source: Field survey, 2016

5.4.8 Respondents' overall attitude towards UI agricultural research output

Data on Table 5.32 shows the attitude of respondents towards utilisation of University of Ibadan agricultural research outputs. Result obtained revealed that more of the beneficiaries (59.8%) had favorable attitude towards utilisation of disseminated agricultural research outputs while 40% of the beneficiaries had unfavourable attitude towards the utilisation of U.I Agricultural research outputs. This confirms that more of the beneficiaries had favorable attitude towards utilisation of the disseminated research outputs related to their agricultural enterprise in the various adopted communities. High knowledge of the beneficiaries on the disseminated research outputs probably influenced their favorable attitude towards their utilisation of such research outputs.

Ogunsumi (2011) in a similar study observed that favorable attitude of farmers towards the adoption of a new technology is an indication of the importance on improved production which is always influenced by respondents' level of education with higher level of sustainability. She also confirmed that, educated farmers are expected to have more favorable attitude towards adoption of agricultural skills and knowledge.

Table 5.32: Categorisation of respondents' overall attitude towards utilisation of UI AROs

Attitude category	F	%	Min.	Max.	Mean	S.D
Unfavorable	78	40.2	39.00	77.00	60.3	10.7
Favorable	116	59.8				

Source: Field survey, 2016

5.5: Benefits derived from utilisation of UI agricultural research outputs by respondents

Benefits derived from the disseminated agricultural research outputs were assessed from respondents on neem extract for pest control, moringa powder production, ruminant feed block meal, grasscutter domestication, integrated farming system, sweet potato flour and sweet potato granule processing in the study area.

5.5.1. Benefits derived from neem extract for pest control by respondents

Data obtained from vegetable farmers in Akinyele LGA of Oyo State (Table 5.33) below revealed the benefits derived by respondents on the use of neem extract for pest control. Increased income ($\bar{x}$=1.83), improved pest resistance ($\bar{x}$=1.73), improved quality of agricultural produce ($\bar{x}$=1.69) were the most benefits derived. Other benefits derived by beneficiaries on the use of neem extract or pest control included cheap and easy accessibility to neem plant ($\bar{x}$=1.67), increased yield ($\bar{x}$=1.56), additional market value ($\bar{x}$=1.48), improved skill for pest control ($\bar{x}$ =1.27), and better soil and environmental condition ($\bar{x}$=0.56).

Categorically, 67.3 % of neem extract beneficiaries derived high benefits from utilisation of neem extract for pest control in the study area. (Table 5.34).

This implies that the beneficiaries' utilisation of the innovation is likely due to the benefits derived from it. This was confirmed by one of the beneficiaries from Akinyele LGA during the FGD that:

'What motivated my utilisation of neem extract for pest control was that it had helped me to generate more income through better produce and had increased my skill in the agricultural enterprise as well"(A male beneficiary from Akinyele LGA of Oyo State).

Table 5.33: Distribution of respondents by benefits derived by from utilisation of neem extract for pest control (n=52)

Benefits of Neem extract for pest control	To a great extent		To a lesser extent		Not at all		Mean	Rank
	F	%	F	%	F	%		
Increased yield or productivity	34	65.4	13	25.0	5	9.6	1.56	5th
Increased Income	43	82.7	9	17.3	0	0.0	1.83	1st
Improved product quality	39	75.0	10	19.2	3	5.8	1.69	3rd
Improved pest resistance	39	75.0	12	23.1	1	1.9	1.73	2nd
Better soil/environmental condition	3	5.8	23	44.2	26	50.0	0.56	8th
Enhances market for products	28	53.8	21	40.4	3	5.8	1.48	6th
Improved skill for pest control	21	40.4	24	46.2	7	13.5	1.27	7th
Cheap and easy accessibility of neem plant	36	69.2	15	28.8	1	1.9	1.67	4th
Weed control	1	1.9	11	21.2	40	76.9	0.25	9th

Source: Field survey, 2016

Table 5.34: Categorisation of respondents by benefits derived from neem extract for pest control

Benefit category	F	%	Min.	Max.	Mean	S.D
Low (8.0-12.03)	17	32.7	8.00	16.00	12.04	1.66
High(12.04-	35	67.3				
16.0)	**52**	**100.0**				
Total						

Source: Field survey, 2016

5.5.2. Benefits derived from moringa powder processing

Data obtained from respondents on benefits derived from moringa powder processing (Table 5.35) revealed that the respondents enjoyed increased yield ($\bar{x}$=1.65) as most beneficial for moringa powder processing followed by increased income ($\bar{x}$=1.53) and high resistance of moringa to diseases ($\bar{x}$=1.47). Other benefits derived from respondents included better health status (mean=1.41), Improved agricultural skill and better environmental condition ($\bar{x}$=1.29) and availability of market for products ($\bar{x}$=1.12).

A total of 52.9% of moringa powder beneficiaries derived high benefits from its utilisation in the study area. (Table 5.36). This implies that moringa powder production is a lucrative agricultural enterprise for the beneficiaries. One of the beneficiaries attested that…

"I would have stopped the production of moringa powder when almost everybody started planting it and the sales reduced a bit but for the fact that I also consume it on daily basis with my family members because of its high nutritional content." (A female moringa processor from Ile-Ogbo, Osun State).

Table 5.35: Distribution of respondents by benefits derived from utilisation of moringa powder

Benefits of MP	F	%	F	%	F	%	Mean	Rank
Increased yield	12	70.6	4	23.5	1	5.9	1.65	1st
Increased Income	10	58.8	6	35.3	1	5.9	1.53	2nd
Improved product quality	4	23.5	12	70.6	1	5.9	1.18	6th
High resistance to diseases	9	52.9	7	41.2	1	5.9	1.47	3rd
Available market for products	6	35.3	10	58.8	1	5.9	1.12	7th
Better health status	5	29.4	12	70.6	0	0.0	1.41	4th
Improved agricultural skill	4	23.5	11	64.7	2	11.8	1.29	5th
Improved environmental condition	8	47.1	8	47.1	1	5.9	1.29	5th
Fast growth of moringa	4	23.5	13	76.5	0	0.0	0.76	8th

Source: Field survey, 2016

Table 5.36: Categorisation of respondents by benefits derived from MP

Benefit category	F	%	Min.	Max.	Mean	S.D
Low (10.0-12.70)	8	47.1	10.00	17.00	12.71	1.86
High(12.71-17.0)	9	52.9				
Total	**17**	**100.0**				

Source: Field survey, 2016

5.5.3. Benefits derived from utilisation of IFS by respondents

Research findings on the benefits derived from respondents on the use of integrated farming system in Ibadan North L.G.A of Oy**o** State (Table 5.37) indicated that benefits by respondents included increased income and yield ($\bar{x}$=1.69), healthy breeds of crops and animals ($\bar{x}$=1.63), improved product quality ($\bar{x}$=1.58), improved market for agricultural products ($\bar{x}$=1.49), more nutritious products ($\bar{x}$=1.33), cheap and available materials ($\bar{x}$=1.09) and better soil and environmental condition ($\bar{x}$=0.88). This implies that the high level of utilisation of the innovations was influenced by the benefits derived from such innovations. In summary, 55.8% of IFS beneficiaries derived high benefits from its utilisation in the study area. (Table 5.38).

It was obvious that many beneficiaries were motivated to utilize the innovation due to increased income and yield. One of the beneficiaries buttressed this during the FGD that…

> *"I initially did not intend to utilize the innovation after the training not until I noticed that my other colleagues that had started practicing it were getting more income with better produce, then I also had to try it out"* (A male fish farmer from Ibadan North LGA, Oyo State).

Table 5.37: Distribution of respondents by benefits derived from utilisation of integrated farming system

Benefits of IFS	To a great extent		To a lesser extent		Not at all		Mean	Rank
	F	%	F	%	F	%		
Increased yield	31	72.1	11	25.6	1	2.3	1.69	1st
Increased Income	27	62.8	14	32.6	2	4.7	1.69	1st
Improved product quality	32	74.4	9	20.9	2	4.7	1.58	4th
Cheap and available materials	13	30.2	21	48.8	9	20.9	1.09	8th
More nutritious products	17	39.5	23	53.5	3	7.0	1.33	7th
Better soil/environmental condition	7	16.3	24	55.8	12	27.9	0.88	9th
Improved market for products	23	53.5	18	41.9	2	4.7	1.49	5th
Healthy breeds of crops and animals	28	65.1	14	32.6	1	2.3	1.63	3rd
Higher pest resistance	22	51.2	17	39.5	4	9.3	1.42	6th

Source: Field survey, 2016

Table 5.38: Categorisation of respondents by benefits derived from IFS

Benefit category	F	%	Min.	Max.	Mean	S.D
Low (10.0-12.80)	19	44.2	10.00	17.00	12.81	1.77
High (12.81-17.0)	24	55.8				
Total	**43**	**100.0**				

Source: Field survey, 2016

5.5.4. Benefits derived from Ruminant Block Meal by respondents

Benefits derived from utilisation of Ruminant Block Meal (Table 5.39) included cheap materials for animal feed ($\bar{x}$ =1.74), followed by increased income ($\bar{x}$=1.70) and increased skill and knowledge about the disseminated innovation ($\bar{x}$=1.67). Other benefits derived from utilisation of the innovation included healthy breeds of ruminant animals ($\bar{x}$=1.40), easy preparation of animal meal ($\bar{x}$=1.18) and animal resistance to diseases ($\bar{x}$=1.29) as well as increased productivity of animals ($\bar{x}$=1.07). Result on table 5.40 further shows that 59.3% of ruminant block meal beneficiaries derived high benefits from its utilisation in the study area. This indicated that the utilisation of the innovation was due to the benefits derived especially income generated from it.

This was affirmed by one of the beneficiaries from Iwo LGA, Osun State that…

"The only reason why I was motivated to utilize the innovation was because I noticed my goats consume the meal than if they were given the raw leaves and I noticed that it keeps them more indoor and less exposed to danger"

Table 5.39: Distribution of respondents by benefits derived from utilisation of ruminant block meal

Benefits of RBM	To a great extent		To a lesser extent		Not at all		Mean	Rank
	F	%	F	%	F	%		
Increased productivity of animals	9	33.3	11	40.7	7	25.9	1.07	7th
Increased Income	20	74.1	6	22.2	1	3.7	1.70	2nd
Animal resistance to diseases	12	44.4	11	40.7	4	14.8	1.29	5th
Increased skill and knowledge	19	70.4	7	25.9	1	3.7	1.67	3rd
Healthy breeds of animals	12	44.4	14	51.9	1	3.7	1.40	4th
Cheap animal feed	21	77.8	5	18.5	1	3.7	1.74	1st
Improved animal product	7	25.9	14	51.9	6	22.2	1.03	8th
Easy preparation of meal	10	37.0	12	44.4	5	18.5	1.18	6th

Source: Field survey, 2016

Table 5.40: Categorisation of respondents by benefits derived from ruminant block meal

RBM Benefit category	F	%	Min.	Max.	Mean	S.D
Low	11	40.7	8.00	18.00	12.15	2.23
High	16	59.3				
Total	**27**	**100.0**				

Source: Field survey, 2016

5.5.5. Benefits of farmers on Grasscutter domestication

From the field survey carried out on grasscutter domestication beneficiaries revealed that the top most benefits derived by the grasscutter farmers in order of preference included healthy breeds of animals ($\bar{x}$=1.56), increased income ($\bar{x}$=1.50) and resistance of animals to diseases ($\bar{x}$=1.39). Other benefits derived by the respondents included lesser capital to start business ($\bar{x}$=1.33), prolific nature of animals ($\bar{x}$=1.28) and easy preparation of meal ($\bar{x}$=0.67).

It was further revealed on table 5.42 that 55.6% of grasscutter beneficiaries derived high benefits from its utilisation in the study area. These benefits influenced the utilisation of the innovation as confirmed by one of the respondents during the FGD that:

"Grasscutter farming does not require much income to start the business and a farmer can be assured of realizing his capital within six months if well managed" (A male grasscutter farmer from Egbeda LGA of Oyo State).

Agbelusi (2013) also attested to the fact that grasscutter domestication is a profitable enterprise because of its social acceptability, meat quality, inexpensive feed sources and amenability to captive rearing, good litter size and short generation interval. He also reported that grasscutter is a good source of animal protein of high biological value.

Table 5.41: Distribution of respondents by benefits derived from utilisation of grasscutter domestication

Benefits of grass cutter Domestication	To a great extent		To a lesser extent		Not at all		Mean	Rank
	F	%	F	%	F	%		
Lesser capital	8	44.4	8	44.4	2	11.1	1.33	4th
Increased Income	10	55.6	7	38.9	1	5.6	1.50	2nd
Animal resistance to diseases	9	50.0	7	38.9	2	11.1	1.39	3rd
High productivity of animals	10	55.9	8	44.4	0	0.0	1.28	5th
Healthy breeds of animals	7	38.9	9	50.0	2	11.1	1.56	1st
Cost effectiveness	6	33.3	10	55.6	2	11.1	1.22	6th
Easy preparation of meal	6	33.3	9	50.0	3	16.7	0.67	8th
Preservation of green pasture	3	16.7	10	55.6	5	27.8	0.89	7th
High export rate	3	16.7	15	83.3	0	0.0	0.17	9th

Source: Field survey, 2016

Table 5.42: Categorisation of respondents by benefits derived from grasscutter by respondents

Grasscutter domestication benefit category	F	%	Min.	Max.	Mean	S.D
Low (3.0-10.49)	8	44.4	3.00	15.00	10.50	3.05
High(10.50-15.0)	10	55.6				
Total	**18**					

Source: Field survey, 2016

5.5.6. Benefits derived from sweet potato flour processing by respondents

Data obtained from the respondents on the benefits derived from sweet potato flour (Table 5.43) showed that improved product quality and taste of product ($\bar{x}$=1.61) were ranked as the highest benefit derived by the respondents in the study area followed by increased skill and knowledge and increased income ($\bar{x}$=1.56) and use of sweet potato peel for animal feed ($\bar{x}$=1.39). Other benefits derived by beneficiaries on the processing of sweet potato flour included cheap and available raw materials ($\bar{x}$=1.50), diversified livelihood activity ($\bar{x}$=1.44) since it is a new technology disseminated to them. Table 5.44 further revealed that 55.6% of SPF beneficiaries derived high benefits from its utilisation in the study area. This shows that the benefits derived from the innovation influenced utilisation of the disseminated research output. This was also confirmed by one of the beneficiaries during the FGD that:

"Though some of us had been involved in similar agricultural enterprise before the innovation was disseminated to us but we decided to give it a trial because we believed it will help improve our agricultural production and earn us more income" (A female sweet potato flour processor from Ilora, Oyo State)

Ladele *et al* (2015) also confirmed that retention of essential vitamins and nutrients and improved taste of product were parts of benefits of adding value to sweet potato.

Table 5.43: Distribution of respondents by benefits derived from utilisation of sweet potato flour

Benefits of Sweet potato flour	To a great extent		To a lesser extent		Not at all		Mean	Rank
	f	%	F	%		%		
Improved product quality	12	66.7	5	27.8	1st	5.6	1.61	1st
Diversified livelihood activity	9	50.0	8	44.4	6th	5.6	1.44	6th
Use of sweet potato peel for animal feed	9	50.0	7	38.9	7th	11.1	1.39	7th
Increased skill and knowledge	11	61.1	6	33.3	3rd	5.6	1.56	3rd
Cheap and available raw materials	10	55.6	7	38.9	5th	5.6	1.50	5th
Increased Income	11	61.1	6	33.3	3rd	5.6	1.56	3rd
Better health status	5	27.8	11	61.1	9th	11.1	1.17	9th
Improved taste of product	12	66.7	5	27.8	1st	5.6	1.61	1st
Available market	6	33.3	10	55.6	8th	11.1	1.22	8th

Source: Field survey, 2016

Table 5.44: Categorisation of respondents by benefits derived from SPF

SPF Benefit category	F	%	Min.	Max.	Mean	S.D
Low (9.0-13.05)	8	44.4	9.00	18.00	13.06	2.60
High(13.06-18.0)	10	55.6				
Total	**18**					

Source: Field survey, 2016

5.5.7. Benefits derived from sweet potato granule production by respondents

Research findings on the benefits derived by respondents on the production of sweet potato toasted granules in Afijio L.G.A (Table 5.45) revealed that increased skill and knowledge ($\bar{x}$=1.74), increased income and improved quality or value addition to sweet potato ($\bar{x}$=1.47) were the most benefits derived by the respondents. Other benefits derived were cheap and available raw materials ($\bar{x}$=1.42), diversified livelihood activity ($\bar{x}$=1.37) followed by use of sweet potato peel for animal feed, available market for products and improved taste of product ($\bar{x}$=1.05). Better health status ($\bar{x}$=1.00) was not derived to a great extent probably due to small scale production of the enterprise which did not allow the respondents to consume as much as they would want from the product. It was further explained on Table 5.46 that, 52.6% of SPG beneficiaries derived high benefits from its utilisation in the study area. All these benefits derived were due to the high knowledge and favorable attitude of the respondents to the processing of sweet potato toasted granule in the study area.

Meludu (2010) also attested that benefits derived from the production and consumption of sweet potato toasted granule included additional value of product, improved taste and retension of vitamin A in sweet potato.

Table 5.45: Distribution of respondents by benefits derived from utilisation of sweet potato toasted granule

SPG Benefits	To a great extent		To a lesser extent		Not at all		Mean	Rank
	F	%	F	%	F	%		
Cheap and available raw materials	9	47.4	9	47.4	1	5.3	1.42	4th
Increased Income	10	52.6	8	42.1	1	5.3	1.47	2nd
Use of sweet potato peel for animal feed	6	31.6	8	42.1	5	26.3	1.05	6th
Increased skill and knowledge	19	73.7	5	26.3	0	0.0	1.74	1st
Diversified livelihood activity	8	42.1	10	52.6	1	5.3	1.37	5th
Improved product quality	11	57.9	6	31.6	2	10.5	1.47	2nd
Better health status	4	21.1	11	57.9	4	21.1	1.00	9th
Improved taste of product	5	26.3	10	52.6	4	21.1	1.05	6th
Available market	4	21.1	12	63.2	3	15.8	1.05	6th

Source: Field survey, 2016

Table 5.46: Categorisation of respondents by benefits derived from SPG

SPG Benefit category	F	%	Min.	Max.	Mean	S.D
Low (9.0-11.62)	9	47.4	9.00	16.00	11.63	1.74
High(11.63-16.0)	10	52.6				
Total	**19**	**100.0**				

Source: Field survey, 2016

5.5.8 Overall benefits derived from UI agricultural research outputs by beneficiaries

It was revealed on Table 5.47 that increased income ($\bar{x}$=1.63) was the most benefit derived by beneficiaries of University of Ibadan in utilising the disseminated research outputs in the study area. This was closely followed by increased yield of agricultural produce/product ($\bar{x}$=1.51). Other benefits derived from utilising University of Ibadan agricultural research output were Improved market for produce/products ($\bar{x}$=1.46), Improved product quality ($\bar{x}$=1.43), cheap and available materials (1.41), Improved health status ($\bar{x}$=1.39) and Exportation of agricultural produce/products ($\bar{x}$=1.07). This is an indication that beneficiaries' knowledge about the disseminated research outputs enabled them derived more benefits which eventually influenced their utilisation of such research outputs.

This result conforms to the findings of Akinnagbe, Ukaegbu and Saddiq (2013) that benefits of utilising agricultural technology disseminated included increase in productivity, increased yield, increased quality and shelf life of products, and improved breed of crops and livestock.

Table 5.47: Distribution of respondents' overall benefits derived from utilisation of UI AROs

Benefits	To a great extent		To a lesser extent		Not at all			
	F	%	F	%	F	%	Mean	Rank
Increased yield	116	59.8	61	31.4	17	8.8	1.51	2nd
Increased Income	130	67.0	57	29.4	7	3.6	1.63	1st
Improved product quality	104	53.6	69	35.6	21	10.8	1.43	4th
Cheap and available materials	99	51.0	76	39.2	19	9.8	1.41	5th
Improved market for products	103	53.1	78	40.2	13	6.7	1.46	3rd
Improved health status	91	46.9	88	45.4	15	7.7	1.39	6th
Exportation of produce/products	68	35.1	71	36.6	55	28.4	1.07	7th

Source: Field Survey 2016

5.5.9 Benefit category of respondents on utilisation of UI agricultural research outputs

It was further revealed on Table 5.48 that most (62.4%) of the total beneficiaries' derived high benefits from the disseminated research outputs while 37.6% of the beneficiaries derived low benefits from the disseminated agricultural research outputs in their various adopted communities. This result confirms that more of the beneficiaries of each disseminated agricultural research output derived benefits as stated by one of the beneficiaries during an interview schedule session that…

> "*Additional income generated from the disseminated research output motivated my continuous utilisation despite the fact that it's a bit more stressful than what I am used to"* (A male fish farmer from Egbeda LGA, Oyo State)

Saka and Lawal (2009) also attested that derivation of more benefits than constraints encountered in agricultural production enhances faster adoption and utilisation of improved agricultural practices.

Table 5.48: Categorisation of respondents by overall benefits derived from utilisation of University of Ibadan agricultural research outputs

Overall benefit category	F	%	Min.	Max.	Mean	S.D
Low (3.0-12.0)	73	37.6	3.00	18.0	12.1	2.0
High (12.1-18.0)	121	62.4				
Total	**194**	**100.0**				

Field survey, 2016

5.6 Respondents' constraints to utilisation of UI agricultural research outputs

Constraints encountered by respondents in utilisation of the disseminated agricultural research outputs were determined for neem extract for pest control, moringa powder processing, grasscutter domestication, integrated farming system, feed block meal for ruminants, sweet potato flour and sweet potato toasted granule processing in the study area.

5.6.1: Constraints to utilisation of neem extract for pest control

It was discovered from the study as indicated on Table 5.49 by vegetable farmers that constraints militating against the use of neem extract for pest control included unavailability of water for most part of the year ($\bar{x}$=1.54), high technical expertise of the innovation ($\bar{x}$=0.69), large farm size ($\bar{x}$=0.67), foul smell of neem extract ($\bar{x}$=0.67), insufficient capital ($\bar{x}$=0.65), high labour intensity ($\bar{x}$=0.56), insufficient application materials ($\bar{x}$=0.52), religious barrier ($\bar{x}$=0.37), inaccessibility of neem leaves ($\bar{x}$=0.31) and lack of extension services respectively ($\bar{x}$=0.25).

Mgbenka and Mbah (2016) in a similar study also observed that the major constraints small-scale farmers encounter in utilisation and adoption of agricultural innovation in Southwestern Nigeria includes inadequate processing and infrastructural facilities, ready-made markets for products and high cost of labour.

Table 5.49: Respondents' constraints to utilisation of neem extract

Neem Constraints	Severe constraint		Mild constraint		Not a constraint		Mean	Rank
	F	%	F	%	F	%		
Lack of Capital	5	9.6	24	46.2	23	44.2	0.65	5th
Inaccessibility to neem leaf	3	5.8	10	19.2	39	75.0	0.31	9th
High technical expertise	6	11.5	24	46.2	22	42.3	0.69	2nd
Religious/cultural barrier	2	3.8	15	28.8	35	67.3	0.37	8th
High labour intensity of preparation and application	4	7.7	21	40.4	27	51.9	0.56	6th
Unavailability of water	30	57.7	20	38.5	2	3.8	1.54	1st
Lack of extension services	2	3.8	9	17.3	41	78.8	0.25	10th
Large farm size	9	17.3	17	32.7	26	50.0	0.67	3rd
Lack/Insufficient application materials e.g Knapsack sprayer	3	5.8	21	40.4	28	53.8	0.52	7th
Foul smell of neem extract	3	5.8	18	34.6	30	57.7	0.67	3rd

Source: Field survey, 2016

5.6.2. Constraints to utilisation of MP processing

Constraints encountered by moringa powder processors as indicated on Table 5.50 included insufficient capital (mean=1.00), high labour intensity (mean=0.47), poor infrastructural facilities (mean=0.29) and insufficient market (mean=0.29). Other constraints encountered by respondents include high technical expertise (mean=0.28), constant climate change (mean=0.24), sour taste of M.P (mean=0.24), lack of extension services (mean=0.18) and inaccessibility to moringa plant (mean=0.18).

This implies that insufficient capital and labor involved in moringa powder production posed more threat to beneficiaries than other forms of difficulties they encountered during production. This is probably due to the fact that not all beneficiaries do not have access to moringa drier at the same time and it is much more difficult to dry during rainy season. This was confirmed by the leader of the moringa women in Ile-Ogbo that…

> *"Our members find it a bit difficult to dry their leaves during reason because very few of them have the drier and the one belonging to the association is on first-come, first-serve basis"*(A female beneficiary from Ile-Ogbo in Osun State).

Table 5.50: Respondents' constraints to utilisation of MP

M.P Constraints	Severe constraint		Mild constraint		Not a constraint		Mean	Rank
	F	%	F	%	F			
Lack of Capital	2	11.8	13	76.5	2	11.8	1.00	1st
Inaccessibility to moringa plant	0	0.0	8	47.1	9	52.9	0.18	9th
High technical expertise	0	0.0	4	23.5	13	76.5	0.28	5th
Religious/cultural barrier	0	0.0	5	29.4	12	70.6	0.23	8th
High labour intensity of MP processing	0	0.0	4	23.5	13	76.5	0.47	2nd
Poor infrastructural facilities	0	0.0	3	17.6	14	82.4	0.29	3rd
Lack of extension services	0	0.0	3	17.6	14	82.4	0.18	9th
Insufficient market for product	0	0.0	4	23.5	13	76.5	0.29	3rd
Constant climate change	1	5.9	3	17.6	13	76.5	0.24	6th
Sour taste of MP	0	0.0	4	23.5	13	76.5	0.24	6th

Source: Field survey, 2016

5.6.3. Constraints to grasscutter domestication

Constraints faced by respondents on grass cutter domestication as shown on Table 5.51 included poor market for grass cutter product (mean=1.28), poor follow up by researchers (mean=1.22), insufficient infrastructural facilities (mean=1.17). Other constraints identified by the farmers included grass cutter domestication is labor intensive (mean=1.11), time consuming and capital intensive (mean=0.89), high technical expertise (mean=0.89), scarcity of animal feed (mean=0.78) and cage preparation (mean=0.78). This was affirmed by one of the beneficiaries that…

"*As nutritious as grasscutters are to humans, it's a pity that many people are not aware of this and there is still poor market for the product coupled with poor infrastructural facilities"* (A male grasscutter farmer from Egbeda LGA, Oyo State)

Unaeze, (2016) also attested that high demand for grasscutter meat and insufficient income has resulted in a decline in grasscutter production in Nigeria.

Table 5.51: Respondents' constraints to utilisation of grasscutter domestication

Constraints to Grasscutter domestication	Severe constraint		Mild constraint		Not a constraint		Mean	Rank
	F	%	F	%	F	%		
Capital intensive	2	11.1	12	66.7	4	22.2	0.89	5th
High technical expertise	3	16.7	10	55.6	5	27.8	0.89	5th
Religious/cultural barrier	0	0.0	3	16.7	15	83.3	0.17	10th
Stressful preparation of animal cage	2	11.1	10	55.6	6	33.3	0.78	8th
Scarcity of animal feed	1	5.6	12	66.7	5	27.8	0.78	8th
Poor market of animal product	7	38.9	9	50.0	2	11.1	1.28	1st
Animal domestication is labour intensive	4	22.2	8	44.4	6	33.3	1.11	4th
Poor follow up by UI researchers	6	33.3	10	55.6	2	11.1	1.22	2nd
Time consuming	4	22.2	12	66.7	4	22.2	0.89	5th
Insufficient infrastructural facilities	6	33.3	9	50.0	3	16.7	1.17	3rd

Source: Field survey, 2016

5.6.4. Constraints to the utilisation of IFS

Constraints of farmers practicing integrated farming system shown on Table 5.52 included high technical expertise (mean=1.19), lack of capital (mean=1.09), unavailable market for products (mean=0.95), high labour intensity (mean=0.88), lack of extension services (mean=0.81), poor infrastructural facilities (mean=0.79), illiteracy (mean=0.69), small farm size (mean=0.51) and constant climate change (mean=0.33). These constraints do not however have much influence on the farmers' level of utilisation of IFS.

One of the farmers also confirmed this affirmation that expertise and sufficient capital is needed for the utilisation of IFS…

> *'I would not have succeeded in utilising this innovation if I did not participate in the training and also had to source for fund to enable me maximize profit"* (A male fish farmer from Ibadan North LGA, Oyo State).

Table 5.52: Respondents' constraints to utilisation of integrated farming system

Constraints to IFS	Severe constraint		Mild constraint		Not a constraint		Mean	Rank
	F	%	F	%	F	%		
Lack of Capital	9	20.9	29	67.4	5	11.6	1.09	2nd
High technical expertise	12	27.9	27	62.8	4	9.3	1.19	1st
Religious/cultural barrier	0	0.0	7	16.3	36	83.7	0.16	10th
High labour intensity of innovation	8	18.6	22	51.2	13	30.2	0.88	4th
Poor infrastructural facilities	5	11.6	24	55.8	14	32.6	0.79	6th
Constant climate change	1	2.3	12	27.9	30	69.8	0.33	9th
Lack of extension services	9	20.9	17	39.5	17	39.5	0.81	5th
Illiteracy	0	0.0	3	7.0	40	93.0	0.69	7th
Small farm size	4	9.3	14	32.6	25	58.1	0.51	8th
Unavailable market for products	6	14.0	29	67.4	8	18.6	0.95	3rd

Source: Field survey, 2016

5.6.5. Constraints to utilisation of Ruminant Block Meal

Analysis of constraints encountered by ruminant farmers on the use of ruminant feed block as shown on Table 5.53 included poor follow up by researchers (mean=1.22), innovation is time consuming (mean=1.15), capital intensive (mean=1.17), high technical expertise (mean=1.11), poor knowledge about feed block preparation (mean=0.67) and stressful preparation of block meal (mean=1.00). Other constraints encountered included receptivity of some animals (mean=0.93), poor infrastructural facilities (mean=0.74) and religious barrier (mean=0.93).

This implies that there is need for beneficiaries to be evaluated after dissemination of agricultural technology to ensure sustainability of such practice/innovation.

FGD report also expatiated that….

"I would have been able to generate more income from this innovation if I had more capital to invest in it though it is a bit stressful without the help of laborers or family members" (A female beneficiary from Ibadan North LGA of Oyo State).

Table 5.53: Respondents' constraints to utilisation of ruminant block meal

Constraints to RFBP	Severe constraint		Mild constraint		Not a constraint		Mean	Rank
	F	%	F	%	F	%		
Capital intensive	5	18.5	19	70.4	3	11.1	1.07	4th
High technical expertise	8	29.6	14	51.9	5	18.5	1.11	3rd
Religious/cultural barrier	0	0.0		22.2	21	77.8	0.22	10th
Stressful preparation of block meal	6	22.2	15	55.6	6	22.2	1.00	5th
Poor infrastructural facilities like electricity, water	6	22.2	8	29.6	13	48.1	0.74	8th
Small number of ruminants (farm size)	4	14.8	14	51.9	9	33.3	0.81	7th
Distance of farm location	5	18.5	15	55.6	7	25.9	0.93	6th
Poor knowledge about feed block preparation	0	0.0	18	66.7	9	33.3	0.67	9th
Poor follow up by UI researchers on feed block pattern	11	40.7	11	40.7	5	18.5	1.22	1st
Time consuming	8	29.6	15	55.6	4	14.8	1.15	2nd

Source: Field survey, 2016

5.6.6. Constraints to utilisation of sweet potato flour production

Constraints encountered during processing of sweet potato flour by respondents (Table 5.54) included difficulty in peeling sweet potato (mean=1.21), marketing of product and high cost of sweet potato (mean=1.17), technicality involved in processing and seasonal scarcity of sweet potato (mean=1.11). Other constraints encountered included technicality involved in sweet potato flour production (mean=1.10), unacceptability of product by some respondents (mean=0.89) and difficult transportation of sweet potato to processing sites (mean=0.56).

This reflects that there is need for further research to provide simple and affordable tools and machines that can address the issue of peeling and drying of sweet potato flakes.

Ladele *et al* (2015) also found out that unfavorable perception of some consumers affected the marketing of sweet potato flour causing a decline in the demand and utilisation of SPF.

Table 5.54: Respondents' constraints to utilisation of sweet potato flour (n=18)

Constraints to SPF	Severe constraint		Mild constraint		Not a constraint		Mean	Rank
Sweet potato is difficult to peel	5	27.8	10	55.6	3	16.7	1.21	1st
Seasonal scarcity of sweet potato	4	22.2	12	66.7	2	11.1	1.11	4th
Sweet potato flour processing is labour intensive	4	22.2	13	72.2	1	5.6	1.17	2nd
High cost of sweet potato	4	22.2	13	72.1	1	5.6	1.17	2nd
Unacceptability of product	3	16.7	10	55.6	5	27.8	0.89	6th
Religious/cultural taboo	0	0.0	0	0.0	18	100.0	0.00	9th
Low income	0	0.0	0	0.0	18	100.0	0.00	9th
Difficult transportation of raw materials	0	0.0	10	55.6	8	44.4	0.56	8th
Unconducive environment for processing	1	5.6	14	77.8	3	16.7	0.89	6th
High technical skill required	4	22.2	12	66.7	2	11.1	1.11	4th

Source: Field survey, 2016

5.6.7. Constraints to utilisation of sweet potato toasted granule

As revealed from data obtained from respondents (Table 5.55), constraints encountered by respondents on sweet potato granule production included seasonal scarcity of sweet potato (mean=1.26), difficult transportation of raw materials to processing sites (mean=1.11) and high cost of sweet potato in the market (mean=1.05). Other constraints as rated by the respondents includes high cost of labour (mean=0.95), high capital (mean=0.89), difficult peeling of sweet potato (mean=0.47) and high technical skill (mean=0.42). This was further buttressed by one of the beneficiaries that…

> *"The seasonality of sweet potato to certain period of the year makes it difficult to produce SPF when it is not in season and we focus on some other crops in season at that period till it is in season again"* (A female sweet potato processor from Ilora, Oyo State).

Obayemi (2014) also indicated that constraints to utilisation of sweet potato toasted granule in Kwara State included difficulty in peeling of sweet potato, poor market demand and Lack of capital for sweet potato toasted granule production.

Table 5.55: Respondents' constraints to utilisation of sweet potato granule

Constraints to SPG	Severe constraint		Mild constraint		Not a constraint		Mean	Rank
	F	%	F	%	F	%		
Difficult peeling of Sweet potato	1	5.3	7	36.8	11	57.9	0.47	8th
Seasonal scarcity of sweet potato	7	36.8	10	52.6	2	10.5	1.26	1st
Sweet potato flour processing is labour intensive especially during wet seasons	2	10.5	14	73.7	3	15.8	0.95	4th
High cost of sweet potato	4	21.1	12	63.2	3	15.8	1.05	3rd
High capital	4	21.1	9	47.4	6	31.6	0.89	5th
Religious/cultural taboo	0	0.0	2	10.5	17	89.5	0.11	10th
Low income	3	15.8	6	31.6	10	52.6	0.63	7th
Difficult transportation of raw materials	6	31.6	9	47.4	4	21.1	1.11	2nd
High product competition in the market	2	10.5	13	68.4	4	21.1	0.89	5th
High technical skill required	2	10.5	4	21.1	13	68.4	0.42	9th

Source: Field Survey 2016.

5.6.8. Overall constraints to utilisation of UI agricultural research outputs

Overall constraints to utilisation of UI AROs as revealed on Table 5.56 indicated that the constraints (factors) militating against the utilisation of University of Ibadan agricultural research outputs included lack or insufficient capital (mean=0.84), high technical expertise of disseminated research output (mean= 0.83), high labour intensity of innovation (mean= 0.67). Other constraints encountered by beneficiaries included constant climate change (mean=0.67), unavailable market for produce/products (mean= 0.62), poor infrastructural facilities (mean=0.62), illiteracy (0.54) and lack of extension services (mean=0.53). This implies that most of the disseminated agricultural research outputs' utilisation level was influenced by insufficient capital, high technical expertise of some of the disseminated research outputs, high labor intensity of disseminated research output.

This finding is in consonance with Mgbenka and Mbah (2016) who identified the major constraints militating against the utilisation and adoption of agricultural innovation among small scale beneficiaries in Southwestern Nigeria as; inadequate processing and infrastructural facilities, ready-made markets for products, high cost of labour and lack of extension service linkage.

Table 5.56: Respondents' overall constraints to utilisation of UI agricultural research outputs

Constraints	Severe		Mild		Not a constraint			
	F	%	F	%	F	%	Mean	Rank
Lack/insufficient of Capital	25	12.9	112	57.7	57	29.4	0.84	1st
High technical expertise	37	19.1	86	44.3	71	36.6	0.83	2nd
Religious/cultural barrier	10	5.2	75	38.7	109	56.2	0.49	9th
High labour intensity of innovation	23	11.9	84	43.3	87	44.8	0.67	3rd
Poor infrastructural facilities	22	11.3	77	39.7	95	49.0	0.62	5th
Constant climate change	37	19.1	56	28.9	101	52.1	0.67	3rd
Lack of extension services	22	11.3	58	29.9	114	58.8	0.53	8th
Illiteracy	20	10.3	64	33.0	110	56.7	0.54	7th
Unavailable market for products	21	10.8	79	40.7	94	48.5	0.62	5th

Field survey, 2016

5.7. Respondents' utilisation of UI AROs

The utilisation level of the disseminated agricultural research outputs among beneficiaries were assessed on neem extract for pest control, moringa powder production, ruminant feed block meal, grasscutter domestication, integrated farming system, sweet potato flour and sweet potato toasted granule processing in Oyo and Osun States, Nigeria.

5.7.1. Utilisation of neem extract for pest control

The utilisation of neem extract for pest control by vegetable farmers as discovered from the research findings (Table 5.57) reveals that irrigating the farm with neem extract during dry season (mean=1.83) was mostly used by vegetable farmers in the study area to serve as irrigation method, this was responsible for the application of neem extract to crops by some farmers during the dry season only (mean=1.44). Many of the farmers also soak 1 kg of neem leaves in about 10 litres of water for neem extract solution (mean=1.01) while they also often add hot pepper to the neem extract before use (mean=0.92). Some farmers also indicated that they apply neem extract only on affected vegetables or plants (mean=0.88) while some keep neem leaves in sacks before soaking in water for easy removal (mean=0.85). Practices not well utilized by the respondents includes addition of wood ash to neem extract when applying on crops for efficiency (mean=0.42), addition of chemical pesticides to neem extract before use for effectiveness (0.31), boiling of neem leaves for few minutes before application to kill parasites on leaves (mean=0.12), and making use of neem leaf, seed and bark for neem extract insecticide (0.17). This result implies that farmers mostly make use of the innovation during dry season to serve as alternative irrigated farming due to lack of access to irrigation services in the study area during dry season. Another reason for that is because farmers will need to practice the innovation more often during wet seasons to avoid washing away by the rain. It was further explained on Table 5.58 that 55.8% of neem extract beneficiaries utilized the research output in the study area. This is not far from the fact that beneficiaries' had high knowledge and favorable attitude towards the research outputs which influenced their level of utilisation.

Table 5.57: Distribution of respondents' utilisation of neem extract for pest control

Neem extract practices	Always		Occasionally		Not at all	
	F	%	F	%	F	%
Neem leaf, seed and bark composition for neem extract solution	2	3.8	5	9.6	45	86.5
Soaking neem leaves and seed together for 2 weeks before spraying	3	5.8	15	28.8	34	65.4
Application of neem extract solution using knapsack sprayer	8	15.4	20	38.5	24	46.2
Addition of hot pepper to neem extract before spraying	12	23.1	24	46.2	16	30.8
Application of neem extract before crop cultivation	9	17.3	16	30.8	27	51.9
Neem extract application to only matured crops ready for harvesting	6	11.5	18	34.6	28	53.8
Application of neem extract to only infected vegetables or plants	15	28.8	16	30.8	21	40.4
Milling of neem leaf and seed before soaking	7	13.5	15	28.8	30	57.7
Weekly application of neem extract	8	15.4	18	34.6	26	50.0
Dry season application of neem extract	27	51.9	21	40.4	4	7.7
Application of neem extract before sunrise	2	3.8	15	28.8	35	67.3
Application of neem extract for rodent control	1	1.9	13	25.0	38	73.1
Addition of wood ash to neem extract for efficiency	5	9.6	12	23.1	35	67.3
Storage of neem leaves in sacks before soaking in water for easy removal	13	25.0	18	34.6	21	40.4
Irrigating with neem extract during dry season	30	57.7	13	25.0	8	15.4
Application of neem extract to plants at any time of the day	9	17.3	21	40.4	22	42.3
Fortification of neem extract with chemical pesticides for pest control	1	1.9	4	7.7	46	88.5
Boiling of neem leaves before application to kill parasites on leaves	0	0.0	6	11.5	46	88.5
Soaking of 1 kg of neem leaves in 10 litres of water to make neem extract solution	13	25.0	31	59.6	8	15.4
Application of neem extract solution for improved soil fertility	9	11.5	18	34.6	28	53.8
Inter-planting of neem tree on plot	9	17.3	7	13.5	36	69.2

Source: Field survey, 2016

Table 5.58: Categorisation of respondents' utilisation of neem extract for pest control

Neem extract utilisation category	F	%	Min.	Max.	Mean	S.D
Low (5.0-13.45)	23	44.2	5.00	32.00	13.46	4.38
High (13.46-32.0)	29	55.8				
Total	**52**	**100.0**				

Source: Field survey, 2016

5.7.2. Utilisation of MP

Utilisation of moringa powder by respondents as revealed on Table 5.59 indicated that majority (82.0%) of the women always sift MP after grinding to ensure fine texture and also use stove as source of heat in driers when drying moringa leaves during wet seasons respectively. It was also found out that many of the respondents (77.0%) always process MP by picking and drying of moringa leaves before milling and packaging as well as air dry moringa leaf properly before processing into powder respectively and many of them (71.0%) always turn moringa leaves regularly when drying to ensure even dryness. however, 82.0% of the women occasionally package MP at the early hours of the day to avoid moisture absorption, 77.0% of the respondents consume MP with any kind of food, 71.0% oven dry moringa leaves especially during raining seasons and 59.0% of the women package moringa powder manually by using funnel. On the other hand, 88.0% of the women do not add other beneficial leaves to MP to increase its nutritional content, 82.0% of them do not preserve packaged MP for months without losing its potency, do not use jik to kill germs and dirt on leaves and do not package MP when the powder is not properly dried respectively. Many, (77.0%) do not usually add preservatives to milled MP for longer shelf life and do not mill MP by themselves but makes use of machines. A little above average (59.0%) however do not add dry pepper to milled MP to help prevent weevil growth and also do not soak moringa leaves in warm water before drying and processing into powder to remove dirt and germs.

Furthermore, a little above half of MP beneficiaries had high (52.9%) utilisation of the agricultural research output (Table 5.60). The plausible reason for this could be attributed to respondents' knowledge of moringa powder processing, their favourable attitude and also benefits derived from the disseminated innovation.

FGD report also buttressed that ..

"*I decided to also partake in the production of moringa powder when I realized the nutritional benefits I can derived from its consumption in addition to the additional income I can generate from its sale"* (A female beneficiary from Ile-Ogbo in Osun State).

Table 5.59: Distribution of respondents' utilisation of MP

Moringa powder	Always		Occasionally		Not at all	
	F	%	F	%	F	%
Production of moringa powder from moringa leaves, bark and stem	0	0.0	3	17.6	14	82.4
Processing of moringa powder by picking and drying of moringa leaves before milling and packaging	13	76.5	4	23.5	0	0.0
Addition of dry pepper to milled moringa powder to prevent weevil growth	2	11.8	5	29.4	10	58.8
Use of funnel for moringa powder packaging	6	35.3	10	58.8	1	5.9
Air drying moringa leaf before processing into powder	13	76.5	4	23.5	0	0.0
Use of preservatives for prolonging shelf life of packaged moringa powder	0	0.0	3	17.6	14	82.4
Packaging of moringa powder into bottles and nylon even if not properly dried	0	0.0	3	17.6	14	82.4
Soaking of moringa leaves in warm water before drying to remove dirt and germs	1	5.9	6	35.3	10	58.8
Milling of moringa powder with mortal	3	17.6	14	82.4	0	0.0
Drying of moringa leaves on tree before picking and milling	0	0.0	2	11.8	15	88.2
Milling of moringa powder with milling machine	1	5.9	3	17.6	13	76.5
Addition of chilli pepper to moringa powder	0	0.0	4	23.5	13	76.5
Periodic turning of moringa leaves when drying	12	70.6	4	23.5	1	5.9
Use of coal for drying moringa leaves	4	23.5	13	76.5	0	0.0
Fortifying of moringa powder with other medicinal leaves	0	0.0	2	11.8	15	88.2
Oven-drying of moringa leaves during rainy seasons	4	23.5	12	70.6	1	5.9
Sifting of moringa powder to ensure fine texture	14	82.4	3	17.6	0	0.0
Use of water guard in soaking moringa leaves to kill germs and dirt on leaves	0	0.0	3	17.6	14	82.4
Re-packaging of moist moringa powder	1	5.9	4	23.5	12	70.6
Use of stove as source of heat in moringa drier to dry moringa leaves during wet seasons	14	82.4	3	17.6	0	0.0
Re-drying of moist moringa leaves	2	11.8	14	82.4	1	5.9

Source: Field survey, 2016

Table 5.60: Categorisation of respondents' utilisation of MP

MP utilisation category	F	%	Min.	Max.	Mean	S.D
Low (15.0-18.81)	8	47.1	15.00	24.00	18.82	2.48
High (18.82-24.0)	9	52.9				
Total	**17**	**100.0**				

Source: Field survey, 2016

5.7.3. Utilisation of ruminant block meal

Respondents' utilisation of ruminant block meal as revealed on Table 5.61 indicated that many, (67.0%) of the respondents always ensure that water for preparing Ruminant Block Meal boils before adding other ingredients, 63.0% of them always ensure proper preparation of ruminant block meal before feeding the animals to avoid indigestion, 56.0% of them always start preparation of block meals with the binding agent (starch) before adding other ingredients and always make use of only local feeds like gliricidia, cassava and moringa or neem leaves and dried cassava peel for preparing ruminant block meal respectively. Also, a little above average (59.0%) of them attested that they always prepare ruminant block meals under an hour, (52.0%) of them always finds it easy to prepare feed block meal only on weekends while 48.0% of them always make use of certain molds or container to enable the feed block meal form certain shapes after solidification.

However, more than half (56.0%) of the respondents occasionally allow their animals take enough water immediately after consuming feed block meals and also ensure the block meal is consumed in ruminant pens/houses to avoid littering of the environment while 48.0% of them occasionally restrict the consumption of block meals by ruminants to prevent heaviness of weight. On the other hand, majority **(**93.0%) of the respondents do not make use of water for the preparation of ruminant feed block, 77.0% disagreed that well prepared ruminant block meals stay for about 3 months without growing molds, 67.0% also do not make use of agro-industrial molasses, calcium, and magnesium in preparing ruminant feed block meal.

It was further shown on Table 5.62 that 55.6% of the beneficiaries had high utilisation of ruminant block meal in the study area. This is also due to the fact that they had been involved in similar agricultural enterprise before the dissemination of the research output which also influenced their utilisation in addition to the benefits derived from the research outputs. This was also confirmed by the increased number of beneficiaries trained during the dissemination of the agricultural research output.

Table 5.61: Distribution of respondents' utilisation of ruminant block meal

Ruminant feed block	Always		Occasionally		Never	
	F	%	F	%	F	%
Solidification of ruminant block meal can occur within 1 hour of preparation	16	59.3	11	40.7	0	0.0
Feeding of non-ruminants with ruminant block meals	4	14.8	10	37.0	13	48.1
Addition of agro-industrial by products like molasses, calcium and magnesium to ruminant block meal preparation	2	7.4	7	25.9	18	66.7
Preparation of ruminant block meal with neem, gliricidia, cassava leaf and dried peel	15	55.6	11	40.7	1	3.7
Storing of ruminant block meals for about 3 months after preparation	1	3.7	5	18.5	21	77.8
Non-use of water in the preparation of ruminant block meal	0	0.0	2	7.4	25	92.6
Use of molds for block meal preparation to form desired shape after solidification	13	48.1	11	40.7	3	11.1
Feeding of ruminants with block meal alone	7	25.9	8	29.6	12	44.4
Proper cooking of ruminant block meal before feeding	17	63.0	8	29.6	2	7.4
Feeding of only ruminants above 40kg with block meals	5	18.5	7	25.9	15	55.6
Mixing of leaves together alone without cooking of ruminant block meal	0	0.0	4	14.8	23	85.2
Use of any available leaf/grass for ruminant block meals during dry season	1	3.7	6	22.2	20	74.1
Apportioning of block meals to ruminants according to size and sex	4	14.8	13	48.1	10	37.0
Restriction of ruminant block meal consumption in pens to avoid littering	10	37.0	15	55.6	2	7.4
Feeding of only pregnant ruminants with block meal	4	14.8	14	51.9	9	33.3
Boiling of water for feed meal preparation before adding other ingredients	18	66.7	8	29.6	1	3.7
Giving ruminants enough water immediately after consuming block meal	8	29.6	15	55.6	4	14.8
Forcing of small ruminants to consume block meal	6	22.2	12	44.4	9	33.3
Feeding of female ruminants with block meal in different pens	5	18.5	13	48.1	9	33.3
Preparation of ruminant block meal only on weekends	14	51.9	7	25.9	6	22.2
Preceding preparation of block meals with starch before adding other ingredients	15	55.6	10	37.0	2	7.4

Source: Field survey, 2016

Table 5.62: Categorisation of respondents' utilisation of ruminant block meal

RBM utilisation category	F	%	Min.	Max.	Mean	S.D
Low (14.0-19.51)	12	44.4	14.00	24.00	19.52	2.53
High (19.52-24.0)	15	55.6				
Total	**27**	**100.0**				

Field survey, 2016

5.7.4. Utilisation of grass cutter domestication

Majority (83.3%) of the beneficiaries isolate infected animals until they are well treated (Table 5.63), majority of the respondents (72.2%) fumigates animal cages or house annually to avoid rodents and disease outbreaks, 66.7% restricts other pets or animals from entering grass cutter cages, many of the beneficiaries (61.1%) mates animals with f1 parent and treat the animals with antibiotics (61.1%), half of the respondents always dispose old female animals of over 4 years. However, many of the respondents (83.3%) do not practice the innovation for hide and skin production, a little above half of the respondents (55.6%) do not use wiremesh/ cage domestication method and half (50.0%) of the beneficiaries do not vaccinate animals on fortnight basis. However, a little above half (55.6%) of the beneficiaries had high utilisation of grass cutter domestication in the study area. (Table 5.64). The implication of this is that almost half of the beneficiaries did not utlise the research output effectively despite benefits derived from it. This is not far-fetched form the constraints encountered by respondents in the study area.

Mustafa, Akinyemi, Adewale, Odeleye and Abdulazeez (2015) also found out that grasscutter domestication is now on the increase because the meat now becoming popular especially in South-Western Nigeria due to increased awareness on its benefits and producing them under domesticated conditions in higher numbers would be a good source of supplementing the country's inadequate protein needs which is dependent on conventional livestock (Cattle, Sheep, Goats, Pigs and Poultry).

Table 5.63: Distribution of respondents' utilisation of grasscutter domestication

Utilisation statements	Always		Occasionally		Not at all		Mean
	F	%	F	%	F	%	
Herbivorous feeding of animals	5	27.8	8	44.4	5	27.8	1.00
Domestication with other pets/animals	5	27.8	6	33.3	7	38.9	0.89
Domestication for hide and skin	0	0.0	3	16.7	15	83.3	0.17
Wiremesh/cage domestication	2	11.1	6	33.3	10	55.6	0.56
Natural/organic feeding system	2	11.1	9	50.0	7	38.9	0.72
Regular treatment with antibiotics	11	61.1	6	33.3	1	5.6	1.56
Fortnight vaccination for improved reproduction	4	22.2	5	27.8	9	50.0	0.72
Isolation of infected animals	15	83.3	3	16.7	0	0.0	1.83
Free range domestication method	7	38.9	10	55.6	1	5.6	1.33
Enclosed/semi-intensive domestication system	4	22.2	11	61.1	3	16.7	1.06
Annual fumigation of cage/house	13	72.2	5	27.8	0	0.0	1.72
Mating with F1 parent	11	61.1	7	38.9	0	0.0	1.61
Segregation of pregnant animals	6	33.3	10	55.6	2	11.1	1.22
Restriction of other pets/animals into cages	12	66.7	6	33.3	0	0.0	1.67
Cross-breeding of grasscutter	5	27.8	7	38.9	6	33.3	0.94
Daily cleaning up of animals	5	27.8	8	44.4	5	27.8	1.00
Fencing of cage/house	6	33.3	7	38.9	5	27.8	1.06
Feeding of animal with concentrated processed meals	5	27.8	9	50.0	4	22.2	1.06
Disposal/sale of old females over 4 years	9	50.0	7	38.9	2	11.1	1.39
Grasscutters skin change occurs in females after each reproduction	6	33.3	7	38.9	5	27.8	1.06
Feeding with molasses and supplements daily	8	44.4	8	44.4	2	11.1	1.33

Source: Field survey, 2016

Table 5.64: Categorisation of respondents' utilisation of grasscutter domestication

Grass cutter utilisation category	F	%	Min.	Max.	Mean	S.D
Low (17.0-23.88)	10	44.4	17.00	31.0	23.89	3.98
High (23.89-31.0)	8	55.6				
Total	**18**	**100.0**				

Field survey, 2016

5.7.5. Utilisation of IFS

Utilisation of IFS by farmers in Ibadan North L.G.A. of Oyo State (Table 5.65) indicated that many of the farmers (61.0%) always cultivate rice on the fish pond and also keep poultry nearby. Also, many (61.0%) of the farmers affirmed always change the water regularly more than half of the farmers (51.0%) use poultry dung as manure for rice cultivation and also feed their fishes with maggots cultured from poultry dung. It was also discovered from the study that 59.0% of the farmers always locate poultry cage above the fish pond, 87.0% of the respondents hatch the fingerlings by themselves. Also, majority (84.0%) of the farmers created market by themselves through packaging of their agricultural products.

Result on Table 5.66 revealed that 55.8% of IFS beneficiaries had high utilisation of the research output in the study area. This implies that the benefits derived from the research output influenced the level of utilisation by beneficiaries.
FGD report also buttressed that …

"*I was motivated to practice this innovation because it helped me maximize available resources and at the same time generating more income through different agricultural production on the same piece of farmland"* (A male beneficiary of IFS from Ibadan North LGA).

Table 5.65: Distribution of respondents' utilisation of integrated farming system (n=43)

Integrated farming system	Always		Occasionally		Never		Mean
	F	%	F	%	F	%	
Cultivation of Rice on fish pond and keeping of poultry nearby	26	60.5	16	37.2	1	2.3	1.58
Use of poultry dung as manure for rice cultivation	22	51.2	20	46.5	1	2.3	1.49
Feeding of fish with maggots cultured from poultry dung	22	51.2	17	39.5	4	9.3	1.42
Feeding of fish with feed concentrates alone	18	41.9	22	51.2	3	7.0	1.35
Locating of poultry cage above the fish pond	25	58.1	17	39.5	1	2.3	1.56
Changing of fish pond water every three months	26	60.5	16	37.2	1	2.3	1.58
Use of natural water source for fish pond	37	86.0	6	14.0	0	0.00	1.86
Harvesting of rice exactly after harvesting the second batch of stocked fishes	11	25.5	22	51.2	10	23.3	1.02
Harvesting of fishes and rice at the same	3	7.0	6	14.0	34	79.1	0.28
Polishing of rice on the farm after harvesting	4	9.3	20	46.5	19	44.2	0.65
Self-hatching of fingerlings/juveniles	37	86.0	6	14.0	0	0.00	1.84
Processing of fish after harvesting (smoke/dry)	36	83.7	7	16.3	0	0.00	1.86
Bulk harvesting of stocked fishes at the same period	26	60.5	4	9.3	13	30.2	1.30
Feeding of fishes at least twice a day	9	20.9	20	46.5	14	39.5	0.89
Use of chemical pesticide on rice farm	0	0.0	3	7.0	40	93.0	0.69
Feeding of poultry birds with fish extracts	10	23.3	16	37.2	17	39.5	0.83
Use of dragnet for harvesting of fishes	25	58.1	13	30.2	5	11.63	1.47
Harvesting of fishes and rice at different intervals	31	72.1	6	14.0	6	14.0	1.58
Use of fresh moringa and pawpaw leaves as antibiotics for stocked fishes	1	2.3	8	18.6	34	79.1	0.23
Packaging of farm products for improved market	36	83.7	7	16.3	0	0.0	1.84
Harvesting of fishes after six months of stocking	36	83.7	7	16.3	0	0.0	1.84

Table 5.66: Categorisation of respondents' utilization of IFS

IFS utilisation category	F	%	Min.	Max.	Mean	S.D
Low (21.0-26.52)	19	44.2	21.00	33.0	26.53	3.21
High (26.53-33.0)	24	55.8				
Total	**43**	**100.0**				

Field survey, 2016

5.7.6 Utilisation of sweet potato flour

Utilisation of sweet potato flour by respondents as shown on Table 5.67 revealed that majority of the respondents (77.8%) wash sweet potato before and after peeling to remove dirt, more than half of them soak sliced sweet potato in water after peeling to remove some starch before drying as well as dry sweet potato flakes only in perforated trays (55.6%). Many of the respondents mill dry sweet potato flour with grinding machine (66.7%) and also sieve sweet potato flour after milling for a finer texture (61.1%). More than half of the respondents also ensure uniform cutting of sweet potato to ensure faster drying (66.7) and oven dry sweet potato during raining seasons (77.8%).

It was however revealed on Table 5.68 that 55.6% of SPF beneficiaries had high utilisation of the research output in the study area. This is also due to the fact that they had been involved in similar agricultural enterprise before the dissemination of the research output which also influenced their utilisation in addition to the benefits derived from the research outputs as discovered during the FGD carried out with the different agricultural enterprise groups.
Ladele *et al* (2015) also emphasized that the value addition to sweet potato into powdery form and retention of essential nutrients and vitamins motivated the utilisation of SPF among producers and consumers of sweet potato in South-West, Nigeria.

Table 5.67: Distribution of respondents' utilisation of sweet potato flour

Sweet potato flour utilisation statements	Always		Occasionally		Never	
	f	%	f	%	f	%
Washing of sweet potato before and after peeling to remove dirt	14	77.8	3	16.7	1	5.6
Soaking of sliced sweet potato in water after peeling to remove some starch before drying	10	55.6	7	38.9	1	5.6
Open sun drying of sweet potato flakes	9	50.0	8	44.4	1	5.6
Drying of sweet potato flakes with use of perforated trays	10	55.6	7	38.9	1	5.6
Air-drying of sweet potato flakes instead of sun drying	7	38.9	6	33.3	5	27.8
Use of any sharp object for peeling sweet potato	5	27.8	7	38.9	6	33.3
Washing of sweet potato just once after peeling before drying	1	5.6	3	16.7	14	77.8
Milling of dried sweet potato flakes with grinding machine	12	66.7	6	33.3	0	0.0
Use of wire mesh or net for drying sweet potato flakes	10	55.6	6	33.3	2	11.1
Cutting and drying of sweet potato without peeling if properly washed	0	0.0	2	11.1	16	88.9
Preservation of sweet potato flour with little dry pepper to avoid weevil growth	0	0.0	1	5.6	17	94.4
Packaging of dried sweet potato flakes in polythene bags before milling to avoid absorbing moisture	9	50.0	8	44.4	1	5.6
Sieving of sweet potato flour after milling for a finer texture	11	61.1	5	27.8	2	11.1
Oven drying of sweet potato during rainy seasons	14	77.8	3	16.7	1	5.6
Uniform cutting of sweet potato flakes to ensure faster drying	12	66.7	5	27.8	1	5.6
Packaging of sweet potato flour in bottles	8	44.4	7	38.9	3	16.7
Pounding of dried sweet potato flakes with mortal in the absence of milling machine	12	66.7	5	27.8	1	5.6
Fortification of sweet potato flour with cereal to enrich its nutrient	0	0.0	3	16.7	15	83.3
Net covering of sweet potato flakes while sun-drying to avoid contamination	11	61.1	5	27.8	2	11.1
Addition of preservatives to sweet potato flour for a longer shelf life	0	0.0	4	22.2	14	77.8
Addition of flavor to sweet potato flour to enhance its taste	0	0.0	2	11.1	16	88.9

Table 5.68: Categorisation of respondents' utilization of SPF

SPF utilisation category	F	%	Min.	Max.	Mean	S.D
Low (14.0-21.77)	8	44.4	14.00	26.0	21.78	3.15
High (21.78-26.0)	10	55.6				
Total	**18**	**100.0**				

Field survey, 2016

5.7.7 Utilisation of sweet potato granules

Utilisation of sweet potato toasted granule by respondents in the study area (Table 5.69) revealed that majority (84.0%) of the respondents attested that they had their children and family members' support during the processing of sweet potato toasted granules and they always jack fermented sweet potato in sacs before toasting. It was also reported that many (74%) of the respondents toast the sweet potato granules in the same environment where they usually ferment it and that they sieve sweet potato before and after toasting. Majority (73.7%) of the respondents sieve sweet potato before and after toasting, 68.4% of the respondents usually ferment sweet potato before milling and toasting , more than half (52.6%) peel sweet potato with knife or any sharp object and also ensures fermentation of sweet potato takes place in sacks.

On the other hand, it was also gathered that many of the respondents (73.7%) did not dry sweet potato a little after fermentation for easy toasting, many 63.2% do not package sweet potato granules into plastic containers and that they (73.7%) do not dry sweet potato a little after fermentation for easy toasting.

Table 5.70 however revealed that 57.9% of the beneficiaries had high utilisation of the research output in the study area. This result also conforms with Meludu's (2013) claim that sweet potato toasted granule production increased respondents' income which caused a favourable attitude and utilisation of the research output.

Table 5.69: Distribution of respondents' utilisation of sweet potato toasted granule

Sweet potato granules	Always		Occasionally		Never	
	F	%	F	%	F	%
Fermentation of sweet potato before milling to reduce starch content	11	57.9	6	31.6	2	10.5
Regular changing of water during fermentation	13	68.4	5	26.3	1	5.3
Fermentation of sweet potato for at least two days before toasting	11	57.9	6	31.6	2	10.5
Toasting of sweet potato granules with regular frying pot (agbada)	9	47.4	9	47.4	1	5.3
Frying of sweet potato granules instead of toasting	0	0.0	2	10.5	17	89.5
Peeling of sweet potato with knife or any sharp object	10	52.6	5	26.3	4	21.05
Washing of sweet potato after peeling just once before milling	3	15.8	6	31.6	10	52.6
Toasting of sweet potato granules on low heat	2	10.5	10	52.6	7	36.8
Addition of oil to the toasting pan before toasting sweet potato granules	0	0.0	2	10.5	17	89.5
Milling of sweet potato without peeling if properly washed	0	0.0	0	0.0	19	100.0
Sieving of sweet potato only before toasting	14	73.7	5	26.3	0	0.0
Fermentation of sweet potato in sacks	10	52.6	6	31.6	3	15.8
Sieving of sweet potato granules after toasting for a finer texture	7	36.8	7	36.8	5	26.3
Drying of sweet potato after fermentation for easy toasting	1	5.3	4	21.1	14	73.7
Ensuring cooling of toasted granules before packaging	16	84.2	3	15.8	0	0.0
Packaging of toasted sweet potato granules into sacks	6	31.6	12	63.2	1	5.3
Use of brush or short broom to toast the granules on fire	8	42.1	8	42.1	3	15.8
Use of carved wood (igbako) to toast the granules	16	84.2	3	15.8	0	0.0
Jacking of fermented sweet potato in sacs before toasting	16	84.2	2	10.5	1	5.3
Toasting of sweet potato granules in the same environment where it was fermented	14	73.7	4	21.1	1	5.3
Toasting of sweet potato granules for less than twenty minutes on medium heat after sieving the fermented sweet potato	2	10.5	13	68.4	4	21.1

Source: Field Survey 2016.

Table 5.70: Categorisation of respondents' utilization of SPG

SPG utilisation category	F	%	Min.	Max.	Mean	S.D
Low (17.0-24.01)	8	42.1	17.00	28.0	24.02	2.65
High (24.02-28.0)	11	57.9				
Total	**19**	**100.0**				

Field survey, 2016

5.7.8 Utilisation of University of Ibadan agricultural research outputs

Data on Table 5.71 revealed that a little above average (55.7%) of the beneficiaries had high level of utilisation of the disseminated research outputs while 44.3% of the beneficiaries had low utilisation level of the disseminated research outputs from University of Ibadan. It could be deduced from the finding that most of the respondents made use of the disseminated research outputs. Beneficiaries' high level of knowledge, favorable attitude and benefits derived from the disseminated research outputs contributed to their utilisation of U.I agricultural research outputs. This was confirmed by one of the beneficiaries during one of the FGDs that…

'*What motivated my utilisation of the disseminated research outputs was that it helped to generate more income, better products and had increased my skill in the agricultural enterprise as well"*(A male fish farmer from Ibadan North LGA, Oyo State)

It was evident from the result that beneficiaries' high knowledge (due to their education background), favorable attitude and benefits derived from the disseminated research outputs influenced their high utilisation of the various disseminated agricultural research outputs. This was corroborated by Saka and Lawal (2009) that farmers' level of education enhances the utilisation of improved technology as well as their innovativeness and the benefits derived from such innovation.

Mgbenka and Mbah (2016) also corroborated the fact that farmers' level of education, social status, gender difference and land tenure system contributes to the utilisation of agricultural technologies in Nigeria.

Table 5.71: Categorisation of respondents' overall utilisation of UI AROs

Overall utilisation category	F	%	Min.	Max.	Mean	S.D
Low (5.0-20.63)	86	44.3	5.00	33.00	20.63	6.039
High (20.64-33.0)	108	55.7				

Field survey, 2016

5.8 Determinants of utilisation of University of Ibadan agricultural research outputs

Factors responsible for beneficiaries' utilisation of UI disseminated agricultural outputs were considered for neem extract for pest control, moringa powder processing, integrated farming system, grasscutter domestication, ruminant feed block meal, sweet potato flour and sweet potato toasted granule processing.

5.8.1 Determinants of utilisation of neem extract for pest control

Multiple regression analysis carried out to determine the factors affecting the use of neem extract for pest control among vegetable farmers in the study area as shown on Table 5.72 revealed that Educational level (β=0.261, p=0.012), Household size (β=0.128, p=0.044) and respondents' monthly income (β=0.217, p=0.000) had significant influence on the utilisation of neem extract for pest control. Educational status was found to be significant and positively related to the utilisation of neem extract in the study area. This implies that level of education among the respondents has influence on the utilisation of neem extract because of the technicality involved in its preparation and application. Similarly, respondents' monthly income was found to be significantly related to the utilisation of neem extract. This suggests that as respondents' monthly income increases, the utilisation of neem extract increases. Household size was also found to be positively related to the utilisation of neem extract, suggesting that the higher the household size, the higher the level of utilisation of neem extract. The table further reveals that respondents' knowledge (β=0.234, p=0.001) and the benefits derived (β=0.306, p=0.023) significantly contributed to the utilisation of the research output in the study area.

Mbanaso *et al*, (2011) also confirmed in their study that farmer's educational status and income level are major factors that influence the adoption of agricultural innovations.

Table 5.72: Factors affecting utilisation of neem extract for pest control

Factors	β	SE	P	Inference
(Constant)		14.316	0.000	
Sex	-0.009	1.819	0.954	NS
Age	0.267	0.114	0.313	NS
Marital status	-0.352	0.762	0.153	NS
Religion	0.198	0.714	0.290	NS
Education level	0.261	0.888	0.012*	S
Household size	-0.128	0.873	0.044*	S
Monthly Income	0.217	0.307	0.000*	S
Farm Size	0.109	0.630	0.491	NS
Extension services	0.065	0.933	0.711	NS
Credit facilities	-0.002	0.146	0.991	NS
Attitude	-0.119	0.220	0.475	NS
Knowledge	0.234	0.350	0.001*	S
Benefits	0.306	0.404	0.023*	S
Constraints	-0.104	0.346	0.531	NS
$R = 0.543$, $R^2 = 0.295$, Adj. $R = 0.20$				

Source: Field survey, 2016

5.8.2 Determinants of utilisation of ruminant block meal

Result obtained from the regression analysis on the factors affecting utilisation of ruminant feed block pattern among ruminant farmers in the study area (Table 5.73) reveals that Age (β=-0.243, p=0.014), Monthly income (β=0.118, p=0.038), respondents' attitude (β=0.221, p=0.027) and constraints encountered on the preparation of ruminant feed block pattern (β=-0.135, p=0.004) had significant influence on utilisation of ruminant feed block pattern. This implies that younger respondents were more innovative while the older respondents were more conservative about the utilisation of the innovation. Also, high income derived from an innovation can encourage the utilisation of such innovation for sustainability and the more constraints encountered, the less the utilisation level and vice versa.

This result supports Bamigboye *et al* (2013)'s claim that the attitude of the respondents in the study area towards the innovation is a major factor to be considered for continuous utilisation of the research output.

Table 5.73: Factors affecting utilisation of ruminant block meal

Factors	B	SE	P	Inference
(Constant)		9.846	0.001	
Sex	0.189	1.868	0.530	NS
Age	0.243	0.115	0.014*	S
Marital status	0.191	6.280	0.695	NS
Religion	0.257	1.648	0.337	NS
Education level	0.055	0.941	0.822	NS
Household size	0.048	0.943	0.912	NS
Monthly Income	0.118	0.475	0.038*	S
Access to extension services	-0.455	0.911	0.117	NS
Credit facilities	0.042	0.843	0.870	NS
Knowledge	0.137	0.360	0.634	NS
Attitude	0.221	0.141	0.027*	S
Benefit	-0.137	0.328	0.643	NS
Constraints	-0.135	0.415	0.004*	S
$R = 0.691$, $R^2 = 0.477$, Adj R= 0.046				

***= Significant at 0.05 level of significance**

Source: Field survey, 2016

5.8.3 Determinants of utilisation of grasscutter domestication

Result obtained from the regression analysis on the factors affecting domestication of grasscutters in the study area (Table 5.74) reveals that Age (β=-0.767, p=0.033), Household size (β=-1.384, p=0.025), monthly income (β=1.102, p=0.032) and farming experience (β=0.955, p=0.030) affected the utilisation of the research output. It was further revealed on the same table that respondents' knowledge (β=0.644, p=0.041) and benefits derived from the innovation (β=0.273, p=0.007) had significant influence on the domestication of grasscutters by the respondents. This implies that younger farmers found it easier to utilize the innovation than the older farmers because it is labour intensive and the adaptation of experience from other livestock management also assisted in the domestication of grass cutter. Large household size also assisted in providing family labour in the utilisation of the innovation while part of the benefits derived by the respondents included improved protein intake by the respondents' household.

This result also agrees with Unaeze, (2016) that determinants of grasscutter production included years of farming experience and benefits derived from the agricultural production.

Table 5.74: Factors affecting utilisation of grasscutter domestication

Factors	β	SE	Sig.	Inference
(Constant)		19.635	0.111	
Age	-0.767	0.085	0.033*	S
Religion	-0.092	2.321	0.783	NS
Education level	0.456	0.643	0.102	NS
Household size	-1.384	0.977	0.025*	S
Monthly Income	1.102	0.641	0.032*	S
Farm Size	0.386	0.937	0.382	NS
Farming Experience	0.955	0.747	0.030*	S
Extension services	0.007	1.009	0.983	NS
Credit facilities	0.677	1.178	0.129	NS
Knowledge	0.644	0.537	0.041*	S
Attitude	0.365	0.225	0.235	NS
Constraints	-0.217	-0.718	0.103	NS
Benefit	0.273	0.310	0.007*	S
R =0.634, R^2= 0.573, Adj. R= 0.493				

***= Significant at 0.05 level of significance**

Source: Field survey, 2016

5.8.4 Determinants of utilisation of integrated farming system

Result obtained from the regression analysis of the determinants of utilisation of Integrated farming system in the study area (Table 5.75) reveals that monthly income (β=0.077, p=0.003), years of farming experience (β=0.188, p=0.019) and scale of production (β=0.105, p=0.008) were the factors responsible for the utilisation of Integrated farming system among farmers in the study area.

It was further revealed on the table that respondents' attitude (β=0.263, p=0.027) and benefits derived from the innovation (β=0.016, p=0.004) had significant influence on the utilisation of IFS in the study area. This result implies that the benefits derived by the respondents in the utilisation of the innovation influenced their attitude and thus, the utilisation level of the respondents. Also, small scale production of the enterprise encouraged the respondents' utilisation as it was easier to manage than larger farms and less labour intensive.

FGD report also corroborated the fact that …

Increased income and various benefits I derived from this innovation motivated me to practice this it and I am still planning to enlarge my farm size" (A male beneficiary from Ibadan North LGA of Oyo State).

Table 5.75: Factors affecting utilisation of IFS

Factors	β	SE	Sig.	Inference
(Constant)		15.24	0.001	
Age	0.105	0.126	0.616	NS
Marital status	-0.215	5.84	0.250	NS
Religion	0.011	2.337	0.951	NS
Education level	0.088	1.754	0.627	NS
Household size	-0.278	1.177	0.273	NS
Monthly Income	0.077	0.192	0.003*	S
Years of Experience	0.188	0.936	0.019*	S
Scale of production	0.105	0.885	0.008*	S
Extension services	0.191	1.250	0.298	NS
Credit facilities	0.102	1.114	0.544	NS
Knowledge	0.311	0.511	0.088	NS
Attitude	0.263	0.139	0.027*	S
Constraints	0.006	0.361	0.970	NS
Benefits	0.039	0.016	0.004*	S
$R = 0.607$, $R^2 = 0.368$ Adj R= 0.339				

***= Significant at 0.05 level of significance**

Source: Field survey, 2016

5.8.5 Determinants of MP utilisation

Data obtained on Table 5.76 revealed that Age (β=0.369, p=0.022), and scale of production (β=0.538, p=0.014) were the significant factors responsible for the processing of moringa powder in the study area.

It was further revealed from the result obtained that respondents' attitude (β=0.263, p=0.027), benefits derived (β=0.016, p=0.004) and constraints encountered (β=0.016, p=0.004) in moringa powder production were also factors that influenced the utilisation of moringa powder processing in the study area. This implies that younger women found the utilisation of moringa powder easier as older women found it difficult to market the product. Respondents that produced MP on a larger scale acquired more income which influenced their favourable attitude towards the innovation. Some health benefits also derived from the consumption of MP also influenced their utilisation of the innovation despite the fact that there were some setbacks.

This result was further corroborated by Kola-Oladiji, *et al* (2014) in a similar study that nutritional and financial benefits derived from *moringa oleifera* production enhanced its increased production in Oyo State.

Table 5.76: Factors affecting utilisation of MP processing

factors	B	SE	Sig.	Inference
(Constant)	0.409	18.949	0.000	
Age	0.369	0.084	0.022*	S
Religion	0.169	2.263	0.873	NS
Education level	0.222	0.800	0.833	NS
Household size	-1.879	0.837	0.119	NS
Income	1.858	1.011	0.122	NS
Farm Size	0.607	2.389	0.570	NS
Scale of production	0.538	1.577	0.014*	S
Knowledge	0.040	0.655	0.346	NS
Attitude	0.626	0.254	0.044*	S
Benefit	0.969	0.382	0.029*	S
Constraints	-0.682	0.545	0.036*	S
R =0.663 R^2 =0.544 Adj. R=0.382				

***= Significant at 0.05 level of significance**

Source: Field survey, 2016

5.8.6 Determinants of utilisation of sweet potato flour

Result from Table 5.77 on factors affecting the utilisation of sweet potato flour revealed that household size (β=-2.311, p=0.031), years of processing experience (β=1.228, p=0.029) and scale of production (β=2.015, p=0.044) were significant factors responsible for the processing of sweet potato flour in the study area.

This implies that respondents with higher household size tend to utilize the innovation the more because they will spend less on labor. Also, respondents with more years of processing experience utilized the innovation more than those with lower years of processing experience as they would have likely derived more benefits from MP processing. Respondents that produced on a larger scale also utilized the innovation the more because they acquired more income from larger production. The previous knowledge of the respondents on cassava flour production influenced their utilisation of the innovation and also the benefits derived from the research output.

It was further revealed from the study that labour cost (β=-1.086, p=0.034) inversely influenced respondents' utilisation of sweet potato flour in the study area indicating that the higher the cost incurred on labour, the lower the utilisation of the innovation.

Table 5.77: Factors affecting utilisation of sweet flour

Factors	SE	β	Sig.	Inference
(Constant)	24.777		.000	
Age	.260	1.615	.106	NS
Education level	.595	.006	.980	NS
Household size	1.800	2.311	.031	S
Monthly Income	.000	.429	.184	NS
Farm Size	2.012	-.745	.071	NS
Processing Experience	.189	1.228	.029	S
Source of labour	1.511	-.350	.394	NS
Scale of production	2.618	2.015	.044	S
Belong to farmer grp	5.150	.930	.139	NS
Cost of tools	2.299	.813	.171	NS
Labour cost	1.510	-1.086	.034	S
Attitude	.240	.077	.791	NS
R = 0.933 R^2=0.561 Adj. R=0.671				

***= Significant at 0.05 level of significance**

Source: Field survey, 2016

5.8.7 Determinants of utilisation of sweet potato toasted granule

Result from Table 5.78 on factors affecting the utilisation of sweet potato granule by respondents revealed that Age (β=-1.458, p=0.024),years of processing experience (β=1.223, p=0.013) and scale of production (β=0.325, p=0.015) were significant factors responsible for the processing of sweet potato granule in the study area.

It was further revealed from the study that respondents' knowledge (β=0.206, p=0.035) as well as benefits derived (β=0.126, p=0.000) from sweet potato granule production were also factors that influenced their utilisation of Sweet potato granule in the study area. This implies that younger respondents were more involved in the enterprise and those that produced on a larger scale acquired more income. The previous knowledge of the respondents on cassava production influenced their utilisation of the innovation and also the benefits derived from the research output.

This result confirms Meludu *et al* (2010)'s claim that the knowledge of respondents on sweet potato toasted granule as well as their farming/processing experience is a major determinant of their adoption of the research output.

Table 5.78: Factors affecting utilisation of sweet potato granule

Factors	β	SE	Sig.	Inference
(Constant)		7.410	0.010	
Age	-1.458	0.138	0.024*	S
Religion	0.130	1.459	0.618	NS
Education level	-0.058	0.572	0.831	NS
Household size	0.779	1.378	0.297	NS
Income generating activities	0.136	0.967	0.607	NS
Farm Size	0.172	1.462	0.563	NS
Years of experience	1.223	0.722	0.013*	S
Scale of production	0.325	0.687	0.015*	S
Extension services	0.139	2.330	0.718	NS
Credit facilities	0.354	0.832	0.254	NS
Knowledge	0.206	0.397	0.035*	S
Attitude	0.195	0.119	0.632	NS
Benefit	0.126	0.013	0.000*	S
R = 0.685 R^2=0.583 Adj. R=0.443				

***= Significant at 0.05 level of significance**

Source: Field survey, 2016

5.8.8 Determinants of utilisation of University of Ibadan Agricultural Research Outputs

Multiple regression analysis (Table 5.79) was carried out to determine the factors influencing the utilisation of University of Ibadan research outputs in the study area. The coefficient of determination, R^2 values of 0.536 indicated that 53.6% of the variations in the utilisation of University of Ibadan research outputs were explained by the independent variables included in the model. The result further reveals that utilisation of University of Ibadan research output is significantly determined by respondents' attitude towards UI research outputs (β=0.611), educational qualification (β=0.462), knowledge of UI research outputs (β=0.446), scale of production (β =0.325) and constraints to the use of UI research output (β=-0.210). The significant relationship between attitude towards UI research outputs and utilisation of UI research output indicates that the more beneficiaries are favourably disposed to the research outputs, the higher their level of utilisation. In addition, the significant relationship between respondents' educational qualification and utilisation of UI research outputs suggests that the higher the educational qualification of respondents, the higher the level of utilisation of UI research output. Similarly the relationship between respondents' knowledge of UI research outputs and utilisation of UI research output implies as knowledge of UI research output increases, utilisation of UI research outputs tends to increase. Likewise, the significant contribution of scale of production connotes that respondents who operate on large scale tend to utilize more of the research outputs. On the other hand, the negative relationship between constraints to the use of UI research output and utilisation of UI research output is an indication that as constraints faced by respondents increases, the utilisation of UI research output decreases.

Table 5.79: Factors affecting utilisation of UI agricultural research outputs

Factors	β	SE	Sig.	Inference
(Constant)		0.410	0.000	
Age	0.073	0.048	0.329	NS
Sex	0.123	0.772	0.061	NS
Marital status	0.103	0.501	0.830	NS
Religion	0.065	0.766	0.218	NS
Education level	0.462	1.055	0.024*	S
Household size	-0.047	0.358	0.541	NS
Group participation	0.136	0.967	.607	NS
Years of experience	0.271	0.722	0.013*	S
Scale of production	0.325	0.687	0.015*	S
Extension services	0.139	2.330	0.718	NS
Access to credit facilities	0.354	0.832	.254	NS
Knowledge	0.446	0.129	0.012*	S
Attitude	0.611	0.817	0.000*	S
Benefit	0.090	0.635	0.079	NS
Constraints	-0.210	0.124	0.000*	S
$R^{=}$ 0.732	R^2=0.536			

***= Significant at 0.05 level of significance**

Field survey, 2016

5.9 Test of Hypotheses

5.9.1 Relationship between respondents' personal characteristics and level of utilisation of UI AROs

Chi-square results on Table 5.80 indicated that there was a significant relationship between utilisation of University of Ibadan agricultural research outputs and the following variables: marital status (χ^2=5.998; p<0.05); sex (χ^2=3.924), education (χ^2=30.693) while PPMC result on Table 5.81 revealed that age (r=-0.227) and income (r=0.791) were also significant to utilisation of UI agricultural research outputs. This finding suggests that the married are more likely to utilize the innovation output than the unmarried due to support received from their spouses. On the level of education, the higher the educational qualification, the more a respondent is likely to utilise the innovation output. This finding agrees with Oyebade (2014) that the level of education of farmers had significant relationship with innovation utilisation. Saka and Lawal, (2009) also confirmed in a similar study that education enhances the utilisation of improved technology by the farmers as well as their innovativeness.

The significant relationship between sex of respondents and utilisation of university of Ibadan innovation output agrees with Garner *et al* (2014) that gender plays significant role in accessing agricultural information and hence utilisation of innovation.

Similarly, significant relationship between respondents' income and utilisation of University of Ibadan innovation outputs suggest that a respondent with high income is more likely to utilise the innovation output than low income earners. The significant relationship between age and utilisation of innovation output implies that utilisation of the innovation output increases with the age of the respondents which corroborates the finding of Ofuoku (2011) that age is related to innovation utilisation explaining that; the older the beneficiaries are the more likely they are willing to put farming related information to use.

However, religion (χ^2=5.062; p>0.05) and household size (r =0.791, p>0.05) were not significantly related to the utilisation of University of Ibadan output. This implies that respondents' religion and household size do not affect the utilisation of University of Ibadan output innovation.

Adesiyan (2014) also corroborated that religious or cultural practices do not usually hinder rural farmers' application of new technologies and their large household size usually favors

utilisation of new agricultural practices as family labor is usually utilized for their agricultural production.

Table 5.80: Chi-square analysis showing the relationship between respondents' socio-economic characteristics and utilisation of University of Ibadan agricultural research outputs

Variable	χ^2	df	P
Sex	3.924*	1	0.048
Marital status	5.998*	1	0.014
Religion	5.062	2	0.080
Education	30.693*	3	0.000

***= Significant at 0.05 level of significance**

Source: Field survey, 2016

Table 5.81: Relationship between respondents' age, household size, income and utilisation of UI AROs

Variables	r	P
Age	0.227*	0.001
Household size	0.102	0.157
Income	0.791*	0.019

***= Significant at 0.05 level of significance**

Source: Field survey, 2016

5.9.2. Relationship between respondents' attitude and utilisation of UI AROs

The correlation analysis in Table 5.82 shows a significant relationship between respondents' attitude and utilisation of university of Ibadan agricultural research outputs ($r = 0.315$, $p > 0.05$). This implies that respondents' attitude to credibility of the agricultural research output is a significant factor influencing the utilisation of University of Ibadan agricultural research outputs. This finding is in agreement with Sadati *et al*. (2010), who found attitude to be positively related to utilisation of agricultural innovation among beneficiaries in South-West, Nigeria.

Agbelusi, (2013) in a similar study also observed that favourable attitude of farmers towards the adoption of improved agricultural practice is an indication of improved production which can be influenced by farmers' knowledge and their years of experience.

5.9.3. Relationship between respondents' knowledge and utilisation of UI AROs

Correlation analysis on Table 5.82 also shows a significant relationship between respondents' knowledge and the utilisation of University of Ibadan agricultural research outputs ($r = 0.315$, $p < 0.05$). This result implies that respondents who had better understanding of the agricultural research outputs utilized the outputs more than others who had low knowledge. Ogunsumi (2011) in a similar study affirmed that educated beneficiaries had more leverage to adoption or utilisation of new technologies due to their level of knowledge and skill acquired. Meludu *et al*, (2017) also corroborated the fact that farmer's level of education influences their level of utilisation of agricultural technology through improved innovativeness.

5.9.4. Relationship between benefits derived by respondents and utilisation of UI AROs

It was also revealed on Table 5.82 that there was a significant relationship between benefits derived by respondents and the utilisation of University of Ibadan agricultural research outputs ($r = 0.802$, $p < 0.05$). This indicates that the more benefits derived by respondents from the utilisation of the agricultural research output, the higher their level of utilisation of the University of Ibadan agricultural research outputs. This was also buttressed by Karanayo (2002)'s claim that benefits derived by beneficiaries from new technology is as a result of

increased agricultural production which will ensure their continuous utilisation or sustainability of such technology.

Table 5.82: Relationship between respondents' attitude, knowledge, benefits derived and utilisation of UI AROs

Variable	r	P
Attitude vs. utilisation	0.665*	0.000
Knowledge vs. utilisation	0.315*	0.000
Benefit vs utilisation	0.802*	0.000

***= Significant at 0.05 level of significance**

Source: Field survey, 2016

5.9.5 Utilisation of UI agricultural research outputs across enterprises

ANOVA results in Table 5.83 revealed that there was significant difference in the utilisation of disseminated University of Ibadan agricultural research outputs. This suggests that the level of utilisation of University of Ibadan agricultural research output differs across the enterprise ($F=88.14$, $p<0.05$). This implies that the level of utilisation of UI AROs differs based on their knowledge level, attitude to utilization, benefits derived and constraints encountered in the utilisation of UI AROs.

The Duncan Multiple Range Test (DMRT) (Table 5.84) further revealed that the mean score of integrated farming system was statistically greater than the mean scores of other enterprises while the use of neem extract has the least mean score. This implies that respondents involved in integrated farming system utilized more of the university of Ibadan research outputs than those involved in sweet potato granules, grass cutter, sweet potato flour, feed block, moringa and the use of neem extract in the study area.

High knowledge and benefits derived as well as favorable perception to the utilisation of IFS is likely responsible for its higher utilisation than other UI AROs while low utilisation of neem extract for pest control could be attributed to resistance of certain insects to neem extract. This was affirmed by one of the neem extract beneficiaries during the FGD conducted for the study that …

"*I still make use of neem extract for controlling insects on my farm but I discovered that some insects and pests are already resistant to the solution and I had to make use of some other methods that will be more efficient for me"*. (A female beneficiary of neem extract for pest control in Akinyele LGA of Oyo State).

Table 5.83: Summary of analysis of variance (ANOVA) on difference in the utilisation of UI AROs

Utilisation	Sum of square	df	Mean square	F	p
Between group	485.19	6	808.65	88.14*	0.000
Within group	2187.11	187	11.70		

***= Significant at 0.05 level of significance**

Source: Field survey, 2016

Table 5.84: Duncan Multiple Range Test (DMRT) showing utilisation of UI AROs across enterprises

Group	1	2	3	4
Neem Extract	13.46			
Moringa powder		18.82		
Feed block meal		19.52		
Sweet potato flour			23.83	
Grass cutter			23.89	
Sweet potato granules			24.00	
IFS				26.53

Source: Field survey, 2016

CHAPTER SIX

6.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Summary

A summary of the preceding chapters and major findings are presented in this chapter. It further discusses the conclusion and suggested recommendations based on the research findings.

Agricultural development largely depends on the willingness of the beneficiaries to make use of new and better technologies or innovations developed by the researchers to increase their agricultural productivity. Most of these technologies originate from relevant research institutes and institutions among whom University of Ibadan is one. The study aimed at determining the factors responsible for the utilisation of University of Ibadan agricultural research outputs among beneficiaries in Southwestern, Nigeria. The research investigated respondents' personal and enterprise characteristics, knowledge, attitude, benefits and constraints encountered in the utilisation of the disseminated research outputs.

A three-stage sampling procedure was used to select 194 beneficiaries with the use of quantitative and qualitative methods for data collection. Data collected were analysed using descriptive and inferential statistics such as percentages, frequency counts, charts, Pearson Product Moment Correlation (PPMC), analysis of variance (ANOVA) and T-test and multiple regression analysis. Hypotheses were tested at 5% level of significance.

Results derived from the study revealed that majority (62.0%) of the respondents were females and married (89.0%). The mean age of respondents was 40.05±5.48. The mean household size was 4.04±1.25. More (35.0%) of the respondents had primary education with mean farming/processing experience of 7.92±5.26. Mean monthly income was 32,299.47±26241.61. Majority of the respondents (90.72%) had no access to extension services and were small scale farmers with mean farm size of 1.6±0.9 acres though mostly

produced on commercial basis. The most utilized source of labor for agricultural production by respondents in the study area was family (63.0%) and almost all respondents (95.0%) belonged to one farmer group or the other relating to their agricultural production. The average number of animals reared by livestock beneficiaries in the study area was 27 and were mostly involved in more than one livelihood activity to generate more income. Result further revealed that many of the beneficiaries (67.0%) had high knowledge about the disseminated research outputs while more of the beneficiaries (59.8%) had favorable attitude towards utilisation of disseminated agricultural research outputs. Benefits derived by beneficiaries in utilising University of Ibadan agricultural research output included increased income, increased yield of agricultural produce and improved market for products. Constraints militating against utilisation of disseminated research outputs included lack or insufficient capital, high technical expertise of disseminated research output, high labour intensity of innovation and climate change. More than half (55.7%) of the beneficiaries had high level of utilisation of the disseminated research outputs in the study area.

Test of hypothesis one result revealed that there was significant relationship between some respondents' personal characteristics such as marital status (χ^2=5.998; p<0.05); sex (χ^2=3.924; p<0.05), education (χ^2=30.693; p<0.05); age (r=0.00.227; p<0.05) and income (r=0.791; p<0.05) with utilisation of agricultural innovations.

Hypothesis two revealed that there was significant relationship between respondents' knowledge of all the disseminated innovations and their utilisation in their various locations (r=0.315, p<0.05).

Hypothesis three revealed that there was significant relationship between the respondents attitude and utilisation of disseminated innovations (r=0.315, p>0.05).

Hypothesis four stated that there was significant relationship between respondents' benefits derived from all the disseminated innovations and utilisation level (r=0.802, p<0.05) while hypothesis five testing showed that that the level of utilisation of University of Ibadan innovation output differs across the enterprise (f=88.14, p<0.05).

Respondents involved in IFS utilized more of the university of Ibadan innovation outputs than those involved in sweet potato granules, grass cutter, sweet potato, feed block, moringa and neem extract. Determinants of utilisation of University of Ibadan agricultural research outputs included beneficiaries' educational qualification (β=0.462), knowledge of UI research outputs

(β=0.446), scale of production (β=0.325), attitude towards UI research outputs (β=0.611) as well as constraints to the use of UI research output (β =-0.210).

6.2 Conclusion

On the basis of the findings of this study, the following conclusions were drawn:

Majority of the respondents were in their productive age which was a major factor to utilisation of the disseminated agricultural research outputs. All sampled respondents were small scale beneficiaries or processors with low income. The most utilized source of labour was family to reduce cost of labour. Knowledge and benefits derived from UI research outputs were high and more of the beneficiaries had favourable attitude towards UI research output. This was influenced by beneficiaries' level of education and farming/processing experience. All these translated to a high level of utilisation of UI research output. Benefits derived by beneficiaries in utilising University of Ibadan agricultural research output included increased income, increased yield of agricultural produce/product, improved market for products and cheap raw materials. However, respondents in the study area were faced with constraints such as; lack or insufficient capital, high technical expertise of disseminated research output and climate change. Beneficiaries' knowledge, educational qualification, attitude towards UI research outputs, scale of production and constraints to the use of UI research output all contributed to the utilisation of UI research outputs in the study area. Determinants of utilisation of University of Ibadan agricultural research outputs included beneficiaries' knowledge, level of educational, scale of production, attitude towards UI research outputs as well as constraints to the use of UI research outputs.

6.3 Recommendations

Based on the conclusions drawn from this study, it was recommended that:

- University of Ibadan-town (gown-town) relationship should be further strengthened to ensure proper dissemination and uptake of new technologies by end users by ensuring all Departments and Faculties have extension units.
- Adult literacy classes should be made available to farmers especially those in the rural communities to further enhance their knowledge since education was discovered to be a determinant of utilisation of agricultural research outputs.

- Public extension services should be enhanced to ensure effectiveness of deliverables to farmers and rural dwellers.
- Criteria for assessing grants for researchers should be made more liberal to enable more researchers the opportunity of conducting more impact-felt researches in research Institutes and Institutions.
- Establishment of research repositories should be encouraged in all Faculties of the Institution to encourage development of new technologies and their effective dissemination.

6.4 Contributions to knowledge

1. Beneficiaries of University of Ibadan had upgraded skill and knowledge on their various agricultural enterprise(s).
2. Beneficiaries received higher income and improved yield after utilising disseminated agricultural research outputs
3. Level of education is essential for utilisation of any research output
4. The beneficiaries were able to develop coping strategies against constraints encountered in the utilisation of the agricultural research outputs due to certain benefits derived from such agricultural enterprises
5. Determinants of utilisation of University of Ibadan agricultural research outputs included beneficiaries' knowledge, level of educational, scale of agricultural production, attitude towards utilisation as well as constraints to utilisation of UI agricultural research outputs

6.5 Areas for further research

- The same research can be carried out for other research institutes/institutions in Nigeria.
- Factors affecting dissemination of agricultural research outputs in Nigeria.
- Propensity to utilisation of agricultural technologies from research institutes in Nigeria.
- Efficacy of agricultural technology dissemination among beneficiaries in selected States of Nigeria.

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APPENDICES

APPENDIX 1

QUESTIONNAIRE ON DETERMINANTS OF UTILIZATION OF UI AGRICULTURAL RESEARCH OUTPUTS AMONG BENEFICIARIES IN SOUTHWESTERN, NIGERIA

SECTION A: Personal characteristics of respondents (please tick as appropriate)

1) Community: …….
2) Sex: Male ( ), Female ( )
3) Age: …….. (in years)
4) Marital status: Single ( ), Married ( ), Divorced ( ), Separated ( ), Widowed ( )
5) Religion: Christianity ( ), Islam ( ), Traditional ( ), Others (specify) .....
6) Educational attainment: No formal education ( ), Adult education ( ), Primary education ( ), Secondary education ( ), Tertiary education ( ), others, specify ……
7) Household size: ……. (in persons)

SECTION B: Enterprise characteristics of respondents (please tick as appropriate)

8) Agricultural enterprise ……
9) Other income generating activities: Civil service ( ), Trading ( ), Artisan ( ), Agro-processor ( ),others, specify: …….
10) Income per month ……. (in naira)
11) Farm size: …….. (in hectare/ acre/plot)
12) Years of farming/processing experience: ……. (in years)
13) Sources of labour: Family labour ( ), Hired labour ( ), Communal labour( ) others …..
14) Scale of agricultural production: Commercial ( ), Subsistence ( ), Both ( )
15) Do you belong to any farmer group? YES ( ), NO ( )
16) If yes, pls specify
.....

SECTION C: Knowledge of respondents on UI AROs (please tick as correct or incorrect)

Knowledge of respondents on neem extract for pest control

S/N	Neem extract Knowledge statements	YES	NO
1	Neem extract solution contains neem leaf, seed and bark		
2	Application of Neem extract on the farm also increases soil fertility		

3	Milling or grinding of neem leaf before soaking is a more effective method of neem extract solution for repelling insect on the farm		
4	Neem seed can also be soaked in water with the leaf for concentrated neem extract solution		
5	For effective neem extract solution, 10 litres of water is required to be added to 1kg of neem leaves		
6	Little chemical insecticides/pesticides can be mixed with neem extract for better efficiency		
7	Neem extract solution can be applied on cultivated crop at any time of the day		
8	Neem extract solution is best applied to crops with the use of knapsack sprayer		
9	Neem extract solution also helps to control weed		
10	Neem extract solution application does not require any specific measurement		
11	Neem leaves soaked in water for more than 2 weeks can be toxic to plants		
12	Neem extract solution can be applied to cultivated crops at any stage		
13	Crops can be harvested and consumed the same day neem extract solution is applied		
14	Neem leaves can be boiled on fire for few minutes if it must be applied the same day		
15	Application of hot or dry pepper to neem extract makes it more effective for pest control		
16	Addition of wood ash makes neem extract more effective in repelling insects		
17	Neem extract solution is not effective for tree and tuber crops		
18	Neem plant can be cultivated on farmland instead of regular application of neem extract		
19	Marigold plant is an alternative for repelling insect through the use of neem extract		
20	Neem extract application only repels insect and do not kill them		
21	Neem extract solution can also be applied with the use of watering can		

Knowledge of respondents on Moringa Powder processing (MP) (please tick as correct or incorrect)

S/N	MP Knowledge statements	YES	NO
1	Moringa powder can be gotten from both moringa leaves and stem		
2	MP processing involves picking, drying and packaging of moringa leaves		
3	Addition of dry pepper to milled MP help prevents weevil growth		
4	Packaging of moringa powder can be done manually with the use of funnel		
5	Moringa leaves must be air dried before processing into powder		
6	MP can be preserved for as long as a year without losing its potency		

7	MP can be milled even when the leaf is not properly dried		
8	Moringa leaves can be stored after drying for more than 1 year before grinding into powder without absorbing moisture		
9	MP left exposed over 2 weeks becomes stale or sour in taste		
10	Moringa leaves can be left dried on the plant before picking		
11	MP is better packaged in nylon and plastic containers to prevent leakage		
12	Preservatives can be added to milled moringa powder for longer shelf life		
13	Regular turning of moringa leaves when drying is essential to ensure even drying		
14	Exposure of MP to open air for a long period after milling encourages weevil growth in it		
15	Moringa leaves can be rinsed with water before drying to eliminate dirt and germs		
16	Cooking stoves can be used to oven dry moringa leaves especially during raining seasons		
17	MP need to be sifted after grinding to ensure fine texture		
18	A drop of water purifier can be added to water to wash moringa leaves before drying		
19	Moringa powder can be gotten from moringa leaves and stem		
20	MP processing involves picking, drying and packaging of moringa leaves		
21	Addition of dry pepper to milled MP help prevents weevil growth		

Knowledge of respondents on Ruminant Block Meal (RBM) (please tick as correct or incorrect)

S/N	**RBM Knowledge statements**	**YES**	**NO**
1	Block meals can also be consumed by non-ruminants		
2	Blocks meals can be prepared using cassava and gliricidia leaves and starch		
3	Preparation of block meal involves cooking of food for ruminants		
4	Block meal preparation also contains the use of local feeds like dry hay and grasses		
5	Block meals cannot dissolve again once solidified		
6	Block meal for ruminants has a prolonged shelf life up to a year without growing mould		
7	The only pattern for preparing block meal is only by turning ingredients on fire till it solidifies		
8	Feed block meal requires certain moulds or packages to form the desired shape after solidification		
9	Proper solidification of ruminant block meal sometimes takes up to 2 weeks after preparation		

10	Ruminant block meal not properly prepared affect animals' digestion		
11	Feeding ruminants with block meal increases their productivity		
12	Preparation of feed block meals do not require boiling of water before adding plant or animal sources required		
13	Fermentation is required before solidification of block meals		
14	Block meals can only be consumed by ruminants weighing up to 40 kg		
15	Block meal is weather resistant as it can withstand harsh weather conditions		
16	Block meal is a complete diet for ruminants as it contains all required nutrients essential for their growth and reproduction		
17	Feed block meal solidifies at room temperature in less than an hour of preparation		
18	Turning of feed block meal requires much strength		
19	Preparation of ruminant feed block takes averagely an hour		
20	Ruminants can be fed with block meal on daily basis		
21	Gliricidia in block meals aids faster digestion		

Knowledge of respondents on grasscutter domestication

S/N	**Knowledge statements on grasscutter domestication**	**YES**	**NO**
1	Grasscutters are herbivores and feed mostly on grasses		
2	Grass cutter domestication can be initiated with just 2 males and 6 females		
3	Grasscutters can be reared with other domestic animals		
4	Grasscutters can also be kept for hide and skin production		
5	Grasscutters are polygamy in nature and about 10 grasscutters can be kept in a room		
6	Grass cutter domestication help increase their productivity		
7	Grasscutters do not need vaccination or treatment if kept in an hygienic environment		
8	Grass cutter domestication requires a large expanse of farmland to practice		
9	Grass cutter gestation period is 5 months (154 days)		
10	Grasscutters can give birth to up to ten young ones at once		
11	Grasscutters command high selling price than ruminant animals		
12	Grasscutters are more nutritious than lean or poultry meat		
13	Grasscutters must be vaccinated every 2 weeks to avoid disease outbreak		
14	There is no known religious discrimination against grass cutter meat		

15	Grasscutters infected with disease must be isolated to avoid disease spread		
16	Grasscutters are omnivorous (feeds on both herbs and flesh)		
17	Grasscutters are prolific like rabbits		
18	Grasscutters are carnivorous		
19	Grasscutters are neat animals and will not eat in dirty environment		
20	Grasscutters stop reproduction after three years		
21	Grasscutters are herbivores and feed mostly on grasses		

Knowledge of respondents on Integrated Farming System (IFS)

S/N	IFS Knowledge statements	YES	NO
1	Integrated farming system involves the cultivation of crop with livestock production on the same piece of land		
2	IFS involves the use of livestock (poultry/swine) dung to generate maggots for feeding fish as well as manure for rice cultivation		
3	Integrated farming system can be practiced on any type of farmland (loamy, clayey or sandy)		
4	Liming of pond helps to maintain soil PH to increase productivity		
5	Pipes into the fish pond must be covered with fine meshes to prevent predators		
6	Mechanization is not allowed for Integrated farming system		
7	Use of feed supplement is not allowed in IFS		
8	Fishpond serves as regular source of irrigation for rice		
9	Juveniles are better stocked for faster growth than fingerlings		
10	Rice must to able to retain water to a depth of 30cm		
11	Harvesting of IFS must be done with dragnet		
12	Changing of pond water is better done on monthly basis		
13	Harvesting of rice cannot be done when fishes are stocked		
14	Moringa leaves and pawpaw seeds can be used as antibiotics for fishes		
15	Rice should be raised in nursery for about 2wks before transplanting		
16	At stocking point containers are raised over surface water		
17	Harvesting of fishes is usually between 12 to 14 weeks		
18	Livestock in IFS are always reared using intensive system		
19	Netting of fish pond is necessary to prevent predators		
20	Rice field must be cultivated on lowland for easy cultivation		
21	Poultry or pig house must be connected to a soak pit for sedimentation		

Knowledge of respondents on Sweet Potato Flour (SPF)

S/N	SPF Knowledge statements	YES	NO
1	Sweet potato flour can be produced from all types of sweet potato		
2	Processing of sweet potato flour is similar to the processing of yam flour (elubo)		
3	Fermentation of sweet potato is necessary after peeling to ensure reduction of sweet taste		
4	Sweet potato flour can be consumed as gruel (pap) or solid food		
5	The white colour of sweet potato can be retained using sodium metabisulphite		
6	Milling of sweet potato flakes after drying can be done with grinding machine		
7	Washing of sweet potato is essential before and after peeling to remove dirt		
8	Drying of sweet potato must be done at temperature below 50^0C to retain nutritional contents		
9	Discoloration of sweet potato flour can be prevented by soaking in water immediately after peeling		
10	Milled sweet potato flour are better packaged in plastic containers and nylon		
11	Sweet potato flour can be white, yellow or orange in color depending on the sweet potato type		
12	The thickness of sweet potato flakes to be dried must be uniform and not more than 2 mm for easy drying		
13	Sweet potato toasted flour need to be sifted after milling for a fine texture		
14	Diabetic patients cannot consume sweet potato flour because of high sugar content		
15	Sweet potato to be sulphited must not be left for more than 10 mins in sulphite water before draining		
16	Processing of sweet potato flour into has reduced its vitamin and mineral contents		
17	Perforated aluminum trays are better used to drain water from sweet potato flakes for easy drying		
18	Drying of sweet potato flakes with dryer should not exceed 48 hours at constant temperature below 60^0C		
19	Hand peeling of sweet potato can be done using any sharp object		
20	Wire mesh or nets can be used for sun drying sweet potato in the absence of perforated trays		
21	Milling of dried (cripsy) sweet potato should be done immediately after removal to prevent absorbing of moisture at room temperature		

Knowledge of respondents on Sweet Potato Toasted Granule (SPG)

S/N	SPG Knowledge statements	YES	NO
1	Sweet potato toasted granules has high fiber content		
2	Processing of sweet potato granules is similar to the processing of cassava granules (garri)		
3	In processing of sweet potato to toasted granules, fermentation takes at least two days		
4	Sweet potato toasted granules can serve as a supplement to cassava granules (garri)		
5	The colour of sweet potato granules is the same as that of cassava granules (garri)		
6	Sieving of sweet potato is necessary before and after toasting		
7	It is not essential to wash sweet potato after peeling when preparing sweet potato toasted granules		
8	Toasting of sweet potato granules must be done on low heat		
9	Taste of sweet potato toasted granules depends on duration of fermentation		
10	Toasting of sweet potato can be done with brush or short broom		
11	All sweet potato types can be used for sweet potato toasted granule		
12	Open fire is best used for toasting sweet potato granule		
13	Sweet potato toasted granules need to be sieved after toasting for a fine texture		
14	Peeling of sweet potato can be done with any sharp object		
15	Fermentation is the soaking of sweet potato after peeling before milling		
16	Sweet potato toasted granules cannot be consumed in form of garri or eba		
17	Sweet potato granule can be fried instead of toasted		
18	Sweet potato granules have a longer shelf life than cassava garri		
19	Red oil can be used to rob the toasting pan before toasting sweet potato granules to enhance its appearance		
20	Toasting of sweet potato has reduced the vitamin and mineral contents of sweet potato		
21	Milling of sweet potato can be done immediately after peeling without soaking		

SECTION D: Attitude of respondents to UI AROs (please tick as agreed; SA (strongly agreed, A (Agreed), U (undecided), D (Disagreed) and SD (strongly disagreed)

Attitude of respondents to neem extract for pest control

S/N	Attitude statements for Neem extract for pest control	SA	A	U	D	SD
1.	Neem extract application for pest control has increased my agricultural production					
2.	Neem extract application for pest control is capital intensive					
3.	Preparation of neem extract is time consuming					

4.	Neem extract application for pest control contradicts my religious belief					
5.	Preparation and application of neem extract for pest control is labor intensive					
6.	Neem extract application also increases the shelf life of my agricultural products					
7.	Neem extract application had enhanced my agricultural skill for pest control					
8.	Neem extract application is not a sustainable method for pest control as it is not effective during rainy seasons					
9.	Re-application of neem extract solution can be carried out on monthly basis for more efficiency					
10.	Neem extract solution has a foul and repelling smell and can discourage farmer's usage for pest control					
11	Application of neem extract also help prevent rodents on the farm					
12	Application of neem extract for pest control involves rigorous training					
13	Neem insecticide application is an organic agricultural practice					
14	Application of neem extract for pest control is easier for subsistence crop production					
15	Neem extract application kills all insects that touches the cultivated crop					
16	Neem extract solution has an offensive odour					
17	Neem extract solution application is toxic to some plants					
18	Application of neem extract solution enhances the growth of crops					
19	Neem extract solution application is easier with the use of watering can					

Attitude of respondents to MP production

S/N	Attitude statements for MP production	SA	A	U	D	SD
1.	MP processing is a feminine enterprise					
2.	Moringa powder processing is capital intensive					
3.	MP processing is time consuming					
4.	MP production and consumption contradicts my religious belief					
5.	MP production and processing requires high labor intensity					
6.	MP is tasteless					
7.	MP production is difficult during rainy seasons as the leaves wont dry on time					
8.	MP has no known side effect					
9.	MP cannot be produced where moringa tree is not planted					
10.	Well stored MP have a longer shelf life					
11	MP processing and packaging involves rigorous training					

12	MP is better packaged in nylon and plastic containers for longer shelf life					
13	Moringa tree already infected with a disease cannot be useful for MP production					
14	Milled MP are preferred to pounded ones in texture					
15	MP cannot be consumed by babies					
16	MP cures all forms of ailments					
17	MP production can help reduce the rate of unemployment					
18	MP is a good export product					
19	High Vit. C content boosts immunity against diseases					

Attitude of respondents to grasscutter production

S/N	Attitude statements for grass cutter domestication	SA	A	U	D	SD
1.	Feeding of grasscutters is capital intensive					
2.	Grass cutter domestication is mere wasting of time and resources					
3.	Grass cutter domestication contradicts my religious belief					
4.	Domestication of grass cutter increases their productivity					
5.	Domesticated grasscutters live longer than those in the forest					
6.	Grass cutter feeds can only be found in the forest					
7.	Grasscutters are not friendly animals					
8.	Domesticated grasscutters are sweeter in taste than those in the forest					
9.	Grass cutter domestication requires rigorous training					
10.	Only female grasscutters are easy to rear in cages					
11	Grasscutters can never weigh more than 5kg no matter what they are fed with					
12	Grasscutters prefer cages at room temperature					
13	Grasscutters can be fed with household kitchen waste					
14	Grasscutters are naturally shy					
15	Female grasscutters are more friendly than the males					
16	Dark coloured grasscutters are wilder in nature than light colored ones					
17	Grasscutters find it difficult to survive in concrete pens than cages because of they need good ventilation					
18	Grasscutters are more or less pets					
19	Grasscutter meat have higher nutritional value than other domesticated animals					

Attitude of respondents to ruminant feed block meal

S/N	Attitude statements for RBM	SA	A	U	D	SD
1.	Feeding ruminants with block meal is capital intensive					
2.	Preparation of feed block meal for ruminants is time consuming					
3.	Feeding ruminants with block meal contradicts my religious belief					
4.	Feeding ruminants with block meal increases productivity					
5.	Ruminants fed with block meals have longer life span than others not fed with it					
6.	Feeding ruminant with block meal is not a sustainable feeding pattern as its difficult to prepare					
7.	Ingredients for preparing block meal cannot be easily assessed					
8.	Feed block meal preparation is cheap and affordable					
9.	Feed block pattern requires rigorous training					
10.	Only female farmers can utilize ruminant feed block pattern because of the cooking procedure involved					
11	Feeding ruminants with block meal is seasonal as it can only be prepared at periods when the ingredients are available					
12	Bock meal solidification cannot be done at room temperature					
13	Digestion of block meal is slow because it is a heavy meal for ruminants					
14	Block meal preparation for ruminants help utilize plant and animal resources that would have been wasted in the environment					
15	Block meal is a complete diet for ruminants as it contains all required nutrients essential for their growth and reproduction					
16	Feeding ruminants with block meal is capital intensive					
17	Preparation of feed block meal for ruminants is time consuming					
18	Feeding ruminants with block meal contradicts my religious belief					
19	Feeding ruminants with block meal increases productivity					

Attitude of respondents to IFS

S/N	Attitude statements for IFS	SA	A	U	D	SD
1.	IFS is an organic agricultural practice					
2.	IFS is capital intensive					
3.	IFS is time consuming					
4.	IFS causes land degradation					
5.	IFS contradicts my religious belief					

6.	Fishes and crop produced using IFS are always more nutritious than those produced from other farming systems					
7.	IFS is highly labor intensive					
8.	IFS agricultural products are always toxic free and usually has a unique taste					
9.	IFS does not require a specific type of soil to be practiced					
10.	IFS reduces environmental pollution					
11	IFS increases soil fertility through the usage of poultry dung for compost manure					
12	IFS agricultural products usually have longer shelf life					
13	IFS reduces pest infestation					
14	IFS is more sustainable than other farming systems					
15	IFS cannot be practiced where there is constant rainfall to avoid loss of fishes					
16	IFS reduces pest infestation of crop cultivated on fish pond					
17	IFS is only possible with subsistence farming					
18	IFS produces higher crop yield than other farming systems					
19	Nutrient uptake is slow in IFS					

Attitude of respondents to Sweet Potato Flour (SPF)

S/N	**Attitude statements for SPF**	**SA**	**A**	**U**	**D**	**SD**
1.	Processing of sweet potato into flour is a way of adding value to the crop					
2.	Processing of sweet potato flour is labour intensive					
3.	Processing of sweet potato into flour can boost household food security					
4.	Sweet potato flour has high nutritional value					
5.	Processing of sweet potato flour can help reduce the rate of unemployment.					
6.	Processing of sweet potato flour requires high technical skill					
7.	Processing of sweet potato flour is more of women business					
8.	Sweet potato flour is not acceptable to the public as yam flour					
9.	Processing of sweet potato flour requires high capital					
10.	Processing of sweet potato into flour is time consuming					
11	Processing of sweet potato flour is more valuable in the urban area than rural area					

12	There is no market for the sale of sweet potato flour					
13	The colour of sweet potato flour is unattractive					
14	Sweet potato flour is a good export product					
15	Sweet potato flour processing is easy and non-tasking					
16	Sweet potato flour have a longer shelf life than yam flour					
17	Sweet potato flour is more nutritious than yam flour					
18	Sweet potato flour is more accepted by children because of its sweet taste					
19	Sweet potato flour can be easily digested when taken as gruel (pap)					

Attitude of respondents to Sweet Potato Toasted Granule (SPG)

S/N	Attitude statements to SPG	SA	A	U	D	SD
1.	Processing of sweet potato into toasted granules helps reduce bulkiness of raw product					
2.	Processing of sweet potato toasted granule is labour intensive					
3.	Acceptability of sweet potato toasted granules can boost household food security among rural dwellers					
4.	Sweet potato toasted granules has high nutritional value					
5.	Processing of sweet potato granules can reduce the rate of unemployment.					
6.	Processing of sweet potato to toasted granules will help increase my income.					
7.	Processing of sweet potato to granules will reduce production of other products from sweet potato.					
8.	Sweet potato toasted granules is not acceptable because of its sweet taste					
9.	Consumption of sweet potato toasted granules will increase with proper information about its health benefits					
10.	Production of sweet potato granules will reduce consumption of cassava granules.					
11	Conversion of sweet potato to toasted granules is a waste of sweet potato					
12	There is improved market for the sale of sweet potato toasted granules					
13	Unattractive colour of sweet potato toasted granules puts me off from accepting it.					
14	Sweet potato toasted granule is a good export product					
15	Sweet potato toasted granule processing can be done in a day					
16	Sweet potato granules have a longer shelf life than cassava toasted granule					

17	Cassava granules is far better than sweet potato granules in terms of uses					
18	Sweet potato toasted granule consumption is well accepted by children than adults					
19	Sweet potato toasted granules must be mixed with cassava granules to improve its palatability					

SECTION E: Benefits derived from utilisation of UI AROs

Benefits derived from neem extract for pest control

S/N	Benefits derived from neem extract for pest control	Extent of benefits derived		
		To a great extent	To a lesser extent	Not at all
1.	Increased yield or productivity			
2	Increased Income			
3.	Improved product quality			
4	Improved pest resistance			
5	Better soil/environmental condition			
6	Enhances market for products			
7	Improved skill for pest control			
8	Cheap and easy accessibility of neem plant			
9	Weed control			
	Other benefits (Pls specify)			

Benefits derived from MP production

S/N	Benefits derived from MP production	Extent of benefits derived		
		To a great extent	To a lesser extent	Not at all
1.	Increased yield			
2	Increased Income			
3.	Improved product quality			
4	High resistance to diseases			
5	Available market for products			
6	Better health status			

7	Improved agricultural skill			
8	Improved environmental condition			
9	Fast growth of moringa			
	Other benefits (pls specify)			

Benefits derived from grasscutter production

S/N	Benefits derived from Grasscutter domestication	Extent of benefits derived		
		To a great extent	To a lesser extent	Not at all
1.	Increased productivity of animals			
2	Increased Income			
3.	Animal resistance to diseases			
4	Increased skill and knowledge			
5	Healthy breeds of animals			
6	Cost effectiveness			
7	Easy preparation of meal			
8	Preservation of green pasture			
9	Easy digestion of meal			
	Other benefits (pls specify)			

Benefits derived from IFS

S/N	Benefits derived from IFS	Extent of benefits derived		
		To a great extent	To a lesser extent	Not at all
1.	Increased yield			
2	Increased Income			
3.	Improved product quality			
4	Cheap and available materials			
5	More nutritious products			
6	Better soil/environmental condition			
7	Improved market for products			
8	Healthy breeds of crops and animals			
9	Higher pest resistance			
	Other benefits (pls specify)			

Benefits derived RBM

S/N	Benefits derived from Agricultural output	Extent of benefits derived		
		To a great extent	To a lesser extent	Not at all
1.	Increased productivity of animals			
2	Increased Income			
3.	Animal resistance to diseases			
4	Increased skill and knowledge			
5	Healthy breeds of animals			
6	Cheap animal feed			
7	Improved animal product			
8	Easy preparation of meal			

Benefits derived from SPF

S/N	Benefits derived from SPF	Extent of benefits derived		
		To a great extent	To a lesser extent	Not at all
1.	Improved product quality			
2	Diversified livelihood activity			
3.	Use of sweet potato peel for animal feed			
4	Increased skill and knowledge			
5	Cheap and available raw materials			
6	Increased Income			
7	Better health status			
8	Improved taste of product			
9	Available market			
	Other benefits (pls specify)			

Benefits derived from SPG

S/N	Benefits derived from SPG	Extent of benefits derived		
		To a great extent	To a lesser extent	Not at all
1.	Cheap and available raw materials			
2	Increased Income			
3.	Use of sweet potato peel for animal feed			
4	Increased skill and knowledge			

5	Diversified livelihood activity			
6	Improved product quality			
7	Better health status			
8	Improved/sweet taste of product			
9	Available market			
	Other benefits (pls specify)			

SECTION F: Constraints associated with the utilization of U.I Agricultural Research Outputs

Constraints to utilisation of neem extract for pest control

S/N	Constraints of utilization of Neem extract for pest control	Extent of constraint		
		Severe constraint	Mild constraint	Not a constraint
1.	Lack of Capital			
2	Inaccessibility to neem leaf			
3	High technical expertise			
4.	Religious/cultural barrier			
5	High labour intensity of preparation and application			
6	Unavailability of water			
7	Lack of extension services			
8	Large farm size			
9	Lack/Insufficient application materials e.g Knapsack sprayer			
10	Foul smell of neem extract			
	Others (pls specify)			

Constraints to utilisation of MP production

S/N	Constraints of utilization of MP production	Extent of constraint		
		Severe constraint	Mild constraint	Not a constraint
1.	Lack of Capital			
2	Inaccessibility to moringa plant			
3	High technical expertise			
4.	Religious/cultural barrier			
5	High labour intensity of MP processing			
6	Poor infrastructural facilities			
7	Lack of extension services			
8	Insufficient market for product			

9	Constant climate change			
10	Sour taste of MP			
	Others (pls specify)			

Constraints to utilisation of grasscutter domestication

S/N	Constraints of utilization of grasscutter domestication	Extent of constraint		
		Severe constraint	Mild constraint	Not a constraint
1.	Capital intensive			
2	High technical expertise			
3	Religious/cultural barrier			
4.	Stressful preparation of animal cage			
5	Scarcity of animal feed			
6	Poor market of animal product			
7	Animal domestication is labour intensive			
8	Poor follow up by UI researchers			
9	Time consuming			
10	Others (please specify)			

Constraints to utilisation of RBM

S/N	Constraints of utilization of U.I Agricultural Research Outputs	Extent of constraint		
		Severe constraint	Mild constraint	Not a constraint
1.	Capital intensive			
2	High technical expertise			
3	Religious/cultural barrier			
4.	Stressful preparation of block meal			
5	Poor infrastructural facilities like electricity, water			
6	Small number of ruminants (farm size)			
7	Distance of farm location			
8	Poor knowledge about feed block preparation			
9	Poor follow up by UI researchers on feed block pattern			
10	Time consuming			

Constraints to utilisation of IFS

S/N	Constraints of utilization of IFS	Extent of constraint

		Severe constraint	**Mild constraint**	**Not a constraint**
1.	Lack of Capital			
2	High technical expertise			
3	Religious/cultural barrier			
4.	High labour intensity of innovation			
5	Poor infrastructural facilities			
6	Constant climate change			
7	Lack of extension services			
8	Illiteracy			
9	Small farm size			
10	Unavailable market for products			
	Others (pls specify)			

Constraints to utilisation of SPF

S/N	**Constraints of utilization of U.I Agricultural Research Outputs**	**Extent of constraint**		
		Severe constraint	**Mild constraint**	**Not a constraint**
1.	Sweet potato is difficult to peel			
2	Seasonal scarcity of sweet potato			
3	Sweet potato flour processing is labour intensive			
4.	High cost of sweet potato			
5	Unacceptability of product			
6	Religious/cultural taboo			
7	Low income			
8	Difficult transportation of raw materials			
9	Unconducive environment for processing			
10	High technical skill required			
	Others (pls specify)			

Constraints to utilisation of SPG

S/N	**Constraints of utilization of SPG**	**Extent of constraint**

		Severe constraint	Mild constraint	Not a constraint
1.	Difficult peeling of Sweet potato			
2	Seasonal scarcity of sweet potato			
3	Sweet potato flour processing is labour intensive especially during wet seasons			
4.	High cost of sweet potato			
5	High capital			
6	Religious/cultural taboo			
7	Low income			
8	Difficult transportation of raw materials			
9	High product competition in the market			
10	High technical skill required			
	Others (pls specify)			

SECTION G: Factors determining the utilization of U.I Agricultural Research Outputs (Please tick the likely factors determining the utilization of Grass cutter Domestication)

S/N	Factors influencing respondents' utilization of University of Ibadan Agricultural research outputs	Most significant (3)	Significant (2)	Less significant (1)	Not significant (0)
1	**Demographic factors**				
	Farmers' Age				
	Education level				
	Household size				
	Farmers' marital status				
	Farmers' farm size				
2	**Economic/Financial Factors**				
	Farmers' level of income				
	Cost of innovation				
	Cost of agricultural input				

	Labor cost				
	Cost of storage/processing facilities				
3	**Technological Factors**				
	High technical skill/expertise				
	Access to Extension Services				
	Access to credit facilities				
	Access to labour				
	Poor communication of technology to farmers				
	Poor storage facilities				
	Irrelevance of technology to agric. production				
4	**Environmental/Climatic factors**				
	Inconsistent Rainfall				
	Inconsistent sunshine				
	Strong wind				
	Fire outbreak				
	Inconsistent Rainfall				
5	**Infrastructural factors**				
	Accessibility to transportation facilities				
	Accessibility to water				
	Accessibility to storage facilities				
	Accessibility to electrical facilities				
	Accessibility to shelter of animals				
6	**Religious/Cultural factors**				
	Religious barrier/taboo about disseminated technology				
	Innovation contradictory to traditional belief				
	Innovation contradictory to family/lineage practices				
	Religious barrier/taboo about disseminated technology				
	Innovation contradictory to traditional belief				

SECTION H: Utilization of UI AROs (Kindly respond to the following statements on utilization of AROs by ticking appropriate response)

Utilisation of neem extract for pest control

Neem extract Utilisation statements	**Always**	**Occasionally**	**Never**
Neem leaf, seed and bark composition for neem extract solution			
Soaking neem leaves and seed together for 2 weeks before spraying			
Application of neem extract solution using knapsack sprayer			
Addition of hot pepper to neem extract before spraying			

Application of neem extract before crop cultivation			
Neem extract application to only matured crops ready for harvesting			
Application of neem extract to only infected vegetables or plants			
Milling of neem leaf and seed before soaking			
Weekly application of neem extract			
Dry season application of neem extract			
Application of neem extract before sunrise			
Application of neem extract for rodent control			
Addition of wood ash to neem extract for efficiency			
Storage of neem leaves in sacks before soaking in water for easy removal			
Irrigating with neem extract during dry season			
Application of neem extract to plants at any time of the day			
Fortification of neem extract with chemical pesticides for pest control			
Boiling of neem leaves before application to kill parasites on leaves			
Soaking of 1 kg of neem leaves in 10 litres of water to make neem extract solution			
Application of neem extract solution for improved soil fertility			
Inter-planting of neem tree on plot			

Utilisation of MP processing

MP Utilisation statements	**Always**	**Occasionally**	**Never**
Production of moringa powder from moringa leaves, bark and stem			
Processing of moringa powder by picking and drying of moringa leaves before milling and packaging			
Addition of dry pepper to milled moringa powder to prevent weevil growth			
Use of funnel for moringa powder packaging			
Air drying moringa leaf before processing into powder			
Use of preservatives for prolonging shelf life of packaged moringa powder			
Packaging of moringa powder into bottles and nylon even if not properly dried			
Soaking of moringa leaves in warm water before drying to remove dirt and germs			
Milling of moringa powder with mortal			
Drying of moringa leaves on tree before picking and milling			
Milling of moringa powder with milling machine			

Addition of chilli pepper to moringa powder			
Periodic turning of moringa leaves when drying			
Use of coal for drying moringa leaves			
Fortifying of moringa powder with other medicinal leaves			
Oven-drying of moringa leaves during rainy seasons			
Sifting of moringa powder to ensure fine texture			
Use of water guard in soaking moringa leaves to kill germs and dirt on leaves			
Re-packaging of moist moringa powder			
Use of stove as source of heat in moringa drier to dry moringa leaves during wet seasons			
Re-drying of moist moringa leaves			

Utilisation of grasscutter domestication

Grasscutter Utilisation statements	**Always**	**Occasionally**	**Never**
Herbivorous feeding of animals			
Domestication with other pets/animals			
Domestication for hide and skin			
Wiremesh/cage domestication			
Natural/organic feeding system			
Regular treatment with antibiotics			
Fortnight vaccination for improved reproduction			
Isolation of infected animals			
Free range domestication method			
Enclosed/semi-intensive domestication system			
Annual fumigation of cage/house			
Mating with F1 parent			
Segregation of pregnant animals			
Restriction of other pets/animals into cages			
Cross-breeding of grasscutter			
Daily cleaning up of animals			
Fencing of cage/house			
Feeding of animal with concentrated processed meals			
Disposal/sale of old females over 4 years			
Grasscutters skin change occurs in females after each reproduction			
Feeding with molasses and supplements daily			

Utilisation of FBM

RBM Utilisation statements	**Always**	**Occasionally**	**Never**
Solidification of ruminant block meal can occur within 1 hour of preparation			
Feeding of non-ruminants with ruminant block meals			

Addition of agro-industrial by products like molasses, calcium and magnesium to ruminant block meal preparation			
Preparation of ruminant block meal with neem, gliricidia, cassava leaf and dried peel			
Storing of ruminant block meals for about 3 months after preparation			
Non-use of water in the preparation of ruminant block meal			
Use of molds for block meal preparation to form desired shape after solidification			
Feeding of ruminants with block meal alone			
Proper cooking of ruminant block meal before feeding			
Feeding of only ruminants above 40kg with block meals			
Mixing of leaves together alone without cooking of ruminant block meal			
Use of any available leaf/grass for ruminant block meals during dry season			
Apportioning of block meals to ruminants according to size and sex			
Restriction of ruminant block meal consumption in pens to avoid littering			
Feeding of only pregnant ruminants with block meal			
Boiling of water for feed meal preparation before adding other ingredients			
Giving ruminants enough water immediately after consuming block meal			
Forcing of small ruminants to consume block meal			
Feeding of female ruminants with block meal in different pens			
Preparation of ruminant block meal only on weekends			
Preceding preparation of block meals with starch before adding other ingredients			

Utilisation of IFS

IFS Utilisation statements	**Always**	**Occasionally**	**Never**
Cultivation of Rice on fish pond and keeping of poultry nearby			
Use of poultry dung as manure for rice cultivation			
Feeding of fish with maggots cultured from poultry dungxxxxxw			
Feeding of fish with feed concentrates alone			
Locating of poultry cage above the fish pond			
Changing of fish pond water every three months			

Use of natural water source for fish pond			
Harvesting of rice exactly after harvesting the second batch of stocked fishes			
Harvesting of fishes and rice at the same			
Polishing of rice on the farm after harvesting			
Self-hatching of fingerlings/juveniles			
Processing of fish after harvesting (smoke/dry)			
Bulk harvesting of stocked fishes at the same period			
Feeding of fishes at least twice a day			
Use of chemical pesticide on rice farm			
Feeding of poultry birds with fish extracts			
Use of dragnet for harvesting of fishes			
Harvesting of fishes and rice at different intervals			
Use of fresh moringa and pawpaw leaves as antibiotics for stocked fishes			
Packaging of farm products for improved market			
Harvesting of fishes after six months of stocking			

Utilisation of SPF

SPF Utilisation statements	**Always**	**Occasionally**	**Never**
Washing of sweet potato before and after peeling to remove dirt			
Soaking of sliced sweet potato in water after peeling to remove some starch before drying			
Open sun drying of sweet potato flakes			
Drying of sweet potato flakes with use of perforated trays			
Air-drying of sweet potato flakes instead of sun drying			
Use of any sharp object for peeling sweet potato			
Washing of sweet potato just once after peeling before drying			
Milling of dried sweet potato flakes with grinding machine			
Use of wire mesh or net for drying sweet potato flakes			
Cutting and drying of sweet potato without peeling if properly washed			
Preservation of sweet potato flour with little dry pepper to avoid weevil growth			
Packaging of dried sweet potato flakes in polythene bags before milling to avoid absorbing moisture			
Sieving of sweet potato flour after milling for a finer texture			
Oven drying of sweet potato during rainy seasons			
Uniform cutting of sweet potato flakes to ensure faster drying			

Packaging of sweet potato flour in bottles			
Pounding of dried sweet potato flakes with mortal in the absence of milling machine			
Fortification of sweet potato flour with cereal to enrich its nutrient			
Net covering of sweet potato flakes while sun-drying to avoid contamination			
Addition of preservatives to sweet potato flour for a longer shelf life			
Addition of flavor to sweet potato flour to enhance its taste			

Utilisation of SPG

SPG Utilisation statements	**Always**	**Occasionally**	**Never**
Fermentation of sweet potato before milling to reduce starch content			
Regular changing of water during fermentation			
Fermentation of sweet potato for at least two days before toasting			
Toasting of sweet potato granules with regular frying pot (agbada)			
Frying of sweet potato granules instead of toasting			
Peeling of sweet potato with knife or any sharp object			
Washing of sweet potato after peeling just once before milling			
Toasting of sweet potato granules on low heat			
Addition of oil to the toasting pan before toasting sweet potato granules			
Milling of sweet potato without peeling if properly washed			
Sieving of sweet potato only before toasting			
Fermentation of sweet potato in sacks			
Sieving of sweet potato granules after toasting for a finer texture			
Drying of sweet potato after fermentation for easy toasting			
Ensuring cooling of toasted granules before packaging			
Packaging of toasted sweet potato granules into sacks			
Use of brush or short broom to toast the granules on fire			
Use of carved wood (igbako) to toast the granules			
Jacking of fermented sweet potato in sacs before toasting			
Toasting of sweet potato granules in the same environment where it was fermented			

Toasting of sweet potato granules for less than twenty minutes on medium heat after sieving the fermented sweet potato			

APPENDIX 2

FOCUS GROUP DISCUSSION QUESTIONS FOR UTILISATION OF UI AGRICULTURAL RESEARCH OUPUTS (AROs) AMONG BENEFICIARIES IN SOUTHWESTERN, NIGERIA

1. Date of FGD
   _____
2. State/Community
   _____
3. Agricultural Enterprise
   _____
4. Period/Date of ARO dissemination
   _____
5. Other income generating activities of beneficiaries
   _____
   _____
   ____
6. Farmer group/Associations members belong
   _____
   _____
   ____
7. What are the benefits derived from the farmer groups/Associations?
   _____
   _____
   _____
   _____
   _____
8. Have you heard about the ARO before dissemination by the researcher? YES ( ) NO ( )
9. How was the ARO disseminated by the researcher? Training/Workshop ( ), Print Media (Bulletins, Newsletters, Journals, Textbooks) ( ), Audiovisual (Television, Documentary, Radio)
   _____
10. How would you rate the method of dissemination used? Excellent ( ) Good ( ) Fair ( ) Poor ( ).
    _____
11. What are the benefits derived from the disseminated ARO?
    _____
    _____
    _____
    _____

12. What are the challenges you encountered in utilising the disseminated ARO?

_____
_____
_____
_____

13. Suggest ways of overcoming these challenges

_____
_____
_____

14. What motivated your utilisation of the disseminated ARO?

_____
_____
_____
_____

15. How often to you utilize the disseminated ARO? Always (About 5 days in a week) ( ) Occasionally (About 1-2 days in a week) ( ) Rarely (once in a while) ( ) Never (I have not practiced it again after dissemination) ( ).
16. Have you also been involved in training others about the disseminated ARO? YES ( ) NO ( ).
17. What had been the attitude of other farmers/ processors towards the disseminated ARO?

_____
_____
_____

18. What would you want to change or improve about the disseminated ARO?

_____
_____
_____
_____

19. Are there other relevant agricultural practices essential for your enterprise that the disseminated ARO had not addressed?

_____
_____
_____
_____

20. If yes, please list them?

_____
_____
_____
_____