THE REPUBLIC OF UGANDA

MINISTRY OF AGRICULTURE, ANIMAL INDUSTRY AND FISHERIES

PERFORMANCE REPORT

FINANCIAL YEAR 2017/2018

AUGUST 2018

FOREWORD

This agricultural sector annual performance report covers the period July 2017 to June 2018.

The report provides an assessment of the sector performance and the results of public spending during the FY 2017/18. It also highlights progress of implementation of agreed undertakings during the Joint Agricultural Sector Annual Review for FY2016/17.

The information presented covers the MAAIF structure and mandate, Crops, *Livestock; Fisheries* sub-sectors performance, Agriculture Extension Services, Agriculture Infrastructure, Mechanization and Water for Agricultural production, Human Resource Management (HRM), Agriculture Advisory and Research Services delivery.

The Ministry appreciates contributions of all stakeholders in the implementation of FY 2017/18 sector initiatives and welcomes constructive comments that aim at enhancing the quality of its future publications. This report can be down loaded from the Ministry website at www.agriculture.go.ug

It is my sincere hope that the information in this publication is used to make informed decisions.

Pius Wakabi Kasajja
PERMANENT SECRETARY

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ACRONYMS

ACDP	Agriculture Cluster Development Project
ADB	African Development Bank
AFAAS	African Forum for Agricultural Advisory Services
AFALU	Association of Fishers and Lake Users
AFCA	Africa Fine Coffees Association
AgiTT	Agriculture Technology Transfer
AGRA	Alliance for a Green Revolution in Africa
AIV	African Indigenous Vegetables
ATAAS	Agriculture Technology and Agribusiness Advisory Services
AU	African Union
AU-IBAR	African Union Inter-African Bureau for Animal Resources
BAC	Bukalasa Agriculture College
BBW	Banana Bacterial Wilt
BUL	BIDCO Uganda Limited
CAADP	Comprehensive Africa Agriculture Development Programme
CBPP	Contagious Bovine Pleura Pneumonia
CBSD	Cassava Brown Streak Disease
CDO	Cotton Development Organzation
COCTU	Coordinating Office for the Control of Trypanosomiasis in Uganda
COMESA	Common Market for East and Southern Africa
CWD	Coffee Wilt Disease
CWD-R	Coffee Wilt Disease - Resistant
DAES	Directorate of Agriculture Extension Services
DDA	Dairy Development Authority
DfID	Department for International Development
DiFR/DFR	Directorate of Fisheries Resources
DRC	Democratic Republic of Congo
DSIP	Development Strategy and Investment Plan
EEA	Enabling Environment for Agriculture
FAO	Food and Agriculture Organization
FETF	Fisheries Enforcement Task Force
FEW	Field Extension Workers

FFB	Fresh Fruit Bunches
FFS	Farmer Field School
FS	Frame Survey
FSSP	Fisheries Subsector Strategic Plan
FTI	Fisheries Training Institute
FVIP	Fishing Vessel Identification Plates
FY	Financial Year
GAFSP	Global Agriculture and Food Security Program
GDP	Gross Domestic Product
GMO	Genetically Modified Organism
GoU/GOU	Government of Uganda
Ha	Hectare
HQ	Headquarters
HRM	Human Resource Management
IAEA	International Atomic Energy Agency
ICT	Information Communication and Technology
IDA	International Development Agency
IDB	Islamic Development Bank
IFAD	International Fund for Agricultural Development
IGAD	Inter Governmental Authority for Development
IITA	International Institute for Tropical Agriculture
IPC	Integrated Food Security Phase Classification
JASAR	Joint Agricultural Sector Annual Review
JICA	Japan International Cooperative Agency
KAFACI	Korea-Africa Food and Agriculture Cooperation Initiative
KASICA	Kawanda Silk Crafts Association
Kg	Kilogram
KOICA	Korea International Cooperative Agency
LAGBIMO	Lake George Basin Integrated Management Organization
LAKIMO	Lake Kyoga Integrated Management Organisation
LG/s	Local Government/s
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MBAZARDI	Mbarara Zonal Agricultural Research and Development Institute

MCC	Milk Collection Centre
MLN	Maize Leaf Necrosis
MoES	Ministry of Education and Sports
MoFPED	Ministry of Finance Planning and Economic Development
MoPS	Ministry of Public Service
MoU	Memorandum of Understanding
MPMPS	Meat Production Master Plan Study
MT/Mt	Metric Ton
MuZARDI	Mukono Zonal Agricultural Research and Development Institute
MWE	Ministry of Water and Environment
NAADS	National Agricultural Advisory Services
NaCoRI	National Coffee Research Institute
NaCRRI	National Crop Resources Research Institute
NADDEC	National Animal Disease Diagnostic and Epidemiology Centre
NAEP	National Agriculture Extension Policy
NAES	National Agriculture Extension Strategy
NAGRC&DB	National Agricultural Genetic Resource Centre and Data Bank
NAITS	National Artificial Insemination Technology Strategy
NaLiRI	National Livestock Research Institute
NAP	National Agriculture Policy
NARL	National Agricultural Research Laboratories
NARO	National Agricultural Research Organization
NaSARRI	National Semi-Arid Resources Research Institute
NDP	National Development Plan
NFP	National Fisheries Policy
NSC	National Sericulture Centre
NTR	Non Tax Revenue
OWC	Operation Wealth Creation
PACA	Partnership for Aflatoxin Control in Africa
PARIs	Public Agriculture Research Institutes
PASIC	Policy Action for Sustainable Intensification of Cropping
PMU	Project/Program Management Unit
PPP	Public Private Partnership

PRiDe	Promotion of Rice Development
SACCO	Savings and Credit Cooperative Organisation
SCAA	Specialty Coffee Association of America
SCAE	Specialty Coffee Association of Europe
SCAJ	Specialty Coffee Association of Japan
SLM	Sustainable Land Management
SOP	Standard Operating Procedures
SPS	Sanitary and Phyto Sanitary
TAD	Trans boundary Animal Diseases
TDS	Technology Development Sites
TPM	Top Policy Management
TUNADO	Uganda National Apiculture Development Organisation
UBOS	Uganda Bureau of Statistics
UCDA	Uganda Coffee Development Authority
UDHS	Uganda Demographic Health Survey
UEAWCP	Uganda Egypt Aquatic Weed Control Project
UFFCA	Uganda Fisheries and Fish Conservation Association
UFPEA	Uganda Fish Processors and Exporters Association
UFROT	Uganda Fishing Industry Rescue Operation Team
UMPCU	Uganda Meat Producers Cooperative Union
UNBS	Uganda National Bureau of Standards
UNHS	Uganda National Household Survey
UNICEF	United Nations International Children Education Fund
USA	United States of America
USAID	United States Agency for International Development
USD	United States Dollars
USPA	Uganda Silk Producers Association
VODP	Vegetable Oil Development Project
WB	World Bank
WFP	World Food Program
ZARDI	Zonal Agricultural Research and Development Institute

EXECUTIVE SUMMARY

In 2017/18, the size of the economy has been reported at Shs 101.8 Trillion equivalent to USD 27.9 Billion. It expanded by 5.8 percent, higher than the 3.9 percent growth rate achieved in the previous year. This is attributed to good performance in all subsectors of the economy.

The agriculture, forestry and fishing sector recorded an improved growth of 3.2 per cent in FY 2017/18 compared to 1.6 in FY 2016/17. The better performance in the sector was mainly driven by food crop growing activities whose value added grew by 3.7 percent compared to the growth of 2.0 percent in 2016/17. Favorable weather conditions and firm control on pests and diseases supported growth in food crops as shown by the bumper harvests in crops such as maize, beans and sorghum. Cash crops growing activities, however, slowed down to 5.8 percent when compared to 7.7 percent growth in 2016/17. Except for cash crops, all other agriculture sub-sectors improved their performance.

Agriculture has and continues to be one of Uganda's most crucial sectors of the economy employing over 72 percent of the population majority of them women and youth and contributing over 23.5 percent of GDP over the years. It is no surprise that the Agriculture sector is one of the three key sectors recognized in the NDP II to drive economic growth and reduce poverty. Government has over the medium term focused on modernization of this sector to transform it into a spring-board for socioeconomic transformation through gender responsive mechanization, commercialization and provision of infrastructure to facilitate marketing, production and productivity. The NDP II aims to increase sustainable production, productivity value addition and Labour Productivity (GDP per Worker - USD) from $581 in 2012/13 to $ 977.77 in 2019/2095.

Inflation has remained relatively low in 2017/18. Annual headline and core inflation declined to 1.8 percent and 1.6 percent in April 2018 from 6.4 percent and 5.0 percent, respectively in June 2017. There are a number of reasons that led to the decline in inflation. First, the favorable supply shock triggered by good weather conditions in 2017 led to suppressed inflationary pressures leading to a fall in food crops inflation from a high of 23.1 percent in May 2017 to minus 2.1 percent in April 2018. Consequently, overall food inflation dropped from a high of 15.6 percent in May 2017 to minus 1.8 percent in April 2018. Second, despite

the sporadic depreciation pressures seen in the Q4, 2016 and partially extending into Q1, 2017 the exchange rate has remained broadly stable.

The agriculture sector in the NDP II has a target of increasing agriculture exports to US$ 4 billion by 2020 and reducing the labour force in subsistence production to 3 million by 2019/2098. Export revenue from agricultural products increased from US$ 1,222.58 million in 2016 to US$ 1,533.75 million in 2017 representing 46 percent of Uganda's total export earnings. The improvement was majorly on account of the increase in export revenue from coffee which posted a 49.4 percent rise in proceeds. There was a slight improvement in the coffee average unit value from US$ 1.75 in 2016 to US$ 1.94 in 2017. However significant increment was registered in the volumes from 3.54 million (60- Kg bags) in 2016 to 4.78 million ((60-Kg bags) in 2017.

According to the UNHS 2016/17, 43 percent of households have subsistence farming as the main source of earning, majority of the subsistence farmers (52 percent) are in rural areas. Crop farming continues to be the main source of earnings for half of the households in rural areas (52 percent). The average income of the rural households, the majority of whom are subsistence farmers, improved from Ushs. 242,024 in 2012/13 to Ushs 303,000 in 2016/17, however this is still low compared to the urban households whose monthly incomes averaged at Ushs 703,000 in 2016/17

The slowdown in economic growth and climatic shocks experienced over the last two FYs have affected the income generating potential of Ugandans. The 2016/17 UNHS results reveal that there are more poor people in Uganda today than there were in 2012/13. The number of poor persons increased from 6.6 million to 8 million within the two survey periods, indicating an increased vulnerable population of 1.4 million people. Consequently, the incidence and depth of income poverty increased from 19.7 to 21.4 and from 5.2 to 5.3 percent respectively between 2012/13 and 2016/17. This calls for a significant improvement in coordination of public service delivery efforts and much higher levels of public investment if the country is to be able to achieve the 2020 poverty target of 14.2 percent. Income inequality also increased from 0.40 in 2012/13 to 0.42 in FY 2016/17.

CHAPTER ONE: BACKGROUND

1.0 Introduction

Uganda is signatory to the Comprehensive Africa Agriculture Development Programme (CAADP) and the New Partnership for African Development (NEPAD) programme all formulated under the aegis of the African Union (AU). Implementation of these continental programmes require utilization of a mutual accountability tool in the form of national Joint Sector Reviews (JSRs). The reviews provide a forum for collective multi stakeholders' assessments of sector performance and mutual agreement on priority interventions for subsequent improvement. It is in this context that Uganda' second National Development Plan (NDP) II for the Financial Years (FY) 2015/16-2019/20 implementation modalities, oblige sectors to conduct comprehensive reviews based on ***their annual performance reports***. Accordingly, and in line with this requirement, the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) has in collaboration with agriculture sector stakeholders been organizing Joint Agricultural Sector Annual Reviews (JASARs) since 2011 with now 8 reviews conducted to date with the latest held on the 28th and 29th August 2018.

This annual performance report is the climax of JASAR 2018. It is a fulfillment of the NDP II implementation requirements and in that regard, captures and presents an overview of the performance of the Ministry, Departments and its Agencies for the FY 2017/18. The document is composed of four sections that include; an introduction; overall sector performance presented at macro level; detailed sub sector, department and agency performance at outputs level and an overall conclusion.

1.1 Structure and Mandate

1.1.1 MAAIF Mandate

The mandate of MAAIF is to *support, promote and guide production of crops, livestock and fisheries so as to improve quality and increased quantity of agricultural produce and products for domestic consumption, food security and export.*

1.1.2 MAAIF Structure

The structure for the Ministry of Agriculture, Animal Industry and Fisheries in the Financial Year (FY) 2017/18 constituted; 4 directorates with 13 departments; 4 standalone departments and 3 specialized units as the main organizational entities of the Ministry described hereafter as follows.

1) **Directorate of Animal Resources,** with 3 departments namely: -
   a) Animal Health;
   b) Animal Production;
   c) Entomology.

2) **Directorate of Crop Resources,** with 3 departments namely: -
   a) Crop Inspection and Certification;
   b) Crop Production;
   c) Crop Protection.

3) **Directorate of Fisheries Resources,** with 3 departments namely: -
   a) Aquaculture Management and Development;
   b) Fisheries Control, Regulation and Quality Assurance;
   c) Fisheries Resource Management and Development (Natural Stocks).

4) **Directorate of Agricultural Extension Services** with 2 departments namely: -
   a) Agricultural Extension and Skills Management;
   b) Agricultural Investment and Enterprise Development.

5) **Stand Alone Departments namely**: -
   a) Finance and Administration;
   b) Agricultural Policy and Planning;
   c) Agricultural Infrastructure and Water for Agricultural Production;
   d) Human Resource Management.

6) **Specialized Units namely: -**
   a) Procurement and Disposal of Public Assets Unit;
   b) Internal Audit Unit;
   c) ICT Unit.

7) **Agricultural Training Institutions (ATIs) namely: -**

a) Bukalasa Agriculture College (BAC);
b) Fisheries Training Institute (FTI).

8) **Semi-Autonomous Agencies namely: -**
   a) Coordinating Office for the Control of Trypanosomiasis in Uganda (COCTU);
   b) Cotton Development Organization (CDO);
   c) Dairy Development Authority (DDA);
   d) National Agricultural Advisory Services (NAADS);
   e) National Agricultural Genetic Resource Centre and Data Bank (NAGRC&DB);
   f) National Agricultural Research Organization (NARO);
   g) Uganda Coffee Development Authority (UCDA);

1.2 Institutional composition of the Agricultural Sector

The agriculture sector is composed of the following institutions: -

1) MAAIF, its Agencies, Departments, Agriculture Training Institutes and District Agricultural Technology and Information Centres (DATICs) located in District Local Governments;
2) Other line ministries including; Finance, Planning and Economic Development, Gender, Labor and Social Development, Health, Trade, Industry and Cooperatives, Public Service, Local Government, Water and Environment, Works and Transport, Lands, Housing and Urban Development among others;
3) Local Government (LG) Production Departments;
4) The Private Sector;
5) Development Partners;
6) Civil Society Organisations (CSO);
7) International and Regional Organizations;
8) Academia;
9) Farmers (Small, Medium and Commercial)

The institutions and relationships with MAAIF and public agriculture institutions are depicted in the figure presented hereafter.

1.3 Document Structure

The report is presented as follows: -

1) The executive summary presents a synthesis of the report featuring where possible outcomes and impact of the sector performance;

2) Chapter 1 presents the background including an introduction of the context, an overview of the MAAIF mandate and structures;

3) Chapter 2 presents overall agriculture sector performance that covers trends and progress of achievements measured against the NDP II indicators as well as those in the Agriculture Sector Strategic Plan (ASSP) 2015/16-2019/20. The narrative focuses on outcome and where available impact or intermediate result level achievements;

4) Chapter 3 covers 3 categories of agriculture sector performance as follows; the first covers crop, livestock, fisheries and agricultural extension services. The second category includes performance of departments of Human Resource Management (HRM) and Agriculture Infrastructure, Mechanization and Water for Agricultural Production (AIMWfAP). The third category covers performance under the MAAIF Agencies of National Agriculture Research Organization (NARO) and National Agriculture Advisory Services (NAADS). In assessing performance, the presentation reviews, mandates, functions, achievements against targets, challenges and actions taken to mitigate them, collaborative partnerships, response to JASAR 2016 issues and recommendations as well as plans for the FY 2016/17; and

5) Chapter 4 presents overall sector performance featuring the highlights of Sub Sector, Departmental and Agency performance arising from the review of the entire agriculture sector.

CHAPTER TWO: FINANCIAL YEAR 2017/18 ECONOMIC PERFORMANCE

2.0 Introduction

This section reviews the country's economic performance during FY 2017/18 in terms of growth, inflation and exchange rate among others. All these affect and are affected by the performance of agriculture sector growth and exports.

2.1 Economic Growth

In 2017/18, the size of the economy has been reported at Shs 101.8 Trillion equivalent to USD 27.9 Billion. It expanded by 5.8 percent, higher than the 3.9 percent growth rate achieved in the previous year. This is attributed to good performance in all subsectors of the economy (Table 1).

The agriculture, forestry and fishing sector recorded an improved growth of 3.2 per cent in FY 2017/18 compared to 1.6 in FY 2016/17. The better performance in the sector was mainly driven by food crop growing activities whose value added grew by 3.7 percent compared to the growth of 2.0 percent in 2016/17. Favorable weather conditions and firm control on pests and diseases supported growth in food crops as shown by the bumper harvests in crops such as maize, beans and sorghum. Cash crops growing activities, however, slowed down to 5.8 percent when compared to 7.7 percent growth in 2016/17. Except for cash crops, all other agriculture sub-sectors improved their performance.

The growth of the industry (from 3.4 to 6.2 percent) and services (from 5.4 to 7.3 percent) sectors also rebounded when compared to the previous year mainly driven by growth in mining and quarrying, manufacturing and trade.

Table 1: Performance of the economy in 2016/17 and 2017/18

Sector	FY 2016/17	FY 2017/18
Real GDP growth (%)	3.9	5.8
Agriculture	1.6	3.2
o/w Cash crops	7.7	5.8
o/w Food crops	2.0	3.8
o/w Agriculture support services	2.6	4.0
o/w Livestock	1.6	2.0
o/w Forestry	-2.3	3.4
o/w Fishing	1.7	-2.9
Industry	3.4	6.2
Services	5.4	7.3

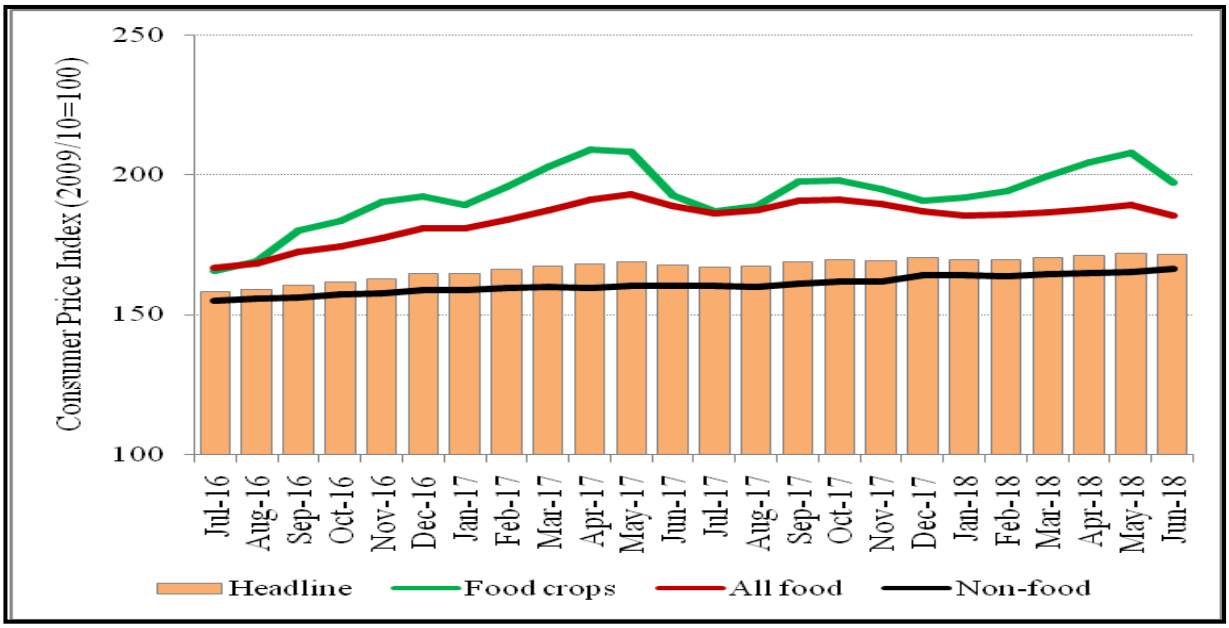
Source: Ministry of Finance Planning and Economic Development, 2018. Background to the Budget 2018/19

2.2 Inflation

Inflation has remained relatively low in 2017/18. Annual headline and core inflation declined to 1.8 percent and 1.6 percent in April 2018 from 6.4 percent and 5.0 percent, respectively in June 2017. There are a number of reasons that led to the decline in inflation. First, the favorable supply shock triggered by good weather conditions in 2017 led to suppressed inflationary pressures leading to a fall in food crops inflation from a high of 23.1 percent in May 2017 to minus 2.1 percent in April 2018. Consequently, overall food inflation dropped from a high of 15.6 percent in May 2017 to minus 1.8 percent in April 2018. Second, despite the sporadic depreciation pressures seen in the Q4, 2016 and partially extending into Q1, 2017 the exchange rate has remained broadly stable.

Figure 1 depicts the inflation indices for food and non-food items and how they contributed to headline inflation in 2016/176 and 2017/18. Food crops include items such as maize, beans, cassava, *matooke* (bananas), millet, etc. All food include food crop items and other food but non-crop items such as meat, dairy products, processed food etc. Non-food items include utilities, fuel, clothing, footwear, beverages, transport, etc.

Figure 1: Change in inflation variables



Data source: UBOS

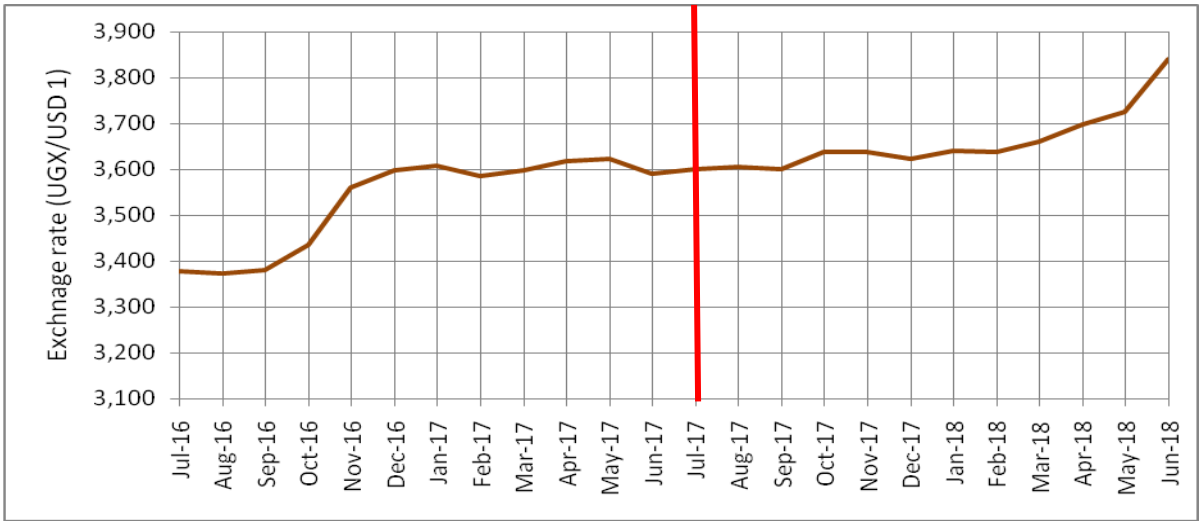
2.3 Exchange Rate

The shilling opened the financial year 2017/18 trading at an official midrate of USh 3,601against the US dollar in July 2017 and closed at USh. 3,840 in June 2018.

This represents a 7 percent depreciation. The figure below shows developments in the exchange rate between July 2016 and June 2018.

Figure 2: Exchange rate (UGX) against the USD: July 2016-June 2018

Source: Bank of Uganda



The depreciation of the Uganda shilling was largely attributed to various factors including seasonal factors and increased demand from domestic oil, manufacturing and telecom services. A weaker shilling would normally stimulate economic activity, and, farmers would enjoy higher export prices. But Uganda's agricultural exports are mainly in raw form, and primary goods do not command a high price in the international market. Further, food commodity transactions between Uganda and its neighbors are normally carried out in local currencies thereby less affecting the dollar market.

2.4 Poverty

The slowdown in economic growth and climatic shocks experienced over the last two FYs have affected the income generating potential of Ugandans. The 2016/17 UNHS results reveal that there are more poor people in Uganda today than there were in 2012/13. The number of poor persons increased from 6.6 million to 8 million within the two survey periods, indicating an increased vulnerable population of 1.4 million people. Consequently, the incidence and depth of income poverty increased from 19.7 to 21.4 and from 5.2 to 5.3 percent respectively between 2012/13 and 2016/17. This calls for a significant improvement in coordination of public service delivery efforts and much higher levels of public investment if the country is to be able to achieve the 2020 poverty target of 14.2 percent. Income inequality also increased from 0.40 in 2012/13 to 0.42 in FY 2016/17.

CHAPTER THREE: AGRICULTURE SECTOR PERFORMANCE FY 2017/18

3.0 Introduction

This section provides an overview of the sector performance for FY 2017/18 and progress on implementation of agreed actions during the JASAR 2016/17. The following is the overall Sector Performance:

3.1 Agricultural Exports

The agriculture sector in the NDP II has a target of increasing agriculture exports to US$ 4 billion by 2020 and reducing the labour force in subsistence production to 3 million by 2019/2098. Export revenue from agricultural products increased from US$ 1.2 billion in 2016 to US$ 1.5 billion in 2017 representing 46 percent of Uganda's total export earnings. The improvement was majorly on account of the increase in export revenue from coffee which posted a 49.4 percent rise in proceeds. There was a slight improvement in the coffee average unit value from US$ 1.75 in 2016 to US$ 1.94 in 2017. However significant increment was registered in the volumes from 3.54 million (60- Kg bags) in 2016 to 4.78 million ((60-Kg bags) in 2017.

3.2 Income

According to the UNHS 2016/17, 43 percent of households have subsistence farming as the main source of earning, majority of the subsistence farmers (52 percent) are in rural areas. Crop farming continues to be the main source of earnings for half of the households in rural areas (52 percent). The average income of the rural households, the majority of whom are subsistence farmers, improved from Ushs. 242,024 in 2012/13 to Ushs 303,000 in 2016/17, however this is still low compared to the urban households whose monthly incomes averaged at Ushs 703,000 in 2016/17

3.3 Agriculture Insurance

Currently, Government is implementing the Uganda Agriculture Insurance Scheme (UAIS) as a pilot. The objective of the scheme is to cushion farmers against losses arising from natural disasters; and also attract financing to agriculture. Agriculture Insurance encourages commercial banks to lend to the agriculture sector given that the risk associated with agriculture is mitigated. The Scheme has improved access to agriculture loans.

In addition, the scheme provides Insurance cover for crops and livestock, for both small and largescale farmers. Under the Scheme, Government provides premium subsidy funds; undertakes publicity; sensitization and training of farmers.

The Insurance Regulatory Authority (IRA) has provided the regulatory oversight and quality control, Bank of Uganda (BoU) on the other hand is managing the draw down on UAIS Account. The Monitoring and Evaluation of the Scheme is being done by the UAIS Technical Working Committee. So far, over 54,000 farmers have benefited from the scheme across all regions of Uganda.

In FY 2017/18, the insured farmers who lost their crops and livestock were compensated and prepared for the coming seasons. In FY 2018/19 Government will continue to roll-out agriculture Insurance to all regions of the country.

Beneficiaries of the Agricultural Insurance Scheme, FY 2017/18

Region	**Number of Farmers**	**Percentage**
Western	23,104	32
Eastern	12,811	31.9
Central	14,934	27
Northern	3,757	9
Total	**54,606**	

Source MFPED

3.4 Employment

Agriculture has and continues to be one of Uganda's most crucial sectors of the economy employing over 72 percent of the population majority of them women and youth and contributing over 23.5 percent of GDP over the years. It is no surprise that the Agriculture sector is one of the three key sectors recognized in the NDP II to drive economic growth and reduce poverty. Government has over the medium term focused on modernization of this sector to transform it into a spring-board for socioeconomic transformation through gender responsive mechanization, commercialization and provision of infrastructure to facilitate marketing, production and productivity. The NDP II aims to increase sustainable production, productivity value addition and Labour Productivity (GDP per Worker - USD) from $581 in 2012/13 to $ 977.77 in 2019/2095.

3.5 Agro-Industry

(a) Completed construction of two tea factories in Kabale and Kisoro in partnership with the Kigezi Highland Tea Ltd. The factories are now operational and will produce a combined total of 2,400 tons of ready tea per annum, earning the country an additional US$ 4.8 million worth of exports annually, creating 1,800 jobs and working with about 1,560 tea out-growers;

(b) Contracted suppliers for installation and commissioning of a third line, with a capacity of 600kg per hour, at Kayonza tea factory in Kanungu. Installation of the third line will increase the processing capacity of Kayonza Tea Factory, significantly reducing the currently experienced post-harvest losses. In the same period, the process for establishing a 450kg/hour tea processing plant in Zombo and Nebbi was started;

(c) Construction of the fruit factory in Soroti was completed and the machinery installed. The fruit factory is co-owned by farmers through the Teso Tropical Fruit Growers Cooperative Union and Government through UDC. Product development was completed, farmers trained in fruit husbandry as well as cooperative management; and staff recruitment and training have been undertaken. Trial test runs have been completed successfully and the factory is now set for the start of commercial production. The factory has an initial processing capacity of 12,000 tonnes of fruits per year, rising to 25,000 per year at full capacity in the second year.

(d) Government also completed the acquisition of 10.1 percent shareholding in Horyal Investments Holding Ltd for the establishment of the Atiak Sugar Factory. The factory, scheduled for completion in 2018/19 will have a crushing capacity of 1,650 tons of cane per day, generate 6 megawatts of electricity and work with 1,500 out-growers spread across five districts. This investment is a critical step for the reconstruction of Northern Uganda.

3.60 Projects and programs

Overall, the sector implemented 38 programs and projects during the financial year as indicated in annex table 1. In summary, the sector implemented the following measures in FY2017/18, with varying levels of service delivery results:

(a) Launched a National Strategy for Youth Employment in Agriculture (NSYEA). The 5-year strategy aims to re-engage youth in agriculture along agricultural value chains. 25 model youth farmers from 5 regions were identified to help educate fellow youth;

(b) Rolled out the Agriculture Cluster Development Project (ACDP), where 450,000 households dealing in the five major crops; maize, beans, rice, cassava and coffee were facilitated with pesticides, fertilizers, and coffee pruning equipment, among other inputs in identified 42 districts;

(c) NUSAF 3 project distributed heifers worth more than Ushs 69 billion to more than 50 residents in Bukedea and Kachumbala sub-counties in Bukedea district;

(d) WFP paid 156 farmers of Nambaale Agri-business enterprise co-operative limited (NAECL) in Iganga district Ushs 400 premium above the market price for maize to feed Uganda's growing refugee population;

(e) Under access to farm inputs, UCDA in coffee planting season of September/ November 2017 allocated total of 131,019,698 coffee seedlings which were planted in 102 coffee growing districts compared to 157,063,064 coffee seedlings that was available in the 2,089 nurseries. During March and May 2018 season, 275,178,950 Coffee seedlings were available in 2,492 coffee nurseries for planting in the five coffee growing regions; and

(f) OWC distributed 428,000 citrus and 2,330 mango trees to each of the newly-created sub counties.

3.61 Commercial Farming

The Ministry has been promoting commercialization of agriculture particularly amongst small holder famers and accelerating the development and commercialization of the prioritized agricultural commodities. Skilled workers in agriculture, forestry and fisheries accounted for the 2nd highest share of total employment in 2016/17 (27.3%) only next to services and sales workers (30.6%)102.

In FY 2017/18, the following were achieved:

a.) Uganda Cooperative Alliance registered 16,000 farmer groups comprising of cooperative unions and cooperative enterprises whose business is farming and agricultural value chain. The registered farmer groups were given priority to benefit from different government programs such as distribution of pesticides and machinery. This was done after UCA carried out a needs assessment of the farmers'groups;

b.) UCDA conducted a study on business case for large scale commercial farmers to generate information on the profitability and feasibility of large scale coffee production in Uganda for all the 5 coffee growing regions

3.62 Agricultural Productivity

Raising agricultural productivity is a longstanding agenda of Government. Efforts to this end have however been hindered by the recent climate changes in the country.

In FY 2017/18, the following interventions were implemented by the respective institutions:

(a.) Agricultural Research and Development

NARO released twenty-nine (29) new crop varieties with attributes including drought resilience, pest and disease resistance with yield, enhanced nutritional value and earliness. The following crop varieties were released:

(1) Three coffee-disease resistant and high quality clones with yields of 4.8tons, 3.9tons and 3.1tons respectively, were released in July 2017, for farmer adoption as NAROKR10, NAROKR9 and NAROKR8.
(2) Three maize-Striga resistant (IR) hybrids released as NARO maize 58-IR, NARO maize 59-IR, NARO maize 60-IR).
(3) Two Maize-Varieties (highland varieties) BH31 and BH33 most high yielding (8.2 and 7.2 t/ha respectively) and sweetest to the farmers therefore subsequently released as NAROMAIZE731 and NAROMAIZE733.
(4) Four banana-matooke hybrids resistant sigatoka, tolerant to weevils and nematodes, yield =2x yield of Mbwazirume were released as NAROBan1, 2, 3 and 4).
(5) One soybean variety released as Maksoy 6N.
(6) Six Cowpea-varieties tolerant to drought and moderately resistant to viral diseases were released as NAROCOWPEA 1- 6.

(7) Five finger millet -varieties were released on 24th of November 2017 as NAROMIL 1-5.
(8) Five sweet potatoes early maturing variety were released. Sweet potatoes were released as NAROSPOT 1, 2,3,4, and 5 (35t/ha, 27t/ha, (26t/ha, 28.7t/ha, 25.5t/ha) respectively.

In the last two years, Abi ZARDI has produced rice seed from 10 acres for distribution to the communities through various channels. The rice seed has been distributed in Rhino camp sub-county, Arua District; Lobule sub-county, Koboko district; Ofua sub-county, Adjumani district.

NACRRI provided rice breeder seed and developed the extension information materials utilized during the training of trainers of trainers (TOTs) and training of farmers. Under the Rice PRIDE project, the national rice growing area expanded to 18,194 ha. The national annual rice (paddy) production increased to 49,809 tons;

(b.) Makerere University College of Agricultural and Environmental Science set up a semen lab at Kabanyoro, Wakiso district to ease distribution of semen to farmers across the country. The lab is set up under the diverse pig project supported by the National Agricultural Research Organization to increase pig production in the country to correspond with the pork demand. Following the various training of artificial inseminators (AI), technicians across the country had to look for better ways of distributing semen to farmers;

(c.) National Livestock Resources Research Institute (NALIRRI) developed an anti-tick vaccine using local extracts, which were tested and proved to be more effective than the imported chemical acaricides. It is capable of preventing the brown ear tick, blue tick and bont-legged tick. It also targets East Coast Fever plus the heart water disease and the anaplasmosis disease. The country will be able to save sh18.6bn annually if the local vaccine is commercialized;

(d.) Three new laboratories to improve agricultural research were launched at the National Crops Resources Research Institute (NaCRRI) in Wakiso with funding from the International Institute of Tropical Agriculture (IITA).

(e.) NARO took over the management and restoration of the Mbale regional fish fry centre from MAAIF. Mbale regional fish fry is among the four Government multi-billion fish fry centres that were established in the 1950s but collapsed in 1999 because of insecurity.

3.63 Coffee Development

Coffee is and still remains Uganda's main export revenue earner. According to the Uganda coffee roadmap, Government plans to plant 300 million trees per year. It's optimistic this will increase output of coffee from the current 4.5 million 60-kilograms bags to 20 million bags by 2020. This is anticipated to create more than 500,000 jobs in the coffee value chain. Coffee exports for 12 months (April 2017 to March 2018) totaled to 4.69 million bags worth $528 million comprising Robusta 3.65 million bags worth $398 million and Arabica 1.03 million bags worth $135 million.

In FY 2017/18, the Ministry through UCDA achieved the following:

(a) Closed more than 150 coffee factories in Kasese in August 2017 over standards and poor structures;
(b) Analysed 62 field coffee samples to determine quality of coffee in the field;
(c) Enforced coffee regulation through field task forces and quality improvement campaigns in South Western (7 districts), Central (3 Districts) and Northern (2 districts);
(d) Issued 3,583 Quality Certificates, 3,528 ICO certificates and analysed 396 FAQ samples at export level110; and
(e) Launched the UCDA Communication and Domestic Coffee Consumption Strategies.
(f) Uganda Coffee Development Authority (UCDA) trained 136 (46 Female) traders in value addition, GHP and PHH practices, bulk selling, specialty coffee and graded coffee best handling. UCDA conducted 10 trainings benefiting 347 new farmers (53 females, 294 males) in the new coffee districts in the North. It also established one farmer field school in Nwoya district and distributed 660,526 coffee seedlings to 1157 households (554 females, 603 males) in 16 new coffee growing Districts in Mid-North

3.64 Tea Development

The Ministry is and continues to pursue a number of interventions aimed at improving the sector performance and increasing tea production, these include among others; mobilization of small holder tea growers into independent legal farmer groups/associations with a critical mass of shareholders owning processing facilities through Government loan guarantees; increasing funding for tea research; providing extension services for tea; production and distribution of 34,965 million quality tea plantlets per annum; and building tea factories (at least 25 single line

in Kisoro, Kabale, Kanungu, Zombo and Mityana) with a capacity to produce 800,000-1,000,000 mt of tea per annum.

Tea production in 2017 amounted to over 61,376 MT, of which 56,477 MT were exported. This generated US$79.58 million for the country an increase from US$ 71.58 in 2016. The sector targets to produce 112,000 mt by 2020, with exports valued at approximately US$155 million.

In FY 17/18, the Ministry achieved the following:-

(a) Collected data and information on pests incidence and severity in tea growing regions;
(b) Distributed 57,495,085 tea seedlings to 18 districts to establish 11,499 acres for 11,499 households

3.65 Cotton Development

Cotton is one the 12 priority commodities identified both in the NDP II and ASSP FY 2015/16 – 2019/20. In FY 2016/17, a total of 151,071 bales of lint (185 Kg each) were produced by farmers in 60 cotton growing districts contributing about Sh.136 billion to household incomes, US$ 42 million in lint sales and Sh.44 billion in cottonseed sales. The sector targets to produce 64,750 mt by 2020.

MAAIF is undertaking the following initiatives in this sector: completion of the seed processing plant in Pader district; provision of cotton inputs to farmers; support to value addition through implementation of the revolving lint buffer stock fund to ensure all year round supply of lint; strengthening cotton research; strengthening cotton farmers support programmes through extension and training in good agronomic practices; support to mechanization in cotton; provision of electricity at US$ 5 cents per KWH to textile industries.

In FY 2017/18, the Ministry achieved the following:

(a) 2,647 Mt of seed were supplied to farmers in 64 districts in Eastern, Northern, West Nile and Mid-West & Central and Western Regions;
(b) 3,965 demonstration plots were established, 8,885 training sessions conducted for over 74,080 farmers who included members of 171 women groups and 124 youth groups;
(c) 328 Field Extension workers belonging to UGCEA were trained and deployed in the cotton growing districts. The extension workers established the 3,965 demonstration plots and used

them to train over 74,080 on crop establishment, pest & general crop management and soil & water conservation;

(d) 443,750 units of pesticides, 4,933 litres of herbicides, 27 Mt of fertilizers and 2,077 spray pumps were procured and distributed with support from UGCEA; and

(e) Under mechanization, 2,657 acres were ploughed by tractor while 62,660 acres and 65,840 acres were ploughed by oxen for cotton and other crops respectively.

3.66 Fish Production

The Ministry has an objective to support sustainable fish production and control quality for improved food security and household income. Cabinet finalized and passed the Fisheries and Aquaculture policy and the policy goal is to increase fisheries and aquaculture production to 1.7million tonnes annually so as to contribute to food security, nutrition and economic growth and earnings from annual fish exports worth US$ 238.80 million.

In order to achieve the above, the following interventions are being undertaken: increasing support to aquaculture through construction of fish ponds; supporting restocking of major water bodies; undertaking research in area fish breeding and production technologies for fast growing and early maturing fish species; control of water weeds; increasing regulation, inspection and certification; and increasing value addition to fisheries.

The fish industry in FY 2017/18 registered the biggest fish stock recovery in 12 years. This surge in fish stock is attributed to the on-going operation supported by the UPDF to stop illegal fishing on both lakes and rivers; strict law enforcement against indiscriminate fishing; and banning use of imported nets in favour of locally manufactured nets.

3.67 Dairy and Livestock Production

The sector targets to produce 360,000 MT of beef (valued at US$ 1.636 billion); 139,185 MT of pork (valued at US$421 million) and 39,775 MT of mutton and goat meat (valued at US$421 million) by 2020. This is in addition to poultry. There are also plans to increase production and exports of hides and skins. In order to achieve the targets, the Ministry is undertaking control of vectors and diseases through vaccinations, disease surveillance and construction of infrastructure for disease control; pasture development; provision of adequate water for livestock production through the construction of valley dams; provision of high genetic

materials; promotion of labour saving technologies; creating a buffer stock/animal handling grounds to support beef processing.

Dairy Development Authority (DDA) rehabilitated Soroti, Bbaale and Gulu milk collection centres. It also trained 819 dairy stakeholders on value chain related practices, 56 were specifically skilled in value addition. 449 dairy premises, equipment and consignments were inspected and 306 dairy premises were registered

3.7 Other Crops

The Ministry recognizes the vital role of other crops which contribute to export earnings, food security and nutrition. Food crops registered an increase in the area planted except banana that registered a small and insignificant decline of 0.41 percent over the NDP I period. Of the 16 food crops analyzed, only five crops registered any increase in yields during the same period with significant increases being registered by maize (13.03%) and sesame seeds (16.55%) while the increases for the other three were either small or insignificant and these are Irish potatoes (0.05%), beans (0.05%) and cow peas (4%).

3.71 Storage

Government of Uganda signed a MoU with the Grain Council of Uganda to construct grain silos countrywide to help in the maintaining of good grain standards. The project is supported by Trade Mark East Africa. The silos will be able to cater for approximately 200,000 kg of grain and is intended to serve close to 10, 000 farmers.

During FY 2017/18, the Grain Council of Uganda also achieved the following:

(a) Launched a self-regulatory code of conduct for grain handlers;
(b) Participated in the revitalization of the Uganda National Commodity Exchange which is due for launch and strongly advocated for the strengthening of the Uganda Warehouse Receipt System Authority; and
(c) Launched grain quality committees in 5 districts across the country.

3.8 Progress of ASSP Impact Indicators

The overall goal of the ASSP is to "poverty reduction, increased food security and availability of quality food to Ugandans". The ASSP M&E Logical Framework Matrix identifies the following indicators to track the sector's contribution to this goal:

- Percentage change in the proportion of rural population below the poverty line
- Agricultural GDP growth rate
- Labour productivity
- Percentage of children under five years of age who are undernourished

Indicator	**Recommended Data Source**	**Progress in 2017/18**
Percentage change in the proportion of rural population below the poverty line	UNHS	The most recent data is for 2016/17 which was reported in the 2017 report. It was reported then that 30.8% of the rural population is living below the national poverty line (UNHS 2016/17)
Agricultural GDP growth rate	UBOS	Due to good weather and pest and disease control measures, agricultural GDP growth doubled from 1.6% in 2016/17 to 3.2% in 2017/18. This is still below the ASSP target of 6% per year.
Labour productivity in agriculture	UBOS	No data
Percentage of children under five years of age who are undernourished.	UDHS	The most recent data is for 2016. In that year, stunting rate was 29% and underweight 11%.

ASSP performance indicators

Over the ASSP period, the agriculture sector aims at achieving the following three outcomes:

Outcome 1 Increase productivity by farmers to at least 50percent of the yields at research stations for the 12 priority commodities

Outcome 2 Transform subsistence farmers into enterprise farmers and transform small holders farmers into commercial farmers

Outcome 3 Increase agriculture exports to at least US$4 billion per year

The ASSP recommended sources of data were the UNHS and UBOS Statistical Abstract. Alternative sources of data as shown in the table below were used because the former sources were not up-to-date with the data requirements.

Outcome 1: Increase productivity by farmers to at least 50% of the yields at research stations for the 12 priority commodities

Indicator	Data source	Progress in 2017/18
1.1 Level of household agricultural income	UNHS	No data available
1.2 Percentage of labour force in agriculture	UNHS	About 70 percent (UNHS 2016/17)
1.3 Percentage change in agricultural contribution to total GDP	UBOS	The share declined from 24.6% in 2016/17 to a projected 24.2% in 2017/18

Outcome 2: Transform subsistence farmers into enterprise farmers and transform smallholders farmers into commercial farmers

Indicator	Data Source	Progress in 2017/18
2.1 Percentage change in the labour force in subsistence production	UNHS	No data
2.2 Percentage annual growth in agricultural value added	2018 Background to the Budget 2017/18	The agriculture value added at constant 2009 prices increased from USh. 12,405 billion in 2016/17 to an estimated USh. 12,863 billion in 2017/18. This represents an increase of 3.2%

Outcome 3: Increase agriculture exports to at least US$4 billion per year

Indicator	Data Source	Progress in 2017/18
3.1 Value of agricultural exports	Bank of Uganda	Value of agricultural exports (processed and unprocessed) increased from USD 1.2 billion in 2016 to USD 1.5 billion
3.2 Percentage change in ratio of agricultural exports to total exports	Bank of Uganda	The ratio increased from about 48% in 2016 to 52 % in 2017. This implies a 4 percent point increase
3.3 Percentage change in ratio of agricultural exports to agriculture GDP	2017 Background to the Budget 2017/18; Bank of Uganda	Agricultural GDP (at current prices) converted in USD using annual average exchange rates increased from USD 5.94 billion in 2016 to USD 6.76 billion in 2017. This implies an increase in the ratio from 20.3 % to 21.4% respectively

Agricultural exports (primary and processed), in terms of value, share in total exports and share in agriculture GDP increased between 2016 and 2017. This shows that the role of agriculture in exports remains high. It should be noted that these export figures are only the formal exports. Bank of Uganda figures estimate that the value of agricultural informal exports has averaged 38% of total informal exports over the last five years.

JASAR 2017 Agreed Actions

1. Policy and Planning

Issue	Agreed Action	Time Frame	Action Taken
Need to Make JASARs More Inclusive	Conduct District Local Government Production and Marketing Sector Annual Reviews to Feed into Regional JASAR	Starting FY 2018/19	Action undertaken, 2017 JASAR was held in Lira, 2018 JASAR was held in Mbale
Poor Inter Sectoral Coordination	Strengthen Inter Sectoral Coordination	FY 2017/18	Strengthened the Agricultural Sector Working Group: Civil Society Organizations and Private Sector in addition to line ministries, regular (quarterly meetings) and special meetings as and when necessary.
Delayed approval and Enactment of Bills	Expedite Enactment of Pending Fisheries Bill	FY 2017/18	The Fisheries and Aquaculture policy 2018 was approved, the Principles of the bill were also approved by Cabinet. Drafting instructions were issued to First Parliamentary Counsel for Legislative drafting.

2. Agricultural Extension

Issue	Agreed Action		
Incomplete Recruitment of Agriculture Extension Workers in DLGs	Complete Agriculture Extension Worker Recruitment	FY 2017/18 & 2018/19	The Ministry had planned to support recruitment of additional 1958 extension staff but all new recruitments were suspended by MFPED .No wage bill was provided by MFPED for 2017/18 & 2018/19
Inadequate Facilitation	Lobby for funding and provide	FY 2017/18	The Ministry with support from IFAD under the ATAAS Project

Issue	Agreed Action		
of Agriculture Extension Workers	facilitation for Agriculture Extension Workers	on wards	planned to procure transport equipment for extension staff at District Local Governments (DLGS). The contracts for supply of 950 motorcycles and 117 pickup vehicles have been accomplished. The deliveries will be done between September and December 2018. Other projects like Agriculture Development Project (ACDP) and Resilience have also provided some vehicles and motorcycles. At least every district will have a new vehicle and 30% of extension staff will have new motorcycles under the Agricultural Extension Grant; District Local Governments have been advised to procure some motorcycles as well.
Weak Linkage between Research, Extension and Farmers	Strengthen Linkage Between Research, Extension and Farmers	FY 2017/18 &2018/19	The Ministry developed a framework between NARO ZARDIs and the the DLGs to upscale technology transfer. This FY alone 8,998 demonstrations were conducted country wide to increase yields thus ensuring food security and household incomes. Technologies disseminated included use of improved seeds, fertilizers, pasture production and conservation, pest and disease (vector control,) post harvest handling, AI, introduction of farmer implements to reduce labour and drudgery water harvesting for irrigation and watering animals among others.

3. Research and Development

Issue	Agreed Action		Action Taken
Inadequate Dissemination of Information on Proven Research Technologies	Expedite Operationalization of Technology Information Dissemination Strategy	FY 2017/18	A NARO information hub was developed. This is an ICT based application that enables interphase between end users and research

4. Enhancing Access to Critical Farm Inputs

Issue	Agreed Action		Action Taken
Inadequate Knowledge of Farmers' Capacities and Interest	Increase Knowledge on Farmers Capacities and Interests by all Directorates	FY 2017/18	A number of interventions are aimed at increasing farmers' capacity to acquire knowledge, skills and technologies were undertaken. Refresher courses for all categories of extension staff to update their knowledge and skills were organized. The Extension staff are now being facilitated with operational funds and Ministry is in the process of procuring transport equipment (vehicles and Motorcycles).
Delayed Enactment of Bills and Approval of Policies	Expedite Approval National Seed Policy	FY 2017/18	The national seed policy was finalized and submitted to Cabinet for approval.
Lack of Comprehensive Agro Input Strategy and Policy	Develop and operationalize National Agro Input Policy and Strategy	FY 2018/19	A number of policies in place / already under preparation to address agro input concerns. These include the fertilizer policy, seed policy and irrigation policy

Issue	Agreed Action		Action Taken
Inadequate MAAIF Capacity for Implementing Regulatory Role	Increase MAAAIF Capacity for implementing regulatory role by all Directorates	FY 2018/19	In crops,22 inspectors were recruited and more to be recruited in 2018/19. In livestock. animal 12 Veterinary inspectors recruited 2017/18 to address the human resource gap; Secured land for animal holding grounds and quarantine e.g. Got Apwoyo land title has been surveyed and titling is in process In Fisheries, provision is made for a paramilitary unit with enough staff to ensure better regulation under the recently approved Fisheries and Aquaculture Policy 2018. Ministry also plans to procure vehicles for staff mobility.
Low Levels of Mechanisation Impeding Increased Production	Develop and operationalize National Agriculture Mechanization and Farm Planning Strategy	FY 2018/19	Draft mechanization policy and strategy developed. Initiated the process of procuring a consultant for development of the farm planning strategy
Limited Promotion and Enhancement of Local Capacity to Produce Seed and Vegetative Material	Promote and Enhance Local Capacity for Input Production	FY 2018/19	The Ministry is working with institutions such as the Uganda Oil Seeds Producers and Processors Association (UOSPA) and Makerere University for multiplication and distribution of sunflower and soya bean seed. This will be scaled out to other seed companies/ farmers in 2018/19.

5. Pests, Vectors and Disease Control

Issue	Agreed Action		Action Taken
Misuse of Agrochemicals by Farmers	Sensitization and training on use of agrochemicals	FY 2018/19	The Ministry has continued to build capacity of farmers on proper usage of chemicals used in aquaculture, crops and livestock.
Presence of Counterfeit Agro Inputs on Market	Increase Capacity for Regulation, Enforcement and Routine Surveillance of Products on Market	FY 2018/19	The Ministry is strengthening the regulation function through recruitment of more staff and procurement of vehicles for staff mobility. The proposed increase in numbers coupled with proposed deterrent penalties and fines are expected to boost regulation and strengthen enforcement Further, the Ministry will carry out joint surveillance with Agricultural police and other stakeholders
Aflatoxins and Chemical Residues Issues (Both Crops & Animals)	Address Aflatoxin and Chemical Residue Issues	FY 2017/18, FY 2018/19	The Ministry has established a chemistry lab at the National Animal Disease Diagnostic and Epidemiology Centre (NADDEC) which has already developed protocols for testing aflatoxins and chemical residues in animal products and feed. Testing should be able to start once the standards are acquired Further, the Ministry support from USAID (EEA) has produced extension and information communication materials (ICM) for control of aflatoxins by all categories of extension workers, farmers and general public. Plans to launch them are underway.
Quarantine Enforcement	Strengthen Quarantine Enforcement by all Directorates with regulatory functions	FY 2017/18, FY 2018/19	The Ministry will continue to pursue and survey all veterinary land meant for quarantine stations and holding grounds. As already mentioned, 12 Veterinary inspectors have been recruited to address the human resource gap

6. Water for Agricultural Production

Issue	Agreed Action		Action Taken
Inadequate Funding for WfAP	Lobby for Introduction and Institutionalization of WfAP Conditional Grants	FY 2018/19	To be undertaken in the FY 2018/19.
Lack of Guidelines for Management of WfAP Infrastructure	Review or Develop National Guidelines for Water User Associations/Committees for management of WFAP Infrastructure; and	FY 2018/19	Planned to be undertaken in the FY 2018/19 under the Agriculture Cluster Development Project (ACDP).
	Develop and operationalize Operations and Maintenance (O&M) systems and plans.	FY 2018/19	To be undertaken in the FY 2018/19.
Weak Inter Agency Coordination	Strengthen Inter Agency Coordination by Forming Technical Working Groups (MAAIF, MWE, DLGs and NSA) for planning and monitoring interventions	FY 2018/19	Inter-ministerial Technical committee on Water for Agricultural production chaired by Office of Prime Minister in place. Coordination strengthened with the approval of the National Irrigation Policy. WfAP projects jointly implemented by MAAIF and MWE in close collaboration with the DLGs
Inadequate Equipment and Machinery	MAAIF to procure additional equipment and machinery	FY 2018/19	Procurement process initiated.

7. Marketing and Value Addition

Issue	Agreed Action		Action Taken
Lack of Concrete Information on Marketing Infrastructure and Value Addition	Establish Baseline of Existing Primary Processing Infrastructure and Value Addition	FY 2018/19	Undertaken. The ministry contracted Uganda Cooperative Alliance (UCA) to undertake an inventory/Profile of the existing farmers' organizations in Uganda and their existing capacities including primary processing and value addition. The ministry has also contracted a consultant (Farm reap Limited) to undertake an inventory of storage capacity in the country. A report for the first phase has been submitted and is available.
Limited Involvement of Farmers and Farmers' Groups in Management of Sector Infrastructure	Empower Farmer Groups/Private Sector through awareness raising and sensitization	FY 2018/19	The ministry is already prioritizing farmer and farmer group empowerment in all the public agricultural infrastructure being developed(User committees) e.g Irrigation schemes, Livestock infrastructure, agro processing infrastructure, fish landing sites .This effort is being complemented by the current vibrant agricultural extension service delivery system in the local governments
Sub Optimal Utilization of Marketing Infrastructure	Conduct Capacity Building and Disseminate Information on Appropriate Use and Utilization of Infrastructure by all Directorates	FY 2018/19	Directorate of Agricultural extension conducted training and capacity building for farmers and other key stakeholders on various aspects of value chains. The include appropriate use and utilization of marketing infrastructure under which information and training materials have been developed and disseminated Through field visits, workshops, trainings, print media and circulars.
Limited Information on Food Safety Along the Value Chains	Promote Food Safety Along the Value Chains by all Directorates	FY 2017/18, 2018/19	The Ministry in collaboration with MTIC and other DPs and Agencies developed and disseminated standards for commodities including grains (maize, beans and rice) cassava, meat, Dairy products, coffee. Postharvest handling technologies are being demonstrated and promoted. The extension workers were trained is PHH technologies in collaboration with Makerere

Issue	Agreed Action		Action Taken
			University and WFP for proper handling of farm produce to ensure food safety especially control of aflatoxin. Some DLGs have been supported to come up with Ordinances and Bye laws of proper handling of produce and they are being enforced. Enforcement of standards for food safety are also being conducted by extension staff and MAAIF Agencies such as meat and fish inspection, DDA on dairy products and UCDA on coffee. Agro processing industries have been put in place for different commodities by private sector but also under Private Public Partnership (PPP) to enable processing and value addition which ensures quality and prolonged shelf life of food products.

8. PPPP Lessons

Issue	Agreed Action		Action Taken
Inadequate Information Sharing of PPP Experiences	Disseminate Information on VODP Model and Experiences	FY 2017/18, 2018/19	This has largely been through trade shows
PPP Act 2015 Limits Scope for Agriculture Sector	Lobby MoFPED on Review of Scope and Provision for Agriculture sector in the PPP Act 2015	FY 2017/18	Government developed Public private partnership policy 2010 and act 2015. The initial first tracking of the implementation of PPP policy and act have been largely implemented in the large infrastructure projects mainly in roads and energy. However, agricultural interventions under the model are emerging e.g in Vegetable oil, Livestock infrastructure, irrigation schemes, warehousing and agro processing. It is important to review the PPP policy and act with the aim of stimulating production.

CHAPTER THREE: CROP SUB SECTOR PERFORMANCE

1. Introduction

The Directorate of Crop Resources constitutes of three (3) departments namely; Crop Production, Crop Protection and Crop Inspection and Certification and two agencies namely Coffee Development Authority (CDA) and Cotton Development Organization (CDO) and implements a number of projects as show in table 1.

2. Mandate of the Directorate

The mandate of the Directorate is the promotion of crop production, value addition and marketing, crop pests and disease control; enforcement of regulations and standards on agricultural chemicals, plant health and seed quality, food and nutrition security.

3. Functions of the Directorate

a) Provide technical guidance for formulation and implementation of policies, plans and strategies in crop production, marketing, protection, inspection and certification.
b) Support, supervise and monitor;
c) Sustainable market oriented production
d) Seed, planting materials, agricultural chemicals, plant health quality and safety.
e) Crop pests and diseases control
f) Primary processing and value addition of crop products
g) Improved food and nutrition security

Table 1: Development Projects under the Directorate in 2017/18

S/N	Project	Department	Funding	Responsible Officer
1	Support for Tea & Cocoa seedlings	Crop Production	GoU	Mr. Alex Lwakuba
2	Vegetable Oil Development Project Phase 2		GoU & IFAD	Ms. Connie Masaba
3	Rice Development Project (PRiDe)	Crop Production	GoU & JICA	Mr. . Cleopas Mucunguzi
4	Agriculture Cluster Development Project (ACDP)	Directorate of Crop Resources	GoU & WB	Mr. Henry Opolot

S/N	Project	Department	Funding	Responsible Officer
5	Enhancing National Food Security through increased Rice Production in Eastern Uganda	Crop Production	GoU & IDB	Mr. Peter Abong
6	Uganda Multi-sectoral Food Security and Nutrition Project	Crop Production	GoU & GAFSP	Mr. Julius Twinamasiko/ Mr. Alex Bambona
7	Banana Livelihoods Diversification Project	Crop Production	GEF	Ms. Rebecca Nanjala / Mr. Stephen Biribonwa
8	Uganda-China South to South Cooperation Phase II	Crop Production	GoU, China and FAO	Dr. James Tumwine
9	Northern Uganda Farmers' Livelihoods Improvement Project	Crop Production	GoU & JICA	Dr. James Tumwine
10	Support to enhance National Capacity for management of Fall armyworm (FAW) in Uganda	Crop Protection	FAO	Mr. Kutunga David
11	Enhancing National Food Security through increased Rice Production in Eastern Uganda	Crop Production	GoU and IDB	Mr. Peter Abong
12	Potato Commercialization Project	Crop Production	GoU	Mr. Alex Lwakuba
13	Crop Pests and Diseases Control Phase 2	Crop Protection	GoU	Mr. Stephen Byantwale

Performance during FY 2017/8

During the FY 2017/18, the Directorate of Crop Resources addressed the following issues; Increasing production and productivity, increasing access to critical farm inputs, Pests and disease control, Post-harvest Handling and Value addition, enforcement of regulations and standards on agro-chemicals, plants and seed quality, food and nutrition surveillance.

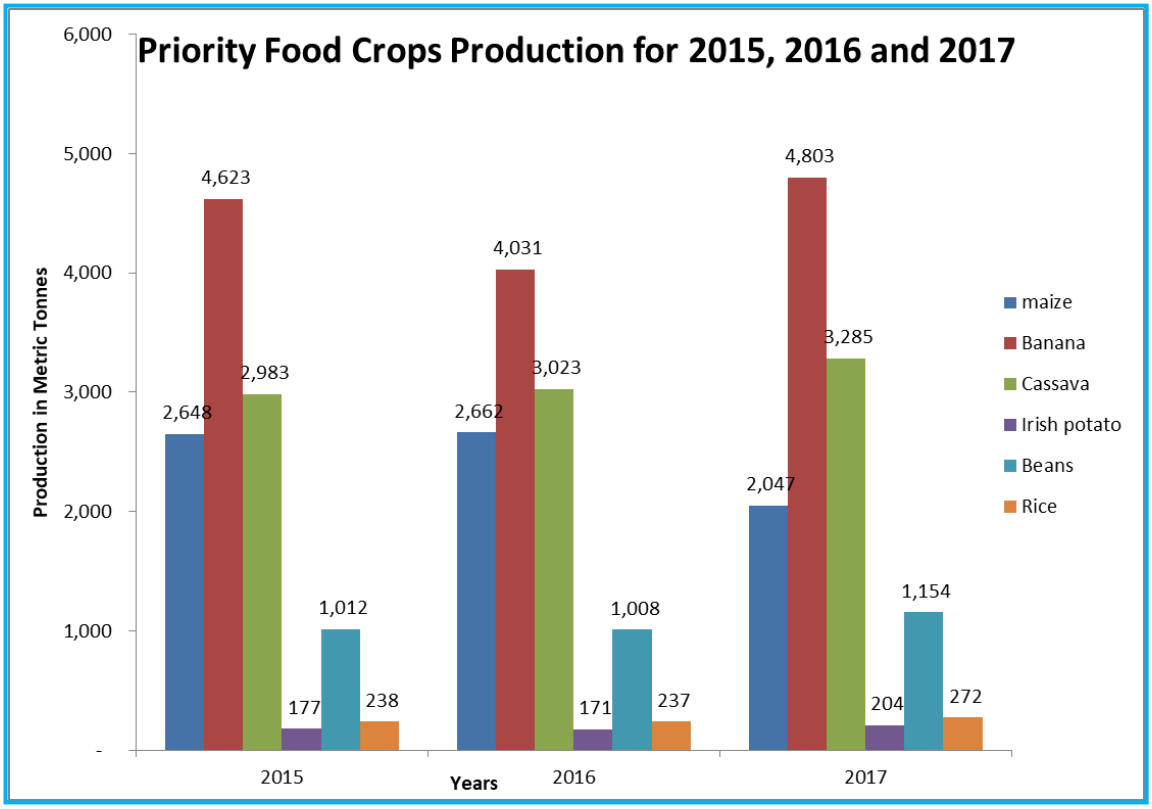
Priority and Strategic Commodity Development

The performance of the directorate is presented in respect of specific priority and strategic crop commodities, including: Coffee, tea, rice, maize, beans, cassava, Potatoes, bananas, Fruits, Vegetables, cotton, oil palm, oil seeds and cocoa.

1. Food Crops Production

There was a general increase in the production of priority food crops between 2016 and 2017 as shown in figure 1. The production of maize, however, decreased by 23.1% from 2,662,000 tons in 2016 to 2,047,300 tons in 2017. This was largely attributed to pests and diseases particularly the fall army worm and drought during that period.

Figure 1: Performance of priority food crops Production during the period 2015 - 2017



Source: MAAIF statistical Abstract 2017

2. Cash Crops Production

a). Coffee

The volume of coffee produced increased from 5.39 million in FY 2016/17 to 5.67 million in FY 2017/18 an increase of 4.92%. This was a result of the coffee planted in the previous FYs which have started yielding in FY 2016/17 leading to increased procurement, exports and closing stock.

Volume of Exports

The total volume of coffee exports for FY 2017/18 is 4.456 million (60-kilo bags) compared to 4.187 million exported in FY 2016/17. This represented a 6.04% increase in export volume.

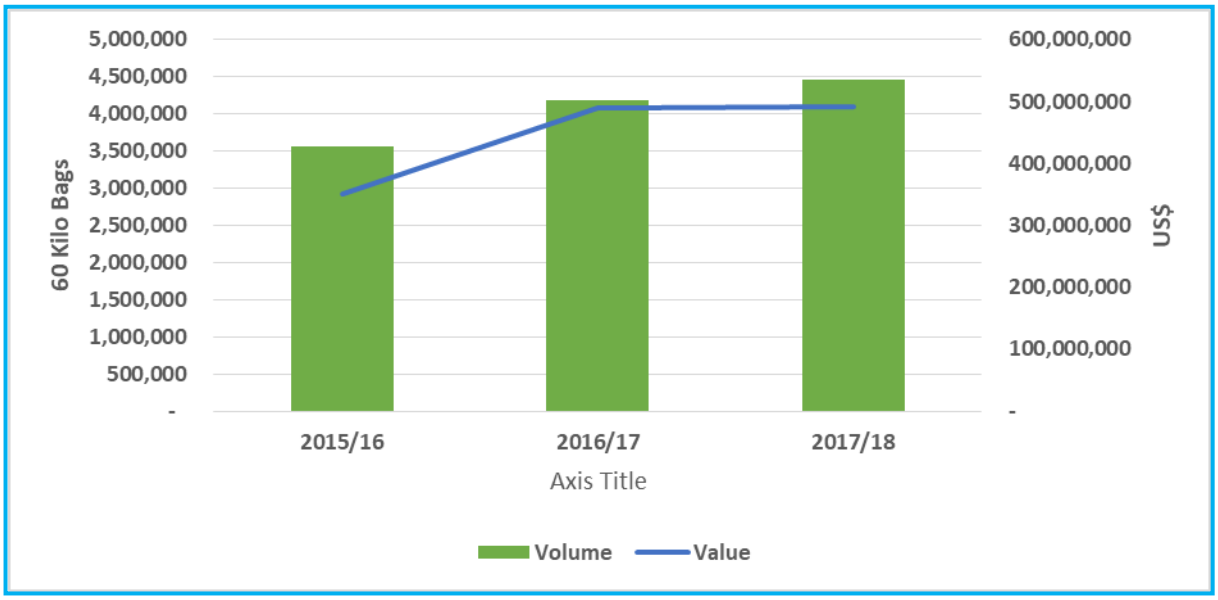
The projected quantity of coffee exports for FY 2017/18 was 3.9 million 60-kilo bags of coffee. The actual quantity of coffee exported in the FY was 4.45 million 60 kilo bags of coffee. This gives a performance of 114% against the projection.

Value of Exports

The value of exports in FY 2017/18 was US$ 492 million compared to US$490 million realized in the FY 2016/17, this represented a 0.41% increase in value.

The projected value of coffee exports for the FY was US$ 498 m, the actual realized value of exports was US$ 492 m giving a 99% performance against the targeted export value.

Figure: Volume and Value of Coffee Exports for the last Three FYs



b). Cotton

- The projected production of lint bales (@ 185 Kg) was 184,000 and 202,357 was produced.
- The Targeted number of lint bales for export was 165,600 and 182,357 was exported.
- The Targeted local consumption of lint bales was 18,400 and 20,000 was consumed.
- In the F/Y 2017/18 the targeted value of cotton exports was US$ 50M and US$ 54M was realized.

Vegetable Oil Development Project Phase Two (VODP 2)

Progress during FY2017/18

Background

The Government of Uganda (GOU) under the Ministry of agriculture, Animal Industry and Fisheries (MAAIF) is implementing the second phase of the Vegetable Oil Development Project (VODP2) with support from the International Fund for Agricultural Production (IFAD). The project, implemented through a Public Private Partnership approach has an overall goal of contributing to sustainable poverty reduction in the project areas. The project development objective is to increase the domestic production of vegetable oil and it's by products, thus raising rural incomes for smallholder producers and ensuring the supply of affordable vegetable oil products to Ugandan consumers and neighbouring regional markets. This is being achieved by supporting farmers to increase production of crushing material (both oil palm and oilseeds) and helping them to establish commercial relations by linking them to processors.

Under the Oil Palm Component of the project, a 10,924 hectare oil palm scheme has been established in partnership with Oil Palm Uganda Limited (OPUL) - BIDCO in Kalangala District. Under VODP 2, the smallholder scheme expanded to the outlying islands of Bunyama and Bubembe in Kalangala district. In Buvuma district, Government has acquired 7,591 hectares of land for the nucleus estate of which 5,114 hectares have been freed of all encumbrances. Government and IFAD have designed a follow on National Oil Palm Project which will expand oil palm activities to Buvuma and other areas across the country.

Under the Oil Seeds Component of the project, 5,311 farmer groups organised in the Hubs of Eastern Uganda (Mbale Hub), Northern Uganda (Gulu Hub), West Nile (Arua Hub) and Lira Hub to commercially produce sunflower, soybeans, ground nuts and sesame. The project is providing value chain support services, building the capacity of farmer groups and establishing linkages between the farmer groups and millers.

Project Funding

The project started was approved by Parliament of Uganda in October 2010 and will end in December 2018 and close in June 2019. The project funding is USD 147.2 million broken down as:

Source	Amount (USD millions)	Funding area
IFAD	52	**Oil palm:** Smallholder plantation establishment **Oil seeds:** Extension and value chain development activities
GOU	14.6	Land in Buvuma and ferry barge services
OPUL	70	Oil palm development in Buvuma
Farmers Contribution	3.9	Smallholder labour contribution
KOPGT	5.4	Self financing and Reflows for Buvuma
IFAD Grant	1	Oil seeds stakeholder consultations under OSSUP
SNV	0.34	Technical assistance to oil seeds platform
Total	**147.2**	

Implementation Approach

Under the oil palm component, Government signed an agreement with BIDCO Uganda Limited in 2003 in which the two parties agreed to establish 60,000 hectares of oil palm across the country. BIDCO has established 2 Palm Oil Mills in Kalangala and a processing plant in Jinja and guarantees market for all the oil palm fresh fruit bunches (FFB) produced by farmers. Government established the Kalangala Oil Palm Growers Trust in Kalangala to provide oil palm value chain support to smallholders, provide marketing services, manage the production loans given to farmers and be the intermediary between the smallholders and BIDCO/ OPUL.

Under the oil seeds component Government recruited 11 extension service providers (PSPs) to provide value chain services to the farmer groups. The service providers are in Mbale Hub (4 PSPs), Lira Hub (3 PSPs), Gulu Hub (2 PSPs) and Arua Hub (2 PSPs).

PROGRESS ON THE ACHIEVEMENT OF THE PROJECT TARGETS

Component	Outcomes/ Outputs	Project Target 2018	Target July 2017-June 2018	Achieved: June 2018
Oil Palm – Kalangala District	Nucleus estate established in Kalangala (Hectares)	6,500 Ha	0 Hectares	The nucleus estate in Kalangala remained at 6,500 hectares (100% achieved)
	Smallholder estate established in Kalangala (Hectares)	4,700 Hectares (1,800 farmers with 30% female)	Order for seedings to plant remaining 276 hectares	84,000 pre-germinated seeds delivered and planted in the nursery. The smallholders on Bugala, Bunyama and Bubembe islands have planted 4,424 Hectares of oil palm (94% achieved). The remaining 276 hectares will be planted by June 2019
	Smallholders registered to benefit from oil palm investment	1,900 (36% female)	0	The number of registered oil palm smallholder farmers in Kalangala remained at 1,810 smallholder farmers with 37% female (95% achieved)
	Smallholders net incomes	USD 1,500 per hectare per year	USD 1,500 per hectare per year	USD 1,426 per ha per year (95% achieved)
	Smallholder oil palm fresh fruit bunch (FFB) Production annually (MT)	30,000 MT	30,000 MT	Between July 2017 and June 2018, the farmers have harvested 37,801 MT of FFB valued at UGX 21.4 billion. Since 2010, the 1,123 farmers with mature gardens have produced a total 124,614 tons valued at UGX 60 billion.
	Farm roads constructed (Bugala)	330 kms	80 kms	In FY 2017/18, 78.2 kms of farm roads were constructed in Kalangala and 36.5 kms of old roads maintained. A total of 379.1 kms of farm

Component	Outcomes/ Outputs	Project Target 2018	Target July 2017-June 2018	Achieved: June 2018
				roads have been constructed on Bugala island in Kalangala.
	Crude palm oil produced (annually in MT)	35,000	30,000	In 2017, the oil palm investment (nucleus estate and smallholder scheme) produced 24,927 (83% achieved)
Oil palm – Buvuma District	Land procured for nucleus estate	6,500 Ha	1,000 Ha	951 hectares of land acquired bringing the total area acquired to 7,591 Hectares. The area free of encumbrances and ready for the nucleus estate development is now 5,114 hectares. (78% achieved)
Oil Seeds	Mill capacity utilization	85%	65%	56% from 74 mills spread across the hubs
	Sunflower yield per hectare	1.7 tons	1.7 tons per hectare	1.9 tons (Target achieved and surpassed)
	Soy bean yield per hectare	1.1 tons	1.1 tons per hectare	1.8 tons (Target achieved and surpassed)
	5,900 groups receive extension services	5,900 farmer groups	5,900 groups	5,311 farmer groups (81% achieved)
	Produce of oil seeds bulked (tons per year)	Sunflower: 50,000 Soybeans: 50,000	Sunflower: 50,000 Soybeans: 50,000	Sunflower: 49,515 (99% achieved) Soybeans: 35,332 (71% achieved)
	Production credit received by oil seeds growers	UGX 3 billion	UGX 3 billion	UGX 3.19 billion to 3,811 oil seeds farmers (37% female) by 10 financial institutions

Challenges faced by the project

i. Oil Palm Expansion in Kalangala

1. The District Local Government does not have the capacity to maintain the 379 kms of farm roads established in Kalangala. The poor state of the roads makes evacuation of oil palm fresh fruit bunches (ffbs) difficult, increasing ffb delivery time over 48 hours, leading to an increase in the FFB rejection rate, resulting in farmer losses. Sustainability of the management of the roads is also not yet fully resolved. The project has in the meantime started utilizing MAAIF equipment and will use the companies contracted in the MAAIF Call of Orders.

2. Delayed construction of landing site(s) and absence of ferry services to the outlying islands of Bunyama and Bubembe to enable bulk evacuation of FFB to the mill on Bugala Island in time. The processes are being expedited to complete the procurement.

3. Weak research capacity to support the expanding crop acreage and growing oil palm sub-sector in general for long term sustainability. There is need for Government to build local capability to handle current and future constraints to support the growing vegetable oil processing industry. The project has supported NARO to recruit 3 scientists and also provided operational funds for establishment and maintenance of oil palm nurseries and regular backstopping support to smallholders in Kalangala. The project has also organized trainings of these oil palm researchers to Ghana for more capacity building.

ii. Oil Palm Expansion to Buvuma

The land acquisition process in Buvuma has not been completed because of the long procedures involved; valuation of the interests of tenants on the land; agreement with land lords; and, facilitation of negotiations between land lords and tenants. This has delayed the handover of 6,500 hectares of land to the private sector and therefore delayed the start of the oil palm development activities in Buvuma. The project has partnered with the Ministry of Lands, Housing and Urban Development and the District Local Government to expedite valuation and compensation processes which will speed up the land acquisition.

iii. Oil Seeds Development in 51 Districts spread across Eastern And Northern Uganda

1. Access to the required quantities of certified seed is a challenge. The project partnership with NARO to produce foundation seed has not yet generated the envisaged interest by private seed industries to multiply and supply the seed. The project is in the meantime supporting NACRRI and NASARRI to increase research on improved varieties, increase production of breeder and foundation seed and support farmer groups to establish Local Seed Businesses.

2. Weak capacity of farmer groups: The farmer groups are not working together which would enable them negotiate better with the other value chain actors, but also learn from each other to increase production and productivity in the sub-sector. The project has in the mean time contracted Uganda Cooperative Alliance to build the capacity of farmer groups to strengthen them, register them at the sub-county and District, form Lower Level Farmer Groups, Area Cooperative Enterprise Groups and Higher Farmer Level Organisations.

Policies, laws, guidelines, plans and strategies

- During FY 2017/18, 03 policies, 04 strategies, 01 plan, 04 regulations, 07 guidelines/hand books were and 01 policy were targeted.
- The National seed policy 2018 was finalised and submitted to cabinet for approval.
- National Sanitary and Phytosanitary (SPS) Draft Policy 2018 was tabled to TPM and Regulatory Impact Assessment (RIA) has been conducted for resubmission to TPM.
- Finalized 04 implementation strategies.
  - National Seed Implementation strategy 2018 finalised and submitted to cabinet for approval
  - The Tea Strategy and guidelines for seedling production, procurement and distribution developed and disseminated in the 22 Tea Growing Districts
  - the National Aflatoxin and Mycotoxin Mitigation Action Plan finalised and approved by TPM
  - The Horticulture Export promotion strategies Developed. Pending dissemination
- Developed 07 guidelines/handbooks.
  - Post-Harvest handling Guidelines for Maize, Beans and Rice developed Disseminated to District Local Government and
  - Facilitators guide hand book for integrating Nutrition into Agriculture enterprise mixes in Uganda
  - Five (05) commodity Handbooks for Cassava, Rice, Beans, Coffee and Maize developed, awaiting printing and dissemination.
- Finalized and submitted Three (03) Regulations on Agricultural Chemicals (Control) Act 2006 for approval.
  - Regulation on pesticides
  - Regulations on fertilizers
  - Regulations on application equipment

Increasing Production and productivity of Priority and strategic commodities.

a) Suitability assessment for crop production conducted

- Planned to conduct 02 Suitability assessments for crop production. One (01) Suitability assessment for cocoa growing conducted in West Nile sub region. Cocoa Growing in West Nile Sub regions was introduced and launched by Hon Minister MAAIF.

b) Mother and demonstration gardens and nurseries for priority and strategic crops established

i) Established 200 acres of Banana Tissue culture Mother gardens in 8 districts of Western Uganda and 157 Acres achieved

ii) Established sweet Cassava mother gardens in 03 regions of central, Eastern and northern Uganda.

iii) Established 153 acres of sweet cassava in the 02 regions of central and Eastern.

iv) Supplied 35.726 metric tons of coffee seeds to 511 nursery operators in the five coffee growing regions.

v) Supplied 239 million coffee seedlings to 350,622 households in 104 districts for planting

vi) Supplied 600,860 coffee wilt disease resistant plantlets to 308 nursery operators for mother gardens establishment

vii) Rehabilitated 1,065 acres of coffee in 05 regions

viii) Supplied 2,647MT of cotton seed to farmers in the cotton growing districts

ix) Established 3,965 cotton demonstrations gardens

x) Supplied 481 MT of fertilizers, 3,040 spray pumps and 5,156 litres of herbicides to cotton farmers

xi) Established 9000 demo gardens of Nutrient –rich foods (vitamin A sweet potato and iron-rich beans) in 15 districts.

xii) Established 36 demonstrations for horticulture and cereals

xiii) Established 12 Farmer Field Schools (FFS) on potato seed production in Kisoro, Kabale, Kanungu, Kibaale, Kyegegwa and Mityana

xiv) Supplied 06 tons of quality potato seed, 3.2 tons of NPK fertilizer to 12 FFS

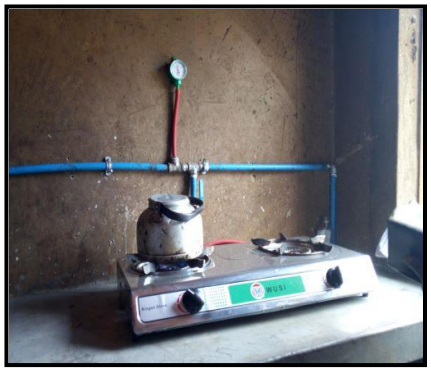
xv) Acquired 5114 Ha to establish oil palm nucleus estate development in Buvuma District. Acquired 951Ha of land bringing the total area acquired to 7,591 Hectares.

Potato farmers sharing their

experiences on best agronomic practices

c) **Contributed to Climate Change mitigation**

- Constructed 200 biogas facilities at household level.



Biogas at household level in Kabuyanda,Isingiro *Bio-digester and bio-slurry pit in Isingiro district*

d) **Profiling, Selection & registration of farmers.**

- Profiled 15,000 farmers in 5 pilot districts of Nebbi, Iganga, Amuru, Namutumba and Ntungamo

Food and Nutrition Security

a) Food and Nutrition assessed

- Planned to conduct a Surveillance of 30 districts for Food and Nutrition security conducted.

Capacity building, training, technical backstopping and Technical Working Groups/platforms.

a) Platforms established.

- National Bio-fortification Technical Working Group Established
- Cassava Platform established in Kiryandongo District
- Established 14 district coffee farmer level organizations in the coffee growing regions

b) Capacity building/trainings conducted.

i) Trained 510 ToTs (Extension workers) trained on Food & Nutrition and integrating nutrition into agriculture Enterprise Mixes

ii) Trained 45 ToTs (Extension Workers) on Nutrition, Good Agricultural Practices, Post-harvest handling, setting up of school demonstration gardens and value addition

iii) Trained 66 Master trainers on Cocoa Value Chain in Bwikwe, Koboko, Jinja, Iganga, Wakiso and Mpigi

iv) Trained 400 agrochemical dealers on safe use of agrochemicals

v) Trained 108,000 farmers on sustainable cotton production and postharvest handling

vi) Trained 329 extension workers on cotton production and deployed in the cotton growing areas.

vii) Trained 373 extension workers and farmers on crop pest and disease diagnostics, management and control using IPM in the districts of Kabale, Rubanda, Mbarara, Sheema, Kabarole, Kween, Isingiro and Bunyangabu

viii) Trained 53 District Agricultural Officers and Extension workers on management and control of invasive weeds. The focus districts were from Eastern Uganda where golden dodder, Parthenium, Striga and Kariba weeds have become of serious economic importance which have led to biodiversity loss besides causing yield losses especially in the Eastern Uganda.

ix) Conducted trainings for 124 Agricultural Extension Workers in Mbarara, Sheema, Kabalore, Isingiro and Kween on plant clinic operations for diagnosis and management of crop pests and diseases including Black Coffee Twig Borer pest management.

x) Trained 39 farmers in Kalungu Districts on management Tomato Leaf miner (*Tuta absoluta* of the pest. Demonstration inputs like pesticides, spray pumps were provided to farmer groups.

xi) Trained 157 MAAIF staff and researchers (47), lead farmers (60),, District Agricultural Officers and Extension staff (50), were in management and control of FAW.

xii) Trained 207 potato extension workers and value chain actors on IPM, linking producers to buyers; producer groups, SMEs financial access and E- commerce

xiii) Trained 400 coffee value chain actors in post-harvest handling and market development

xiv) Trained 67 ToTs Extension Officers on market oriented vegetable production in 8 districts in Acholi sub-region.

xv) Trained 3,000 farmers in Chinese technologies in areas of horticulture, cereals, aquaculture, and livestock production

xvi) Conducted 05 Sensitization meetings on poisonous cassava in Mayuge, Tororo, Bugiri, Busia and Mbale Disticts

xvii) Conducted 04 Technical Supervision and backstopping on Citrus value chain enhancement in 4 Districts of Soroti, Serere, Kumi and Kaberamido.

Quality assurance

a) **Seeds, plants and plant products and agrochemicals inspected and certified**.

i) Certified 4,462,796 coffee bags for export,

ii) Inspected 26,411 ha of crop fields and 26,400 ha certified

iii) Conducted Distinctness, Uniformity, and Stability (DUS) trials for 44 candidate varieties and 15 varieties approved and released

iv) Approved 266 agro input dealers and their premises for registration

v) Inspected and certified 235,000MT of plants and plant products worth 569Million USD for export.

vi) Inspected 247 seed stockists and premises and complied the standards

vii) Approved 97 chemical products for registration

viii) Impounded 10 tons of agrochemical products

b) **Crop Pests and Disease control**

i) Conducted monitoring and surveillance of Banana Bacterial Wilt (BBW) disease and BBW control bye-laws enforcement in 40 districts to assess the periodic status. Results showed resurgence of BBW in some districts of South Western Uganda with average prevalence at >8.5%; a worrying trend due to laxity in Taskforces. There was a slight reduction in BBW field incidence from 6.8% in 2016/17 to 5.6% in 2017/18.

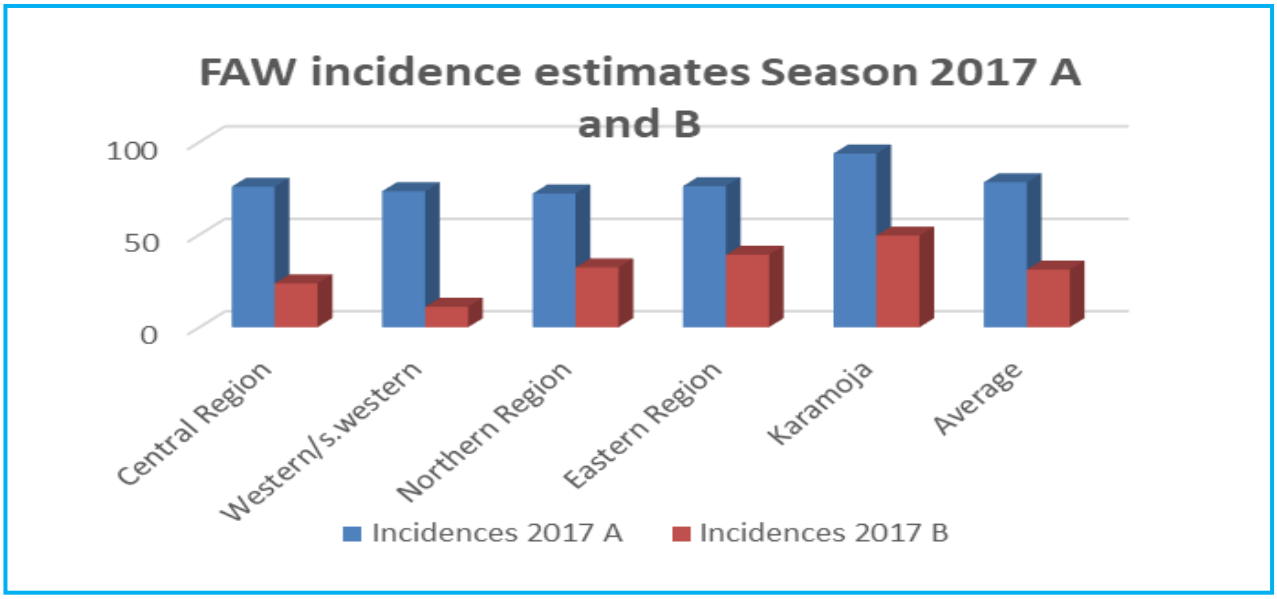
ii) Conducted maize lethal necrosis (MLN) surveillance in the high risk districts of Kween, Tororo, Busia, Manafwa, Bulambuli and Kasese. The disease incidences have been contained at less than 2.7%. Farmers' knowledge and understanding of the disease and its management was assessed to over 70%.

iii) Distributed 69,375 litres of pesticide, 344 motorized pumps and 400 knapsack spray pumps 150 sets of Protective gears to 122 districts for demonstration to maize farmers on control of fall armyworm across the country.

iv) Printed and disseminated information materials including 10,000 brochures and 3,000 posters on identification, monitoring and control of Fall armyworm in 122 districts across

the country. The disseminated materials are available with district and sub-county agricultural officers

v) Sensitized farmers and the general public on management and control of fall armyworm (FAW) through various media channels (radios, press releases,). Regular surveillances were conducted to establish the pest status. Despite the high incidence levels of FAW infestation



in 2017 (>60%), there has been reduction in incidence of FAW to less than 20%.

Fig.1 Shows Fall armyworm incidence estimates.

Key Challenges

i. Fake and counterfeit seed and agro-chemicals on the market.

ii. Inadequate laboratory equipment for seed and pesticide laboratories.

iii. Interceptions on global markets- Stringent international market demands on MRLs and presence of HOs, affecting export volumes, and even leading to shrinking of markets

iv. Stray animals damage crops such as demonstration fields.

v. Effects of climate change that cause high mortality rate on seedlings planted.

vi. Lack of modern equipment for pest and disease diagnosis and analysis of pesticide residues and other contaminants.

vii. Emerging New pest and disease invasions such as *Tuta Absoluta*, Fall armyworm, Maize Letha Necrosis, bronze bug and False codling moth.

Recommendations to address the Challenges

The Ministry will

i. Strengthen/support the Joint task force formed to address the challenge of fake agro inputs (MAAIF, UNBS, URA, MTIC, NDA, MOH)

ii. Leverage ACDP project to equip the seed and pesticide laboratories with modern equipment

iii. Support mitigation of climate change effects through conducting demonstrations on water harvesting using water reservoirs, solar irrigation pumps and use of simple irrigation technologies and also practicing climate smart agriculture.

iv. Procure modern diagnostic tools to strengthen its Laboratories capacity and train continue to train its human resource.

v. Strengthen Agricultural Police now in place to support the enforcement of Agricultural laws as a priority.

CHAPTER FOUR: FISHERIES SUB SECTOR PERFORMANCE

1. INTRODUCTION

The Directorate of Fisheries Resources constitutes of three (3) departments namely; Fisheries Resource Management and Development; Aquaculture Management and Development and Fisheries Control Regulation and Quality Assurance and implements a number of projects that support achievement of the Directorate objectives.

2. MANDATE OF THE DIRECTORATE

The mandate of the Directorate of Fisheries Resources is to "Support, Promote, Guide and Regulate the fisheries sub-sector, so as to improve quality and increase the quantity of fish and fishery products produced for domestic consumption, food security and export". This mandate is to be achieved through collaboration with other Ministries, Departments and Agencies (MDAs), private sector, development partners, civil society, training and research institutions, local governments, fishers and farmers' associations who are involved in guiding and supporting all fisheries and aquaculture development initiatives.

Functions of the Directorate

a) Provide technical guidance for formulation and implementation of policies, plans and strategies in fish production, marketing, inspection and certification.
b) Supporting, supervising and monitoring of fisheries and fishery products;
c) Sustainable market oriented production
d) Fish quality assurance and inspection for quality and safety
e) Fisheries Control and regulation
f) Support and promote aquaculture production and management

Development Projects under the Directorate in 2017/18

S/N	Project	Department	Funding	Responsible Officer
1	Support to Sustainable Fisheries Development	Fisheries Control Regulation and Quality Assurance	GoU	Mr. Akankwasa Alfred (Principal Fisheries Inspector)
2	Promoting Commercial Aquaculture in	Aquaculture Management and Development	GoU & EU	Mr. Omanyi Paul

S/N	Project	Department	Funding	Responsible Officer
	Uganda			
3	Lake Edward Albert Fisheries Project (LEAF)	Fisheries Resource Management	GoU/ADP	Lead agency is Ministry of Water and Environment

2.0 Performance during FY 2017/8

The main key achievement were in areas of fisheries enforcement leading to an increase in Nile perch fish stocks in Lake Victoria and opening of 4 fish processing factories (to now 10 compared to 6 in 2017). Aquaculture has grown by between 5-6% and fisheries resource management has been strengthened in policy areas including harmonization of policies, guidelines and standard operating procedures with Partner States at regional level for shared water bodies. The various achievements are as below.

2.1 Priority and Strategic Commodity Development

While fisheries is considered as one commodity, the overall performance of the directorate is presented in respect of major commercial fish species namely: Large Commercial fish species (Nile Perch and Tilapia) and small pelagic fish species (Mukene, Muziri and Ragooge) and special reference to aquaculture

Large Commercial Fish species

Information from hydro—acoustic surveys shows that the biomass (quantity of fish) for Nile perch for Uganda in 2017 was 457,248 tonnes indicating an increase by 63,895 tonnes from 393,353 tonnes in 2016 (14 %). This was attributed to the support to the Fisheries Protection Force that intensified enforcement operations on Lakes Victoria, Kyoga and Edward/George including trade routes for immature fish. The fish is however still below the harvestable slot size of 50 to 85 cm. In 2017, Information from trawl surveys shows that the biomass of the Nile tilapia decreased from 10,764 tonnes in 2016 to 7,062 tonnes in 2017. This was attributed to inshore fishing that affects fish breeding and nursery areas.

Small Commercial Fish species

Surveys indicated that the biomass of Mukene is decreasing since 2014 and the biomass in 2017 was 284,554 tonnes compared to the 510,264.1 tonnes in 2014 (50%). This could be attributed to the Nile perch stock increase as a predator for Mukene.

2.2 Formulation, review and dissemination of Policies, laws, guidelines, plans and strategies

During the period under review, target was set to produce one (1) Policy, one (1) implementation Plan, One (1) draft bill, three (3) guidelines, one (1) aquaculture plan and mainstreaming HIV/AIDs and climate change in implementation of fisheries policies

a) The National Fisheries & Aquaculture Policy was developed and approved by Cabinet in January 2018 with a vision to have "**a modern, productive, profitable and sustainable fisheries and aquaculture sub-sector"**.
b) National Fisheries and Aquaculture Policy Implementation Plan was finalized and together with the policy approved by Cabinet in January 2018.
c) Principles of the Fisheries and Aquaculture Bill were developed & approved by cabinet and drafting of the bill is ongoing.
d) The Fish Breeding Areas Statutory Instrument was drafted by the Office of the Solicitor General and one gazetted will act as a tool to protect the areas as reserves for the natural fish stocks.
e) Guidelines for the management of Fish Breeding Areas were developed, printed and disseminated to help fishing communities to participate in the management of the fisheries resources
f) Draft guidelines for aquaculture feeds were developed and stakeholder consultations conducted to review the Aquaculture Rules;
g) Stakeholder consultations were conducted to initiate review of the National Aquaculture Development Plan;
h) Stakeholder awareness campaigns were conducted through TV and radio talk shows on Delta, Bukedde, NTV, CBS, Kaboozi Kubiri to promote sustainable fishing practices
i) Adaptation to climate change and HIV/AIDS in fishing communities mainstreamed in the National fisheries and aquaculture Policy, 2018 targeting women and youths groups involvement

2.2 Promotion of sustainable fisheries

- Mobilized and sensitized six (6) fishing communities on alternative livelihoods as an adaptation to climate change in each of the districts of Kasese, Kamwenge, Rubirizi,

Rukungiri (Lakes George and Edward) and Kalangala and Masaka (Lake Victoria) –Plate 1.

Plate 1. Community mobilization and sensitization on alternative livelihood and climate change

a) Promoted two (2) improved technologies (raised drying racks, Catamaran boats) of fishing, handling and processing Mukene for human consumption in Buikwe, Buyende, Rakai, Kalangala and Masaka districts. This contributed to value addition and improved market access and incomes for artisanal women processors (Plate 2).

Plate 2. Artisanal women processors in Mukene trade

b) Manual aquatic weed removal equipment (wheel barrows, pangas, life jackets, forked hoes, spades, were procured and distributed to fishing communities in the districts of Kalungu, Adjumani, Buyende, Nakasongola and Serere districts for control of Kariba weed by the fishing communities.

c) Ten (10) fishing communities were trained on fisheries data collection and community participatory protection of fish breeding areas in Jinja, Kalangala, Serere, Buikwe, Kasese, Kamwenge districts. This has strengthened co-management structures.

d) Enhanced the capacity of District Local Government Fisheries Officers in licensing using the electronic single window system

e) Six (6) Fish Breeding Areas were identified and marked in Kisima – Jinja, and Bulago Island, Mukono district for protection with a community participation concept in the management of the fisheries resources for sustainable production.

f) Fish marketing information was collected from Busia, Malaba, Bwera, and Mutukula border post markets for planning purposes and guided the development of the National Fisheries and Aquaculture Policy, 2018.

g) Fish Catch Assessment (CASs) and Frame Surveys (FSs) were conducted on Lakes Edward, Kazinga channel and George. This informs management on the status of the natural stocks for management decision making and management plans.

h) Two (2) trial stations for the biological control of the Kariba weed were established in Amolatar and Kaberamaido districts and the five stations for the biological control of the water hyacinth were maintained.

i) The land committee undertook measures to survey, open boundaries and secure fisheries land

j) Ten (10) vehicles were maintained and two (2) new vehicles procured to facilitate fisheries related field activities

k) The restocking potential and suitability of the Lakes in Kisoro district was investigated by the National Fisheries Resources Research Institute

l) Critical inputs (1, 000,000 fish seed and 41,666Kgs of feeds) were supplied to fish farmers especially the youth and women groups in various districts as alternative livelihood for people displaced from lake fisheries;

m) Compliance monitoring of aquaculture establishments was conducted in all the regions;

n) OWC-NAADS Activities were supported;

o) Capacity of technical staff to effectively conduct surveillance for fish diseases and biosecurity issues was built;

p) Conducted enforcement operations with the Fisheries Protection Force (FPF) and with many illegalities arrested (Plate 3 and Table 1)

Table 1. Illegalities arrested in fisheries operations on Lake Victoria during 2017

Illegalities	Dolwe	Masak	Wakiso	Mukono	Mpigi	Buvuma	Buikw
Canoes	612		21,917	51,814	1,051	1,556	114
Under size	941,557	269,146	320,67	1,720,33	311,21	591,683	46,367
Bao Tatu	5,312			25,907			
Cast Nets	612	474	240	118	7,211	2,680	
Monofilament	143,757	31,916	15,885	47,999	7,213	24,717	464
Beach Seines	1196	476	885	887	308	420	70
Fishing Lines	130,880	79,710	19,825	90,911		798,744	
Fishing Bulbs	1034						46,357
Batteries	453						
Oars	130					876	
Fishing	160				902	102	
Under size	457	26,612	504			7,426	255
Bags(Icing of fish on waters)	846					68	
Mukene nets						1,086	
Tacycoons	172					68	
Total			379,93	1,937,96	327,89	1,429,42	93,627
SUSPECTS		315	412				

- Fisher and fishing input dealers registered and licensed on major water bodies with Non Tax revenue increasing to 1,652,470,000 compared to 819,000,000 in 2016 (Table 2)

Table 2. Status of licensing and NTR generation from fishers and input dealers

Status of Licensing as at 31st July, 2018			
License Category	**Number**	**Rate**	**Amount**
Artisanal	351	50,000	17,550,000
By Products	266	500,000	133,000,000
Fish Sanitary Certificate	1,721	20,000	34,420,000
Appliance Importation	8	1,000,000	8,000,000
Appliance Manufacture	5	1,000,000	5,000,000
Control Permit (Citizen)	14,524	25,000	363,100,000
Control Permit (Non-	13	100,000	1,300,000
Vessels	7,306	100,000	730,600,000
Vessels Non-Citizen	11	2,000,000	22,000,000
Industrial	41	3,000,000	123,000,000
Maws	85	500,000	42,500,000
Trucks 5-10	128	500,000	64,000,000
Trucks Less 5	266	250,000	66,500,000
Trucks Over 10	18	750,000	13,500,000
Vessels Less 5	53	250,000	13,250,000
Vessels 5-10	16	500,000	8,000,000
Vessels Over 10	6	750,000	4,500,000
Recreation	15	150,000	2,250,000
Total			1,652,470,000

Species specific licensing was undertaken while also limiting the number of fishing boats per species and per district on Lake Victoria (Table 3) as a measure to control fishing effort and capacity

Table 3. Number of set fishing boats per district per species on Lake Victoria

Districts	**Nile perch**	**Nile tilapia**	**Mukene**	**Total**
Busia	50	65	15	130
Namayingo	1,217	711	659	2587
Bugiri	87	88	66	241
Mayuge	1,100	1,045	758	2903
Jinja	39	167	12	218
Buvuma	3,291	744	1,158	5193
Buikwe	381	428	724	1533
Mukono	1,541	1,029	773	3343
Kampala	40	66	15	121
Wakiso	714	847	398	1959
Mpigi	147	324	311	782
Kalungu	25	59	15*	99
Masaka	318	188	141	647
Rakai	297	58	57	412
Kalangala	1,637	387	946	2970
Total	**10,884**	**6,206**	**6,049**	**23,139**

2.3 Improvement of market access for fisheries and fishery products

a) Five (5) artisanal processing women groups were supported in Buyende, Buikwe, Jinja and Masaka districts. This is a contribution towards gender mainstreaming along the fisheries value chain.

b) Fisheries Exhibitions were held at the World Food Day in Rubanda, The National Agriculture Show in Jinja, The World Fisheries Day and The Fish Festival at Uganda Museum. This has contributed to market access and access to information.

c) Infrastructure development was enhanced through the completion of the Gulu and Bushenyi hatcheries and maintenance of the improved fish landing sites on Lakes Victoria, Kyoga and Albert.

d) Service providers, farmers and District Technical staff of Lake Albert were trained in aquaculture climate resilient aquaculture production systems;

e) Sampling nets, and water quality testing kits were procured for 10 districts in the northern and eastern Districts;

f) 10 border posts supported to regulate fish and fishery products imports and exports

g) Inspection for compliance to national and international standards for fish and fishery products conducted for boats, all gazette fish landing sites and approved fish processing establishments.

h) Procured and distributed Fishing Vessel Identification Number Plates to regulate fishing capacity on Lake Victoria

3.0 Challenges

a) Limited capacity for regulation and enforcement of laws and guidelines on all water bodies hence continued use of illegal destructive gears that catch immature fish.
b) Aquaculture is constrained by limited investment in fish farming; high cost; limited access to high quality fish seed and feed; and inadequate extension services.
c) Both capture and aquaculture production systems face challenges of high post-harvest losses; inadequate human, technological and infrastructural capacity at all stages of the value-chain leading to low production and productivity overall.
d) Limited response and financing for the control of the Kariba Weed spread on Lake Kyoga, Albert and now in ponds riparian to Lake Victoria.
e) Lack of financing to fish landing site infrastructure developments
f) Overwhelming demand beyond budgetary allocations for inputs by fish farmers and fishing communities.
g) Delay in procurements due to system and bureaucratic processes
h) Inadequate transport vehicles for field activities
i) Loss of livelihoods in fishing communities as a result of strong enforcement operations

4.0 Conclusion

Despite the underperformance at production level, the subsector is still vibrant and signs of stock recovery are evident. The new National Fisheries and Aquaculture Policy, 2018 has stronger emphasis on aquaculture that will be critical in bridging the gap in fish production in light of declining stocks from the wild. This will significantly support the creation of decent employment; and lift up household and national incomes; food and nutritional security and lead to a modern, productive, profitable and sustainable fisheries and aquaculture sub-sector.

CHAPTER FIVE: ANIMAL RESOURCES SUBSECTOR PERFORMANCE

5.0 Introduction

The Directorate of Animal Resources is comprised of three departments and three agencies namely; Animal production Department, with three divisions, Animal nutrition Division, and Veterinary Public Health and the division of Dairy and Meat

Animal Health Department with three divisions; Regulation and Enforcement Division, Disease Control Division and the division of Epidemiology and Diagnostics

Entomology Department with two divisions; Vector control Division and the division of Productive Entomology

The three agencies are; Dairy Development Authority (DDA), Coordinating Centre for Control of Trypanosomiasis in Uganda (COCTU) and the National Animal Genetic Resources Center and Data Bank (NAGRC&DB).

5.1 Directorate 2017/18 Performance

A. Policies, Laws, Guidelines, Plans And Strategies

a) In order to create an enabling environment for effective regulations in the feeds industry, veterinary profession and the quality of animals and animal products in the animal sub sector, out of 6 laws and 4 policies planned to be reviewed/formulated in Animal production, three (3) policies have been drafted (**Hides and Skins Policy, Dairy Policy**, **Pastoralism and Rangeland Management Policy**), and the process of development of the Meat Development Bill has started with stakeholder consultations.

b) The Animal Feeds Bill, the Veterinary Practitioners Bill and the Pastoralism and Rangeland Management Policy have already been submitted to Cabinet for approval.

c) Regulations for livestock breeding, registration and certification of livestock breeders, breeds, AI service providers, hatchery operators and hatchery establishment have been

drafted and will be validated by stakeholders. The final regulations will assist in formalizing, guiding and regulating operations of these actors in the livestock industry.

d) Regulations for a livestock identification and traceability system have been drafted and when approved, these will ease identification of livestock and promote traceability of livestock and livestock products as well as support disease control efforts

e) Guidelines for meat handling establishments have been reviewed and will be published and disseminated to relevant stakeholders to promote quality meat and meat products on the market

f) Guidelines for managing rangelands have been drafted and will be finalized to guide efficient utilization of rangelands especially for beef production.

g) In order to review the Apiculture policy, the Draft Regulatory Impact Assessment (RIA) to support the Apiculture Development policy was produced and submitted to stakeholders for comments

h) To develop the National sericulture policy, the Draft Sericulture policy was reviewed by key stakeholders and the 2nd draft submitted to the Policy Analysis Unit, Agricultural Planning Department.

i) And a Strategic plan for sericulture was drafted, awaiting a consultative stakeholder's meeting.

j) Finalized the costed PPR eradication strategy in order to contribute to the goal of global PPR eradication by 2030. The strategy was submitted to IGAD.

k) Developed an acaricide zoning strategy and implementation plan to regulate acaricide movement and use between districts which are below and those above the River Nile.

l) Successfully organized and hosted the FAO-OIE E. African regional meeting for FMD-PCP roadmap in Uganda

m) Meeting for DVOs to discuss rampant disease outbreaks in the country and strategies for control was successfully held.

n) Developed a strategy to manage increase of animal disease outbreaks in the country and submitted to cabinet.

B. Improved Animal Production and Productivity

I. Improved access to Water for Livestock:

Out of **12** reservoirs and **52** boreholes planned; **1** valley dam, **7** valley tanks and 51 bore hole sites were identified, assessed, designs completed and tendering completed. However**3** valley dams and **1** valley tank are under design.

II. Pasture and Fodder Production;

To ensure Improved Dairy Production, DDA provided pasture seeds and planting materials to the dairy farmers in Eastern, North Eastern and South Western Regions. Atotal of 987 kgs of Cloris gayana, lablab Lab lab, Centrosema, Calliandra, Mucuna, and 239 bags of Napier cuttings and Brachariaspp were procured and distributed. This planting material covered at least 700 acres of land country wide and farmers have been encouraged to harvest and preserve the grass as hay to cater for dry season feeding**.**

III. Breeding and Genetic Development under NAGRC &DB:

(a) Artificial Insemination being the fastest, easiest and cheapest means of genetic improvement, the targeted was to produce 76,200 dozes of semen for both dairy and beef and extend the same to the farmers. 60,551 were produced in the effort to increase access to quality genetics in the country

(b) The target was to train 200 artificial insemination (AI) technicians to improve service delivery in assisted reproductive techniques. The total number of AI technicians133 from 33 districts was trained

(c) In order to improve enabling environment for breeding, the target was to establish five administrative structures at Ruhengyere,Maruzi and Lusenke. Currently we are in progress

to construct an administration block and farm managers' house at Lusenke stock farm in Kayunga district, and one assisted reproductive techniques training center at Ruhengyere in Kiruhura District.

(d) The target for liquid nitrogen was to produce 43,200liters. 41,880liters were produced and distributed to different breeding centres in Mbarara,Kiruhura,Kamuli,Gulu, Mbale, Bunyangabu,Jinja and Kamuli

(e) All targeted 12 kilometres of farm roads were opened, graded and gravelled at Maruzi Ranch for increased access to the ranch and control of wild fires.

(f) All targeted farm mechanization machinery was purchased namely; one crawler bull dozer, one high power tractor and implements, Nshara ranch IN Kiruhura District and so it has cleared over 500 acres. This is to enhance production and productivity of the farms.

(g) Community breeding was prioritizedin order to rapidly improve the quality of genetics in the country in the areas of Ntoroko, West Nile and Eastern region. The total number of animals synchronized and served with high grade semen stood at 2000 and the success rates of conception stood at 70%.This effort will rapidly improve the genetics of the National herd.

IV Disease Control

Disease Diagnostics;

(a) Foot and Mouth Disease (FMD) was investigated in the districts of Nakaseke, Moyo, Masaka, Lira, Amudat, Bukedea, Mbale, Kumi, Ntungamo, Sheema, Ibanda, Hoima, Kyotera, Rukungiri, Lamwo, Isingiro, Mbarara, Rakai, Lyantonde Tororo, Gomba, Mityana, Buliisa, Kween, Bushenyi, Lwengo, Sembabule, Moroto, Kiryandongo, Butaleja, Namutumba, Pallisa, Budaka, Bugiri, Bukomansimbi, Soroti, Katakwi, Kiruhura, Nakasongola.

(b) Investigated Crimean Congo Hemorrhagic Fever (CCHF) in 4 districts of Nakaseke, Kiboga, Kasese and Kaabong districts.

(c) NADDEC investigated RVF and outbreaks in Kabale, Abim, Kotido, Kaabong, Arua, Kiruhura, Ntungamo, Rakai, Kasese, Amudat, Mbarara, Pallisa, Masaka, Mbarara, Kasese, Arua, Isingiro, Bukedea.

(d) Anthrax was investigated in 4 districts of Arua, Kween and Arua and Kiruhura

(e) Procured 500,000 doses of CBPP, 1,000,000 doses of FMD and 500,000 doses of Rabies vaccine procured against the planned 2,000,000 doses of FMD, 2,000,000 doses of PPR, 500,000 of CCPP, 500,000 doses of CBPP, 200,000 doses of rabies and 100,000 doses of Lumpy skin disease (LSD). The doses procured could not march the high numbers of outbreaks recorded during the year

(f) Over 400,000 dogs and cats were vaccinated against Rabies

(g) Trained 20 staff (both national and regional) on proper Rabies diagnostic procedures.

(h) Stakeholders sensitized on Transboundary Animal Diseases (TADs) and vaccination of animals promoted in border districts of Koboko, Yumbe, Moyo, Adjumani, Amuru, Busia, Tororo, Kasese, Ntoroko, Rakai, Isingiro, Kabale, Kisoro, Kween, Amudat. Achievement was at 80%.

(i) Contagious Bovine Pleuropneumonia (CBPP) was investigated in Ntoroko, Kyotera, Kapchorwa, Moroto, Nakapiripirit, Napak, Amudat, Mbarara, Bushenyi, Mubende, Kitgum, Pader, Hoima, Abim and Nebbi.

(j) Abattoir surveillance in Ntungamo, Kabale, Mbarara, Kiruhura, Ibanda & Lyantonde districts carried out to investigate diseases at post-mortem.

(k) Conducted five radio talk-shows to sensitize stakeholders on animal health issues

(l) Established and designated sites for quarantine, checkpoints and animal holding infrastructure in West Nile, Eastern, S.E, SW, Central, Western, N.E, Northern

Vector control and suppression

a) To ensure Tsetse suppression in high tsetse risk districts,30 sets of protective wear and 5000 tsetse targets were procured and 6000lts of Deltamethrin pour-on insecticide for emergence tsetse control interventions in High tsetse infested areas of Kaabong and Kotido districts. These are on-going in 6 sub counties of Karenga, Lobalangit, Loleria, kawalakol, Loyoro, Sidok in Kaabong district and 3 sub counties of Kacheri, Kotido and Rengen in Kotido district.

b) In order to evaluate the impact of the interventions entomological monitoring in geo referenced sites is necessary. The Department of Entomology undertook a comprehensive monitoring in at least 30 Fixed Monitoring Sites in Kaabong district. During this exercise Bi-conical tsetse traps odour-baited with a combination of tsetse attractants (4-methylphenol, Octane-3-ol and 3n-propyl phenol) packed in polythene tubing of gauge 1000 were deployed in Fixed Monitoring Sites.

c) The results got indicate that the tsetse problem is still big in Kaabong and Kotido districts calling for massive interventions with tsetsefly apparent densities of over 50 flies per trap per day.

d) Sensitization on community based vector control undertaken in 5 sub-counties of Napak District in conjunction with the district technical staff and the Community Animal Health workers (CAHWs)

e) Systematic surveys carried out using 40 biconical tsetse traps in 5 sub counties of Napak District i.e. Lokopo, Ngoleriel, Matany, Napak TC , Lotome and Iriiri

f) Baseline tsetse entomological data were collected from the districts of Arua, Maracha, Moyo and Adjumani. 200 pyramidal tsetse traps were used for the data collection.

g) In the same way to foster for the for tsetse fly eradication and trypanosomiasis elimination for National Game parks in Uganda, a project proposal "Control of Tsetse fly Infestation in Murchison Falls National Park to ssupport the tourism industry" worth USD 3,290,550 was completed and submitted to Commissioner Agricultural Planning. The project document is

being used to support stakeholder awareness on the technologies to be deployed and resource mobilisation

h) The department of animal health continued monitoring of development of tick resistance to acaricide in conjunction with COVAB and NARO.

i) Distributed 3,000 litres of Vectoclor and supervised tick control activities (tick cleansing) in Sembabule, Lyantonde, Mubende, Kyegegwa, Gomba and Nakaseke

j) Acaricide use in selected tick resistant districts of Kyankwanzi, Kiboga, Nakaseke, Nakasongola, Sembabule, Gomba, Mityana & Mubende among others. About 60% of affected districts were monitored.

k) Clinical trials are still ongoing on institutional farms to determine the effectiveness and suitability of the novel acaricide products to control ticks in the country. The Institutional farms among others include Nshara, Sanga and Rushere (Kiruhura District), Kirasi and Buyana (Gomba District), Ngoma (Nakaseke District), Kasolwe (Buyende District), Atera and Maruzi (Apac) and Aswa(Pader District). About 60% of the trials have been done so far.

Reduction of the tsetse vector and man- tsetse-animal contacts

a) In order to achieve the above, the COCTU undertook, the training of one hundred sixty (160) youthful Animal Resource Key persons (ARK) from Teso sub region in live bait technology using Restricted Acaricide Application (RAP)to spray cattle as a way of reducing the man- vector

b) These catalytic activities resulted in 1,750,894 heads of cattle sprayed by the youth, paid for by the communities. This approach is used to reduce the vector population and ultimately reducing the human and livestock infection rates. For every 1 cattle sprayed as a catalyst, it attracts 4 sprays from the community making the return on investment very attractive.

c) To train girls make pyramidal tsetse traps and supporting women groups in making and distributing tsetse traps for control tsetse flies and Trypanosomiasis and also generate income to improve their livelihood. One hundred forty **(140)** girls from Dokolo, Kaberamaido, Kumi, Bukedea, Kamuli and Kaliro were trained in making pyramidal traps so as to reduce the cost of acquiring them by the local Governments in the region and beyond. They were further supported to produce **500** pyramidal traps. The purpose is to create local capacity, create employment for the youth and increasing access to the trap technology

Girls from Dokolo, Kaberamaido, Kumi, Bukedea, Kamuli and Kaliro trained to make pyramid traps.

Treating cattle with trypanocidals **conducted**

Surveillance, diagnosis and early disease detection

a) Avian influenza surveillance conducted in Jinja, Mukono, Wakiso, Kayunga Masaka, Kalangala, Luwero, Kisoro Albert region, Nebbi and Budaka. The target was to have Avian influenza controlled in Wakiso, Masaka & Kalangala districts and this was achieved at 100%.

b) Cattle Surveillance was carried out in Lira, Alebtong, Dokolo, Kole, Kaberamaido, Oyam, Otuke, Apac and Kiryandongo.**10, 291blood** samples from cattle were collected from ear vein and spotted on FTA cards. The results indicate a prevalence of less than 5% although there are about 20 villages in Lango sub region that have prevalence higher than 5 %.

c) To ensure mass treatment of cattle with trypanocidal in areas identified with high prevalence to improve production and protect human population, **137,943**heads of cattle were treated with Diminazeneaceturate to cleanse the herds of the trypanosome parasite in Bunyoro, West Nile, Busoga, Lango and Teso regions.**183** sheep, 4**51** goats, **32** pigs and **19** dogs were also treated with trypanocidal drugs to clear them of the parasite. This is done to protect the people and also improve herd production and productivity.

d) To Screen people for sleeping sickness the council surveilled the sub counties by taking blood samples from **3,000** people in villages where no positive cases were diagnosed. The thick and wet smears were performed including HCT. Blood was also spotted on FTA for molecular analysis. **5,032** people in Alebtong, Kole and Lira were also screened.

e) Support local government to conduct tsetse Tsetse surveys were carried out in fourteen **(14)** districts including; Dokolo, Kaberamaido, Packwach, Kiruhura, Zombo, Nebbi, Koboko, Maracha, Yumbe, Adjumani, Amuru, Arua, Bukedea and Kumi. This is done to assess the tsetse burden and level of exposure to people and livestock. The FTD is less than 1

C. Promotion of animals and animal products

Meat:

a) In order to promote market oriented beef production , beef value chain stakeholders including Beef farmers &Feed lotters, Cattle Traders and Transporters, Veterinarians, Nutritionists, Local Government Leaders, Beef Processing Plant Owners, Researchers, Uganda Meat Producers Cooperative Union, Uganda Beef Producers Association, MAAIF staff, a food safety specialist and members of Human Dynamics on the EU beef project from 5 districts of Nakasongola, Luwero, Nakaseke, Kiryandongo and Wakisoin central Uganda were mobilized and a consulted/sensitized on how to improve the quality and safety of beef and other animal products and on steps to form a beef quality and safety innovation platform.

b) To meet the demand of beef for export under NAGRC&DB, the target under NAGRC&DB was to produce 1000 calves from pure beef breeds & appropriate crosses. 1264 beef animals were produced on Ruhengyere in Kiruhura district, Aswa ranch in Pader, Maruzi Ranch in Apac and Sanga Field station in Kiruhura. These animals shall be extended to farmers in future to improve their herds. The produced animals have potential daily weight gain of 500gms.

c) The targeted under NAGRC&DB for enhancing poultry production was to produce 1,000,000 Kuroiler chicks to be distributed across the country. 300,849Kuroiler chicks were produced and distributed to…..households. These were distributed to households in

54 Districts of Uganda and this has contributed to the increased production and productivity of poultry farmers by reducing the lengthy period of delivering local cocks and eggs on the market from one year to four to five month.

d) The target was to produce one thousand 1000 improved goats from the center farms and ranches. 1260 goats were produced and this has contributed to the improved pool of improved goat flocks in the country. The efforts have improved the growth rates of goats in the country.

e) For breeding and multiplication of quality pig genetics, the target was to produce 600 piglets & avail them to pig farming households in the country.468 were produced which has contributed to the improved genetics pool of pigs extended to farmers in the 39 different Districts of Uganda. This has resulted into improved litre size from 5 to 14 and the growth rates improved to average market weight of sixty KGs compared to 25kgs in the period of 4-6 month

f) Inspected animals and animal products at ports of entry/exit, processing plants, hatcheries.

g) Enforced Veterinary inspection and regulations during animal quarantine restrictions to avoid disease spread. How many arrests, prosecution, penalties

h) Registered Commercial hatcheries in districts of Wakiso, Mpigi, Kampala, Mukono, Buikwe, Jinja, Kayunga& Mityana. The target was to register all commercial establishments but only 80% was achieved.

i) Controlled illegal routes for animals and animal products both inland and at ports of entry/exit (Malaba, Busia, Katuna, Elegu, Oraba, Mutukula, Pakwach, Entebbe international airport, Nakawa/PortBell/General post office). The target was to patrol on a 24 hr basis. About 70% of the target was achieved.

Milk;

a) In the effort to improve the genetic potential of the national herd and to improve access to good quality genetic stock to dairy farmers, targetwas to produce 700 Dairy crossbred bred calves and 150 pure dairy calves. 1,075 crosses and 242 pure dairy animals were produced at Ruhengyere, Rubona, Bulago, Livestock experimental station and Njeru stock farms.

b) Milk production increased from 2.2 billion litres in 2016/17 to 2.5 billion litres in 2017/18; representing 13 % growth rate what brought that rapid change

Hides and Skins;

a) In order to promote good quality Hides and Skins, mobilisation for formation of value chain innovation platforms was conducted in Eastern and Central regionsand will continue in other regions of the country.

Silkworm Farming (Sericulture)

(a) In order to increase cocoon and silk production through improving access to quality silkworm seed and mulberry planting materials, Silkworm breeds and mulberry stocks were maintained at the National Sericulture Centre in Kawanda and 268 boxes of silkworm eggs (each box contains 20,000 eggs) were distributed to farmers in Kamuli, Luwero, Wakiso and Bushenyi districts

(b) Bushenyi Silk Farmers' Association wasalso supported to increase mulberryacreage, with 14 tons of mulberry cuttings and 35 acres of mulberry planted. Also 2 tons of mulberry cuttings were distributed to 6 farmers groups in Luwero and Mubende and 6.25 acres planted.

(c) Built capacity for farmers and district staff, 72 farmers and 18 extension workers were trained in Silkworm farming technologies at the National Sericulture Centre in Kawanda.

(d) Conducted awareness activities on silkworm farming among stakeholders through mobilization and sensitization on silkworm farming enterprise in 5 districts in Central and Eastern Uganda (Luwero, Wakiso, Mubende, Kamuli and Luuka) and farmers were organized into groups.

Bee Farming (Apiculture);

a. **S**upported beekeepers with 46 sets of beekeeping equipment (923 beehives, 59 hive tools, 104 bee smokers, 96 pairs of bee gloves, 96 pairs of gumboots and 96 sets of protective wear)
b. Built capacity of extension workers and farmers, 24 district entomologists on bee reserve apiary management and colony multiplication and 74 project beneficiary farmers, entrepreneurs and district entomologists from 8 districts were trained in beehive products' processing and value addition.
c. To ensure quality control and maintenance of standards for hive products, laboratory testing of honey samples for pesticide residues in Ugandan honey was conducted.
d. In order to create awareness and popularization of modern bee farming technologies, three (3) commonly used beehive technologies (traditional log beehive, Kenyan Top Bar (KTB) beehive and Langstroth frame beehive) were demonstrated and exhibited at the National Agriculture Show Jinja 2018.


Some of the bee hives given to bee farmers

D. Improved Market Access for Animals/Livestock and Animal/ Livestock Products

Improved Livestock Marketing Infrastructure and Market access

a) To improve marketing of livestock and livestock products in the sub regions of Karamoja, Teso and Sebei ,12 Livestock markets and 12 slaughter sheds sites were identified, assessed and designs and tendering have been completed
b) To enhance regional trade in livestock all planned structures , thus 4 Holding grounds, 3 quarantine stations and 4 cross border check points were identified, assessed, designs completed and tendering completed in Karamoja and Teso regions. To promote legal trade of cattle/Livestock, 4000 cattle trader's licences were procured and delivered to MAAIF stores and a register of traders maintained

Hides and skin

The department of animal health promoted market access by supporting compliance with SPS measures by hides and skins tanneries and providing on spot guidance at Hoopoe, Skyfat, Loyal small scale industries, Jambo, Novelty, Uganda Leather Industries, Guanghua International among others.

Milk Collection, Marketing & Processing

a) Marketed milk stood at 80% of the total production in 2017 and this is likely to increase further as we rehabilitate more milk collection centers (MCC).

b) The value of marketed milk had a 5% increase from USD 716 million in 2015 to USD 752 million (about UGX 2.7 trillion) in 2016/17.
c) Currently, Uganda has 119 operational milk processing companies (large scale, medium scale, small scale and cottages) with a total installed capacity of 2.7 million litres per day.
d) Total rural milk collection centres are currently 461 with total installed capacity of 1,770,417 litres.
e) Dairy exports stood at US $ 60 million in 2016 and estimated at USD 130 million in 2017 while Dairy Imports dropped from USD 5.4 million to USD 5.2 million over the same period. The increase in the net exports has been as a result of increased compliance of Uganda's milk and milk products to international standards on both regional and international markets.

f) The main dairy exports are Casein, Skimmed and Whole Milk Powder, UHT Milk, Ghee, Cheese, Butter and Butter oil.

g) The Dairy exports mainly go to EAC, COMESA countries, SADC, UAE, Nigeria, Syria, Egypt, Omen, USA, Nepal & Bangladesh.

h) In order to ensure Increasing Access to Farm Inputs and Milk Marketing Equipment, a total of 552 milk cans with total collection capacity of 27,600 litres were procured and distributed to dairy stakeholders across the country on a cost sharing basis to facilitate marketing of quality milk. Beneficiaries are selected from dairy farmer cooperatives / associations

i) Within FY 2017/18, DDA rehabilitated Soroti Milk Collection Centre in Soroti Municipality to aid the farmers bulk the milk hence reduction in post-harvest losses and improvement in income generation. More than 300 dairy farmers are already utilizing the rehabilitated milk collection centers.

Soroti MCC before rehabilitation

Soroti MCC after rehabilitation

Inside Soroti MCC **Kaberamaido MCC**

j) In an effort to promote Value Addition at Entebbe Dairy Training School, the DDA Is Promoting Value Addition through Entebbe Dairy Training School in Fy 2016/17 And Fy 2017/18:-

k) A total of 216 dairy stakeholders ; majority being the youth were skilled in value addition especially on how to make yoghurt, cheese and ice-cream .Most of the dairy stakeholders have already established dairy cottages and others are employed along the value chain as a result of the trainings.

l) Entebbe Dairy Training School (EDTS) was equipped with Batch pasteurizer, Yoghurt, Ice cream, Cheese production lines, Milk packaging lines, Homogenizer, Boiler and other milk processing equipment to assist in skilling dairy stakeholders in value addition.

m) To ensure sustainable dairy farming and trade through building capacities for dairy stakeholders along the dairy value chain to enhance the capacity of dairy stake holders, DDA has trained over 3675 dairy stakeholders in value addition, silage and hay making, breeding technologies, dairy feed production, management & utilization, business entrepreneurship, product development, reducing post-harvest losses, conserving the farm environment, Tick resistance to Acaricide and control of tick borne diseases, standards and regulations, cooperative benefits and group dynamics.

n) Animal health department promoted market access by supporting compliance with SPS measures by milk processing plants, and providing on spot guidance at Pearl dairy, Amos dairies, GBK, Paramount Cheese, Sameer Agriculture, etc.

Poultry and poultry products

o) Promoted market access by supporting compliance with SPS measures by poultry farms at Kwagala poultry farm, SR Afrochick, Hundani Manji International, Quantum foods (Masindi), Royal farms, etc.

p) Provided on spot SPS guidance to Poultry breeders: Biyinzika, Ugachick, Jeni, Eden stores, NAGRC, Nutrofeed (U), Bukomo, Najja Poultry, Butenga farmers, Senda poultry farmers, etc.

Promotion of Public Health

a) To promote food safety and biosecurity in Uganda, the VPH team collected 60 samples for beef from 12 districts in central Uganda and 28 samples of donkey meat from the Donkey slaughter facility in Tororo and submitted them to laboratories the Government Analytical, UNBS and NADDEC Labs for analysis. Laboratory results indicated 4 pesticides residues above the acceptable Maximum residue limits in 6.7% of the beef samples. The four pesticides are: Diazinon (0.843 ppm cf 0.7 ppm) ,Ethion, (2.632ppm cf 2.5 ppm), Chlorpyrofos (2.632ppm cf 2.0 ppm), and Malathion (1.0004-1.0005ppm cf 1.0 ppm).

b) The donkey Meat samples (78.8%) were contaminated with micro-organisms-E.coli.The two sets of laboratory results show a serious food safety issue in the meats and therefore of great public health concern that require regular monitoring and sensitization of the masses.

c) To promote Dairy Quality enhancement through National Dairy Quality awards**,** the DDA conducted the 5th National Dairy Quality Awards under the theme "Quality Commitment for Market access and transformation to middle income status" in December 2017. A total of 35 dairy stake holders were awarded for excellent performance in various categories (Large, Medium and Small scale)

PROJECT BRIEF: REGIONAL PASTORAL LIVELIHOODS RESILIENCE.

Project title: Regional Pastoral Livelihoods Resilience Project (RPLRP)

Kaabong, Kotido, Moroto, Abim, Napak, Nakapiripirit, Amudat, Kween, Bukedea, Kumi, katakwi and Amuria districts (**Kenya, Ethiopia, South Sudan and IGAD Secretariat are the regional partners)**

Funding Agency:	IDA World Bank 40 million dollars
	GOU counterpart funding: 1.8 million dollars
Executing Agency	Ministry of Agriculture, Directorate of Animal resources
Project Length:	5 years (January 2014 – December 2019)
Loan amount:	USD 36,246,000
Disbursement to date:	USD 14,264,000 (40%)
Projected disbursement	USD 25,967,400 (FY 2018/2019)

Project area: **Kaabong, Kotido, Moroto, Napak, Nakapiripirit, Amudat, Kween, Katakwi, Bukedea, Amuria, Kumi, Abim**

Progress on project deliverables

Component 1: natural resources management aims at enhancing the sustainable management and secures access of pastoral and agro-pastoral communities at natural resources (water and pasture) with trans-boundary significance

a) 1 valley dam, 7 valley tanks and 51 bore hole sites identified, assessed, designs completed and tendering completed. Contract award awaiting World Bank clearance

b) b) 3 valley dams and 1 valley tank under design

c) Identified pastoral and agro-pastoral land for sustainable management. Communities trained and contract for pasture seeds, fertilizers and farm tools signed. Awaiting delivery of inputs

d) 15 conflict mitigation platforms formed to manage cross border conflicts.

Component 2: Market Access and Trade aims at improving the market access of the agro-pastoralists and pastoralists to the intra-regional and international markets of livestock

a) 12 Livestock markets, 12 slaughter sheds, sites identified, assessed, designs completed and tendering completed. Awaiting World Bank clearance to award contract

b) 12 district laboratories, 1 regional laboratory and 1 central laboratory equipped with new lab equipment

c) 4 Holding grounds 3 quarantine stations and 4 cross border check points identified, assessed, designs completed and tendering completed. Awaiting World Bank clearance to award contracts

d) 12 vehicles, 60 motor cycles and 360 bicycles delivered to districts

Component 3: Livelihoods support: aims at enhancing the livelihoods of Pastoralist and agro-pastoralist communities.

a) 1,500,000 doses of vaccines delivered, 1,456 animals vaccinated against FMD, CBPP and PPR

b) District staff (450 CAHW, DVO, VO) trained and provided with funds for disease surveillance

c) 12,000 lts of Pour on and 56,000 sachets of Samorin provided to Kaabong and Kotido. 175,000 cattle treated.

Component 4: Pastoral early warning and disaster risk management aims at enhancing drought-related hazards and preparedness, prevention and response at the national and regional levels

a) 12 district early warning committees established. 12 Early warning focal officers trained (District agriculture Officers)
b) District contingency plans developed for effective disaster risks management, policy harmonization across the implementing countries and contingency plans

Hon. Minister of Agriculture, Animal Industry and Fisheries handing over laboratory equipment to project district Chief Administrative Officers

Application of Pour on Deltamethrine to kill tsetse flies in Kaabong and Kotido districts

E. Key Outstanding Challenges

1. Inadequate funds which would be utilized for diseases control, revamping government farms and ranches, surveying and titling government lands
2. Frequent disease outbreaks in the country
3. Increased zoonotic disease outbreaks e.g. anthrax, Rift Valley Fever, Crimean Congo which affect livestock and public health
4. **Limited funding to support disease investigation and response to outbreaks**
5. **Limited transport for officers at the headquarters to support disease surveillance and control**
6. Continued re infestation of North Karamoja by Tsetse flies from Kidepo National Park and other Wildlife reservoirs
7. **Protracted procurement processes for civil works therefore most structures for civil works are not yet in place.**
8. Delay in Cabinet Approval and Parliamentary Ratification of loans, therefore projects lose time in implementation.
9. Inadequate Technical staff in the districts to implement government extension services.

10. Influx of large herds of cattle from neighboring Kenya and South Sudan leading to spread of diseases.
11. Continued re-infestation of North Karamoja by Tsetse flies from Kidepo National Park and other Wildlife reservoirs makes it difficult to maintain freedom from the flies.
12. Slow absorption of funds by local governments makes project implementation slow,
13. Delay in the approval process for policies and Bills.
14. Influx of large herds of cattle from neighboring Kenya and South Sudan
15. Stringent Social and Environmental safeguard requirements of the World Bank especially for WB funded projects like the Resilience project
16. **Interference of Civil Avian Authority,(CAA) activities with breeding and production at Livestock Experimental station in Entebbe since they have failed to compensate NAGRC as agreed in the sub division arrangements.**
17.
18. Vast area is a Game Park (Kidepo National Park) which constitutes a source of re invasion and not easy to access for surveys and also for community based tsetse control approaches
19. The amended regulation to stop the sale of loose milk was contested in April, 2016 in court and therefore could not be implemented (enforced).This compromises quality and safety of milk in the market for consumers and also unfavorably competes with processed milk, where there is heavy investment.
20. Seasonal fluctuation in the supply and quality of feed resources and water for livestock as a result of climatic change.
21. **There is rampant land grabbing/encroachment of government properties due to lack of funds to acquire titles and develop them.**
22. Predominance of low milk yielding animals.
23. High cost of farm inputs and milk handling equipment such as chuff cutters, cans and planting materials in the region.
24. Low implementation of milk consumption strategies.

Proposed appropriate recommendations

1. Fast tracking approval process for policies and laws.
2. Support the National Animal Disease Diagnostics and epidemiology center (NADDEC) with funds

3. Increase the budget for Animal health activities so as to be able to respond to epidemics in time
4. Increase budget for the procurement of vaccines so that a bigger proportion of the national herd is protected
5. GoU should consider investing in disease control infrastructure such as holding grounds, Quaratine stations and laboratories
6. Consider supporting the ministry to manufacture vaccines locally in Uganda
7. Include Rift Valley Fever, Anthrax and Brucellosis on the state controlled disease list
8. Fast tracking the recruitment of extension staff and required project staff.
9. Government should implement aerial spraying to eradicate tsetse flies in the region including the Kidepo National Park
10. Fast tracking food safety issues to protect the public from consuming meats containing dangerous residues.
11. Increase GOU contribution to the livestock sector in general
6. There in need to support the planned tsetse eradication campaign through proposed projects thus:

a) The Uganda Tsetse and trypanosomiasis eradication project (UTTEP)- 30,000 Km^2 in S. E. Uganda ($ 13m). Approved by Ministry of Finance Planning and Economic Development – MoFPED awaiting provision of funding

b) Support to the Tourism Industry, through progressive reduction of Tsetse infestation in the National parks". Phase 1: Murchison falls National park (8100 sq km) at a cost of USD 7m

c) "Improving Food Security and Livelihood Through the Progressive Reducion of tsetse and trypanosomiasis in the Karamoja region" .To cover 7 districts at a cost of USD 11.7m

10. Farmers should be trained and encouraged to embrace fodder conservation and water harvesting technologies to mitigate feed and water shortage during dry season.
11. Guide farmers on where to procure high grade in calf heifers and mobilize Dairy Farmers' Cooperative Societies to sponsor their members for training in Artificial Insemination and equip them with A.I kits.
12. Government should consider improving the dairy herd in the region with breeds which are highly productive but hardy enough to survive better in harsh conditions.
13. Government should consider subsidizing agricultural inputs and agricultural equipment used through the different value chains.

CHAPTER SIX: DIRECTORATE OF EXTENSION SERVICES

1.0 Introduction

Government in October 2016 adopted the National Agricultural Extension Policy that effectively transferred the function of agricultural extension from the National Agricultural Advisory Services (NAADS) to the MAAIF. Under this policy, the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) through the Directorate of Agricultural Extension Services (DAES) is mandated to reorganize the agricultural extension service into a harmonized, well-coordinated and integrated delivery system. The Policy goal is strengthen and establish a sustainable farmer-centred agricultural extension system for increased productivity and household incomes with four main objectives:

1) To establish an effective and efficient pluralistic agricultural extension delivery system
2) To build institutional capacity for effective delivery of agricultural extension services
3) To develop a sustainable mechanism for packaging and disseminating appropriate and relevant technologies to all categories of beneficiaries.
4) To empower farmers and other value chain actors to effectively participate in agricultural extension processes and build their capacity to demand for services.

The Directorate has two departments namely

a. **Department of Extension and Skills Management (**This department has three divisions namely; Division of Information Communication, Division of Skills Management and Division of Agricultural Extension Coordination**)**
b. **Department of Agricultural Investment and Enterprise Development (**With two divisions; Division of Agribusiness Services and Division of Primary Processing and Value Addition**)**

1.1 Mandate and Functions of the Directorate of Agricultural Extension Services.

The mandate of the Directorate is to: ***"promote adoption of appropriate information, knowledge, and technological innovations for commercialization of agriculture."***

The directorate has several functions and these include;

(i) Policy formulation and reviews on matters related to agricultural extension
(ii) Strengthen coordination of local government production departments, NGOs and private

(iii) Provide technical advice on agricultural extension and advisory services

(iv) Setting standards for service delivery in local governments and private sector

(v) Quality assurance of agricultural extension services

(vi) Support agricultural enterprise development nationally

(vii) Provide information and communication services to MAAIF and local governments

(viii) Strengthen inter-institutional linkages between research, educational and farmer institutions

(ix) Promote agribusiness services and agricultural value chain development with private sector

(x) Support farmer institutional development through capacity building programs

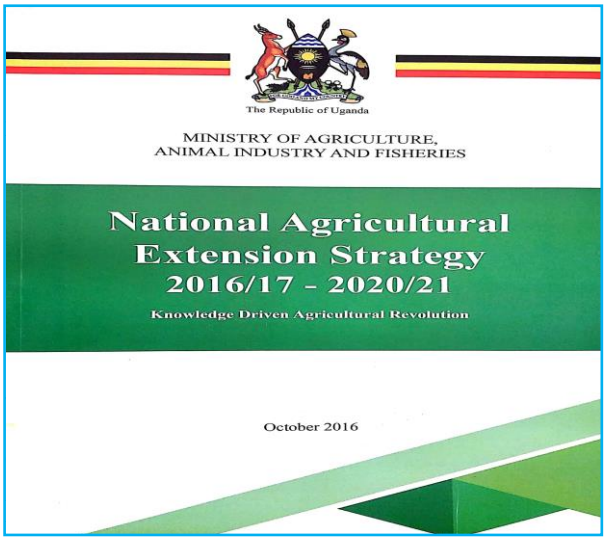
(xi) Support skilling and manpower development in the agricultural sector

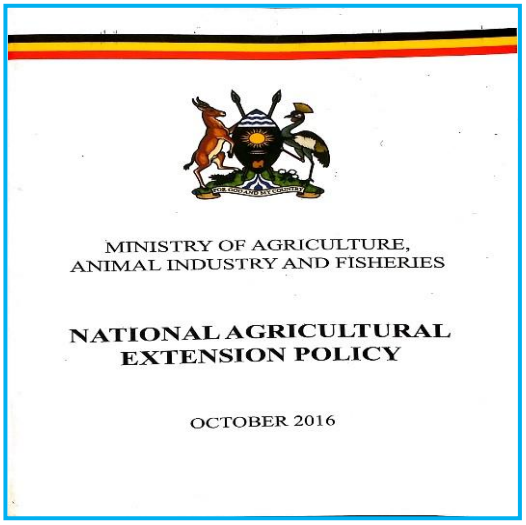
(xii) Identify investment opportunities in the agricultural sector

2.0 Key Achievements during FY 2017/1

2.1 Policies, Strategies, Guidelines and Laws

During the FY 2016/2017, the National Agricultural Extension Policy and the National Agricultural Extension Strategy were approved by Cabinet and became effective. To operationalize these policy documents, a number of policy instruments oped. These included; the guidelines and standards for agricultural extension services, ethical code of conduct for extension officers and the process of registration and accreditation of service providers.





To ensure compliance of these policy instruments, the DAES developed the National Agricultural Extension Services Bill in 2017/2018. The Principles for the National Agricultural Extension Bill 2017 approved by MAAIF were completed and submitted to Cabinet. The latter discussed and made recommendations among which was further consultations. These consultations have since been undertaken and a final Cabinet Memorandum completed and due for resubmission. The National Strategies for Youth Employment in Agriculture and that of Knowledge Management and communication, were printed and disseminated during FY2017/2018

2.2 Strengthening Coordination, Collaboration, Partnerships and Linkages

The pluralistic nature of the agricultural extension services demand that actors along the entire value chains are coordinated, harmonized and supported. The DAES initiated a number of Memoranda of Understanding with strategic partners in FY 2016/2017, many of which, were concluded in the FY 2017/2018. These included among others, Kilimo Trust, Uganda Cooperative Alliance, Farm Radio International and Pelum Uganda.

These Memoranda have enabled the Ministry to work in collaboration and reach out to many stakeholder, some of which, it would not have been possible to reach acting alone. At local government level, an institutional framework for coordination and collaboration between local governments and Zonal Agricultural Research and Development Institutes (ZARDIs) was operationalized resulting in strong linkages between research and extension.

Promotion and dissemination activities including technology upscaling, establishment of adaptive trials, and demonstrations on seed multiplication and farmer trainings, among others were conducted. A total of 8,998 demonstrations were established countrywide involving more than 160,000 households. Increased yields among the participating households for the different enterprises have been

Nursery Rice management in Butaleja

reported ranging from 50% to more than 100%.

The technologies demonstrate ranged from improved seeds, fertilizers, mulching, soil and water conservation, pasture improvement, Artificial Insemination, Kroiler chicken, pests and disease control to a wide range of postharvest technologies. There was registered improvement in food security and household incomes by participating households.

Rice towers in Kween District for escape of floods and early planting

Fish Sampling (5 months) in pond farming demonstration in Isingiro district

Demostration of cage fish farming in Kaberamaido district

Training of host farmers in honey processing in Nakapiripirit district

A youth Mr. Kamugisa Innocent from Bunyonyi village , Kanunge Town Council, Kamwenge District who acquired stem cuttings from Mr. Magezi, Host farmer 2016A Season and established 1 acre of cassava his own garden

Mrs. Teddy Rose Awor, extreme right together with her fellow group member pausing for a photo in her Narocas 1, cassava garden.
On the extreme left is the DVO Tororo. Teddy is located at Kisia Village, Sere Parish, Paya Sub-county, Tororo District

Discussion after Verification selected Host Farmers in Katooke Sub County, Kyenjojo District

Farmers preparing Rip lines for planting beans in Kiceece Sub County, Kamwenge

Pasture Demonstration in Kyegegwa Fig 2: Farmer Field day in Kasese

Mini- Irrigation technology in Kyegegwa

Cattle shed technology in Kasese District

Ms. Namuwuulya demonstrating forage chopping and uncovers the silage to MUZARDI Advisory committee members during a visit to her farm

The DAES strengthened coordination of all district local governments through routine supervision and monitoring visits and providing technical support. To improve coordination efforts and strengthen extension service delivery at local government level, the DAES with support from International Fund for Agricultural Development (IFAD) and Government of Uganda initiated the procurement of 950 motorcycles and 117 vehicles to support mobility of agricultural extension staff. The contracts with successful bidders were concluded and delivery is expected before December 2018.

In addition, the DAES coordinated and collaboratively implemented a number of activities with Non State Actors with support from development partners. Support was notably registered with the following organizations among others:

(i) The World Bank supported ATAAS project which came to a close in June 2018. This project supported technology demonstrations and upscaling activities countrywide; and a number of capacity building activities at all levels.

(ii) United States Agency for International Development (USAID) through the Enabling Environment Activity supported the development and dissemination of the agricultural extension policy instruments highlighted in 2.1 above; and the ongoing efforts to develop the National Agricultural Extension Bill 2017.

(iii) Food and Agricultural Organization (FAO) supported dissemination of the National Strategy for Youth Employment in Agriculture developed during the 2016/2017. Policy studies on the economics of combining agricultural extension and inputs were conducted providing important scientific evidence to guide policy. FAO is also collaborating with DAES in scaling up the Farmer Field Schools methodology in extension service delivery as well as integrating it in higher institutions of learning.

(iv) Japanese International Development Cooperation (JICA) provided support to DAES and NARO to develop a technical proposal on establishment of the National Skills enhancement Center to facilitate technology transfer from research institutions to farmers and other value chain actors. The proposal was submitted to Ministry of Finance. JICA also provided financial support to

repair machinery in the DAES Printery to cut down costs of outsourcing printing services.

(v) The World Food Program supported capacity building activities of both farmers and agricultural extension staff in postharvest handling in more than 40 districts.

(vi) Korean International Cooperation Agency (KOICA) continued to support agro-processing and marketing activities including post-harvest handling and storage in pilot demonstration centers in Masindi, Kiryandongo, Jinja and Iganga.

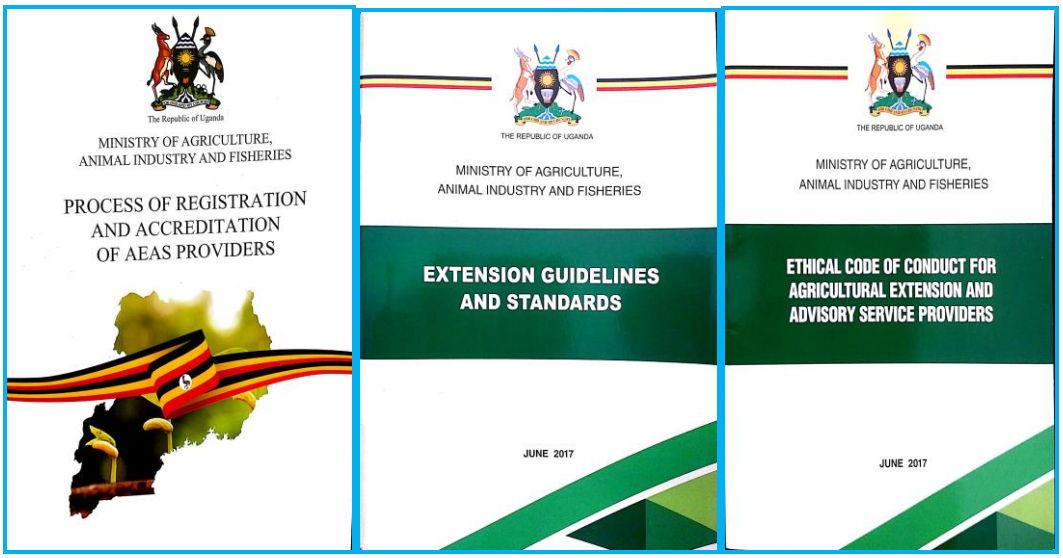
(vii) Many non-state actors coordinated their activities with the DAES and these included but not limited to the following: Food Rights Alliance (FRA), PELUM Uganda, Caritas Uganda, Uganda National Farmers' Federation (UNFFE), Kilimo Trust, Center for Agricultural Bio-sciences International (CABI), Uganda Cooperative Alliance (UCA),International fertilizer Development Center (IFDC), International Institute of Tropical Agriculture (IITA), Uganda Forum for Agricultural Advisory Services (UFAAS), Uganda National Agro input Dealers Association (UNADA), Uganda Seed Traders Association (USTA) and Civil Society Advocacy Budget Group (CSBAG), Sasakawa Global 2000 and One Acre Fund.

The collective effort of working with non-state actors improved the capacity of DAES especially in the area of policy advocacy and lobbying as well as taking active role in the budget process. The creation of the Agricultural Extension Conditional Grant which now stands at **Shs 39.6 Billion** was a result of collective advocacy and lobbying. The DAES through a participatory process developed the annual outputs with clear monitoring indicators for the grant; and these form the basis of planning. A checklist to guide supervision of the extension services in both public and private sectors was developed.

2.2 Setting Standards and Quality Assurance of Agricultural Extension Services

One of the major challenges facing agricultural extension is farmer access to quality extension services. During FY 2017/2018, the DAES trained stakeholders in the

application of guidelines and standards, ethical code of conduct and the accreditation guidelines for service providers. These documents have also been uploaded to MAAIF website for wide stakeholder access. This has led to harmonized standards in service delivery by both the public and private service providers.



The DAES also developed and operationalized the procedures for development of agricultural extension materials to ensure harmonized and standardized agricultural extension messages. However, there is still lack of a mechanism to ensure compliance by all actors to these established guidelines and procedures. This will be achieved with enactment of the National Agricultural Extension Services Act.

2.3 Farmer Institutional Development

For the last two years, the efforts of the DAES were directed at putting in place appropriate policy and institutional environment for delivery of agricultural extension services. During FY 2017/2018, processes of building strong farmer organizations that can hold the extension service accountable were initiated. An institutional farmer need assessment was conducted together with Uganda cooperative Alliance. The results showed that the farmer groups and organizations were largely very weak with limited governance capacities, weak financial management and accountability systems, poor record keeping and lack of business development skills among others.

A training manual tailored to the needs assessment report was developed and 7500 copies of the manual were printed and are due for dissemination. These manuals will be useful tools for extension workers in training farmer groups and high level farmer organization in farmer institutional development.

A profiling of farmer groups and high level farmer organization was initiated and a total of 16,022 farmer groups/organizations were profiled countrywide and the process is ongoing. A farmer registration format was developed through stakeholder consultative processes and in collaboration with local governments and the process of farmer registration is already underway.

2.4 Skilling and Manpower Development

1) The DAES in collaboration with Makerere University, National Farmers Leadership Center (NFLC), Kilimo Trust and National Agricultural Research Organization organized planned and executed capacity building through refresher training courses for agricultural extension staff in local governments. The trainings were support by ATAAS project under IFAD funding and USAID through Enabling Environment for Agriculture Activity. These trainings were a continuation of trainings undertaken during FY2016/2017. More than 1989 extension staff were trained in 14 different course modules. Cumulatively a total of 2998 staff have been trained over the last two years.

2) The DAES has engaged Makerere University to understudy the impact of the trainings on extension service delivery. What is observed in the field is that, the trainings significantly improved the capacity of staff, built their confidence to respond to emerging challenges and were sources of motivation to staff. The USAID sponsored trainings involved non state actors mainly from NGOs providing extension services in local governments.

3) The concept of the Village Agent Model that was piloted by USAID proved effective in some areas. The DAES with support from USAID organized trainings of both state and non state actors with the aim of up-scaling the model as part of the delivery system. The nuclear farm model and 4-acre model are also being piloted in different parts of the country. These models have the potential to significantly increase the extension farmer contact with practical approaches to

skilling farmers not only in agronomic practices but business skills development as well.

4) The DAES also supported the processes of reviewing the curriculum of reviews Bukalasa Agricultural College and the Fisheries Training Institute. The review processes are still ongoing.

2.5 Support to Agribusiness services

1) The DAES during this financial year prioritized development of a database of private sector actors, commercial farmers and organizations engaged in production, value addition and marketing for priority enterprises of poultry, maize, beans, dairy and beef. The database for the Albertine basin was completed and plans to roll out to the other regions are underway.

2) The DAES conducted capacity building in Agribusiness for ACCEs and RPOs identified. Over 2411 farmer organizations were validated comprising of 70,900 farmers of which 26,605 are males and 30,725 are females. The youth comprised 13,725 which is about 20%.

3) In order to improve their postharvest handling and storage, seven youth dominated groups from Masindi, Kiryandongo, Iganga and Jinja were mobilized and trained in sustainable market linkages along the rice and maize value chains.

4) In partnership with the KOICA, the agro processing and marketing strategy was developed and launched by the Hon. Minister, MAAIF. Based on this strategy, a number of projects have been designed for implementation and they include: 1) Integrated approach to inclusive agricultural value chain development in rural communities. The project will be financed by Korean Exim Bank and the focus is on maize, rice and horticulture; 2) Food Processing technology transfer project. This project will be implemented in partnership with Korean Rural Corporation (KRC) with the objective of contributing to the development of grain value chain and disseminating grain processing technologies and establish an incubation center for food research, capacity building and processed foods.

3.0 Challenges experienced during FY 2017/2018

1) The DAES is still grossly understaffed operating at only 38% staffing level and this has limited capacity to coordinate, supervise and monitor extension service delivery. At local government level the staffing has declined from 68% in 2016/2017 to 65% in 2017/2018. The decline is due to retirement and transfer of services without replacement. Unfortunately, even in FY 2018/2019, no resources have allocated for recruitment of extension staff.

2) Inadequate funding for the Directorate of Agricultural extension Services continue to limit ability to effectively coordinate extension services. The DAES share of MAAIF recurrent budget is about 4%. This coupled with understaffing, make implementation of planned activities difficult to undertake.

3) Lack of transport and other logistics for field extension officers has limited mobility and interactions with farmers and other beneficiary groups.

4) Show uptake of improved appropriate technologies due to limited contact of extension to farmers with the ratio still as low as 1:1800.

CHAPTER SEVEN: DEPARTMENT OF AGRICULTURAL INFRASTRACTURE, MECHANISATION AND WATER FOR PRODUCTION

Introduction

The department is standalone reporting to Permanent Secretary and comprises of four divisions namely:

1. Water for Agricultural Production
    a) Irrigation and Drainage
    b) Aquaculture and Animals
2. Soil and Water Conservation
    a) Sustainable Land Management
    b) Soil and water Conservation
3. Agricultural Engineering and mechanisation
    a) Mechanisation
    b) Farm Structures and Energy
4. Farmland Planning and Farming Systems
    a) Farmland Planning
    b) Farming Systems

Mandate

The department's mandate is to support, promote and guide the adoption of appropriate technologies in the development and utilization of Water for Agricultural Production, Farm Machinery and agricultural equipment, Soils, Sustainable Land Management and Farm Land Planning in Uganda

Key functions

i. Formulate, review, and implement policies, legislation, regulations, standards, designs, plans and strategies, for agricultural infrastructure and water for agricultural production and mechanization;
ii. Provide water for animals, crops and fisheries production and development;
iii. Compile, analyze, maintain and disseminate data on soils, water, wetlands, semi-arid areas and rangelands for sustainable animal, crop and fish production;
iv. Enforce legislation, regulations and standards of soil fertility management, irrigation, aquaculture, soil and water conservation, agricultural engineering, mechanization and farming systems for the development of agriculture;
v. Provide equipment and technical guidance for physical farm planning, topographical, vegetation and soil surveys, classification and mapping;
vi. Provide technical support and guidance to MDAs, District local governments, NGOs and other stakeholders in management of infrastructure, water for agricultural production and mechanization;

vii. Establish and operationalize collaborative mechanisms with research and extension services institutions for the development, uptake and application of appropriate technologies;
viii. Build capacity of MAAIF, Local Governments and other stakeholders in management of systems and infrastructure, water for agricultural production and mechanization

1. Key Achievements

1. Policies, laws, guidelines, plans and Strategies

a) **National Irrigation Policy developed** and adopted by cabinet in February 2018
b) **National Irrigation Masterplan development**: Procurement of the consultant for development of the Irrigation Masterplan in final stages. Technical and financial evaluations completed and the best evaluated bidder selected. Negotiations with the bets evaluated bidder completed. **Agricultural Mechanization Policy and Strategy developed**: Draft National Agricultural Mechanization policy in place. Two stakeholders' consultative workshops and one National High level consultative workshop chaired by the Hon. Minister MAAIF have been held so far. Assessment of status of mechanization equipment utilization carried out in the four regions of Uganda, namely Northern, Eastern, Central and Western. The Regulatory Impact Assessment (RIA) and the Agricultural Mechanization Implementation Strategy development was initiated.
c) **Draft Tractor hire guidelines developed**.
d) **Farmland planning and framing system strategy development**: Key stakeholders identified and stakeholders consultative workshop conducted to generate issues for consideration in the strategy.
e) Guidelines to mainstream climate change in the agricultural sector developed by the climate change task force HQ and disseminated in agro ecological zones.

2. Studies and Engineering Designs

a) Project on Irrigation Scheme Development in Central and Eastern Uganda (PISD)- JICA supported:

i. The target was to constitute District Project Coordination Committees (DPCCs) and Project Area Coordination Committees in Kween, Bulambuli and Bukedea. Coordination committees have been constituted in the three project districts
ii. Resettlement Action plan study carried out for Atari Irrigation Scheme

iii. EIA reports for Atari and Sironko-Acomai Irrigation schemes cleared by NEMA

iv. Preparatory survey and outline design for Atari Irrigation scheme carried out with support from JICA.

v. Engaged Local leaders and project beneficiaries signed MoUs

vi. Water User Associations were formed

vii. Feasibility studies for Atari and Sironko-Acomai Irrigation schemes completed

viii. Detailed Engineering Design of Atari Irrigation Scheme in Bulambuli and Kween district started

b) **Prefeasibility studies for development of rice irrigation schemes in 13 ACDP cluster districts** of Iganga, Bugiri, Namutumba, Pallisa, Butalejja, Tororo, Serere, Soroti, Dokolo, Lira, Nwoya, Amuru and Hoima conducted. Under this study 41 potential sites were identified in consultation with the District Local Governments and grassroots level stakeholders during inception stage. The identified sites underwent rapid assessment for suitability of irrigation development and were later prioritized using multi-criteria analysis. Subsequently prefeasibility studies were carried out on 18 selected sites covering all the 13 districts. The sites were further ranked from the most suitable to the least suitable using multi-criteria analysis based on technical, financial, agronomic, social and environmental requirements as follow:

Table 1: Summary of Prioritized Irrigation Sites

SN	Project	District	Size (Hectares)
1st	Bingo Intake	Butalejja	309
2nd	Wapala Diversion	Butalejja	252
3rd	Ayila/AchwaDiversion	Amuru	97
4th	Lumbuye #1 Intake	Iganga	198
5th	BukagoloTE& NSR	Bugiri	351
6th	AswaDiversion	Nwoya	287
7th	Lumbuye #2 Diversion	Iganga	203
8th	Nkusi Diversion	Hoima	221
9th	Ayago Diversion	Nwoya	248
10th	Ayami/Achwa Pump	Lira	296
11th	Ijumangabo Diver.	Hoima	41
12th	Igogero Dam	Bugiri	290
13th	Olweny Pump	Dokolo	55
14th	NawaibeteDam	Namutumba	217
15th	Omunyali Dam	Soroti	397
16th	Karamojong/Omunyal Pump	Serere	140
17th	Osupha Dam	Pallisa	444

SN	Project	District	Size (Hectares)
18th	Nabanja	Tororo	182

3. Water for Agricultural Production Infrastructure / Irrigation Schemes Development

a) Fifty (50) small scale irrigation demonstrations established in all regions of the country

b) Development of Solar powered irrigation schemes at all the nine (9) Zonal Agricultural Research and Development Institutes (ZARDIs) under NARO namely; Rwebitaba, Mukono, Nabuin, Bulindi, Ngeta, Mbarara, Abi, Karengyere and Ikulwe under the ATAAS project.

The irrigation systems were planned to cover five (5) hectares and support agricultural research and demonstrate the effectiveness of the technologies in modern agricultural practice. Boreholes were identified as the most viable alternative water source in the absence of a nearby water body. Borehole siting, drilling and test pumping were completed at all the nine ZARDIs. Small scale irrigation designs were developed. Supply and installation of the solar powered systems are planned for the FY 2018/19.

c) Monitored and Supervised construction of four (4) medium scale Irrigation schemes, namely Mubuku II in Kasese, Doho II in Butalejja, Tochi in Apac and Ngenge in Kween under FIEFOC II Project. Construction expected to be completed in 2019.

4. **Institutional Development in the agricultural sector:**

a) The target was to carry out an induction training of newly recruited Agricultural Engineers in Districts and develop a Continued Professional Development Capacity Program. Fifty (50) newly recruited District Agricultural Engineers and MAAIF Engineers were inducted and trained on the roles of the Agricultural Engineers in the transformation of the agricultural sector; Sector Policies, Strategies and Regulations; Planning, Development, operation and Management of irrigation schemes; Farmland Planning, Soil and Water Conservation best Practices; Agricultural Mechanization; Post-harvest handling and extension methods among others. The training lasted two weeks from 15th – 25th January, 2018 and was part of the Continuous Professional Development program/training to build capacity of the Engineers. The training

emphasized the participatory practical approach to providing services to the farmers given the present conditions and challenges.

b) Forty-five (45) MAAIF and District Agricultural Engineers trained in Environmental and Social safeguards in Infrastructure projects

c) Twenty (20) MAAIF and District Agricultural Engineers attended continuous professional training courses in Japan, Israel, Egypt and Uganda Institution of Professional Engineers (UIPE). The areas of training include Agricultural water management, water harvesting and Advanced Project Management

d) In line with the department's effort to facilitate the creation and registration of dedicated water users' groups for sustainable water management, a baseline study was carried out to establish the existence, legal status and capacity gaps of Water Users Associations in the ACDP Project target areas. It was established that Water Uses Associations do not exist in most of the project areas and where they exist, most of them are not legally registered. The information gathered will guide planning and development of Water User Operation guidelines and training programs for the Water Users Groups for sustainability of the irrigation interventions.

5. **Improving Access and Use of Agricultural equipment and mechanization through use of Labour Saving Technologies Project (ALSP)**

Project Performance

Outputs achieved include the following:

1. **163**Valley tanks/Dams (**2,759,800 C**ubic meters) constructed and rehabilitated for provision of water for livestock, aquaculture and irrigation in the **29**districts in Eastern, Central, Western, Northern, and West Nile regions using the heavy equipment sets

2. **6,500,000m³** of water hauled/transported to refill the dry or empty water facilities using water Bowzers (Tanks) for Aquaculture, livestock and Irrigation during the dry spell especially in the cattle corridor or drought affected districts of Kiruhura, Mbarara, Isingiro, Kiboga, Mityana, Wakiso, Luwero, Nakasongola, Nakaseke, Gomba, Mpigi, Masaka, Kalungu, Rakai, Mukono and Sheema

3. Total of **15,063** Acres of farm land restored, opened and bush cleared for agriculture use through felling of the trees, removal of stamps, obstacles, anthills, and scaping to ease

ploughing and any farm operations to be carried out. The activity was mainly carried out in the Western, central, northern including Kabong district.

4. **182** farm access roads of total **804**Kms improved and opened using the heavy equipment sets to improve mobility, interconnectivity, and market access or linkage in the districts of Kalangala, Luwero, Wakiso, Mpigi, Mukono, Kiruhura, Masaka, Gomba and Nakasongola.

5. **4,450Acres** of farm land opened, ploughed and planted using the two wheel tractors/Implements sets for livestock and crops in the districts of Kabong (Ikk), Lamwo, Amuru, Nwoya, Gulu, Pader, Kiryadongo, Hoima, Wakiso, Kayunga, Kamuli, Kumi, Bukedea, Soroti, Serere, Bugiri, Mayuge, Mpigi, Nakaseke, Nakasongola, Iganga, Mukono and Luwero districts. The opened and ploughed areas have been used for coffee, maize, pasture, livestock, cassava, cotton, vegetables and citrus fruits farming.

6. **100** Heavy Equipment operators and technicians from both the private sector, Ministry and Agencies were skilled and trained in heavy equipment operations, routine maintenance and safety. This has greatly improved on the effectiveness and efficiency of the operations with minimal breakdowns and accident rate.

7. **200** district Sites for development and construction of the new valley tanks, dams and aquaculture facilities, farm access roads and bush clearing were assessed and verified and technical requirements and designs developed

8. Siting and designs for the establishment of the two new regional technical support and coordination centres in Northern and western Uganda were carried out. This will improve on the water facilities and agricultural mechanization facilities establishment and utilization as well as farmers access and waiting time improved.

9. Developed standard technical specifications for the acquisition of the new heavy equipment and labour saving technologies to guide in selection, utilisation and ownership of the agricultural mechanisation equipment in the country to reduce on obsolete machinery importation.

Table 1: Mechanisation project in the 39 districts for the water facilities construction, roads and bush clearing as per the location details (July 2017 - June 2018)

In	Sites location and identification	Activities and outputs - (July 2017 - June 2018) - FY 2017/18		
		Construction Of Valley Tanks	Bush Clearing	Farm Access

	Districts	/Dam/Fish Ponds -VOL – M^3/ NO		and Opening (Acres)	Roads (No/Kms)	
		Capacity (m^3)	Number	Achieved	Achieved	
*1	Wakiso	125,000	7	73.5	45	15
	Wakiso	30,000	6	50	0	0
*2	Kiruhura	218,000	7	20	60	15
3	Adjumani	-	0	550	15	3
*4	Luwero	180,000	25	300	20	5
5	Gomba	42,800	7	593	125	8
*6	Mukono	80,000	8	100	20	6
7	Nakasongola	70,000	5	561	15	3
	Nakasongola	20,000	2	0	7	1
*8	Isingiro	800,000	15	0	0	0
9	Nakaseke	35,000	3	450	0	0
*10	Mubende	56,000	8	450	45	8
	Mubende	15,000	2	0	0	0
11	Gulu	-	0	50	0	0
12	Kayunga	50,000	5	50	0	0
	Kayunga	48,000	4	0	0	0
13	Kamuli	65,000	6	150	0	0
14	Kumi	-	0	0	23	3
	Kumi	-	0	0	15	4
15	Ngora	-	0	0	8	3
16	Kiryadongo	15,000	1	180	0	0
18	Kalangala	-	0	9500	200	53
19	Ntungamo	-	0	50	0	0
*20	Kiboga	145,000	5	0	0	0
22	Buvuma	-	0	350	25	10
24	Sembabule	-	0	150	5	2
25	Lyantonde	-	0	450	25	3
*26	Kalungu	360,000	16	150	0	0
27	Mpigi	40,000	4	100	63	20
28	Katakwi	45,000	5	0	0	0
29	Nebbi	25,000	2	0	0	0
30	Mubende	60,000	4	0	0	0
31	Mpigi	100,000	9	100	25	5
32	Soroti	25,000	2	10	20	3
33	Pader	-	0	100	0	0
34	Lamwo	-	0	150	15	8
35	Kaabong	-	0	200	0	0
36	Sheema	25,000	1	75	0	0
37	Pakwach	40,000	2	50	0	0
38	Fort Portal	45,000	2	0	0	0
39	Jinja	0	0	50	28	4

Total Output (Summary)	**2,759,800**	**163**	**15,063**	**804**	**182**

TABLE 2: Key challenges and strategies to overcome the challenges

Key challenges	Strategies
Limited and fewer number of the Heavy Equipment sets for improving deployment, access, maintenance and utilisation	Five more heavy equipment sets be procured and deployed at regional level to ease access and utilisation by all farming communities Sensitisation of the private equipment owners to provide the services at reasonable costs. Patterning with the Local Govt Ministry for the utilisation of the district equipment.
Inadequate budget allocation for procurement of more **five (05) Sets** of Heavy Equipment for deployment at regional level	Funds be availed and increased for urgent procurement of the **five (05) units** of the heavy equipment to be deployed at regional level Improve on funds releases
High taxes on agricultural heavy equipment and machinery making the acquisition and ownership of the required equipment and accessories costly and expensive thus difficult to afford	Provide a waiver on taxes for five years on all Agriculture Heavy Equipment and accessories to promote access and acquisition Provide import subsidies on all imported and locally manufactured or fabricated agricultural equipment and accessories
Over whelming and High demand for the utilisation of the heavy equipment by the farmers, local communities and other stakeholders country wide.	Sensitising and a awareness creation to all communities to promote heavy equipment services and utilisation. Encourage farmers to form groups or register to ease allocation and deployment of the heavy equipment and related services Heavy Equipment sets to be increased to ease regional deployment and utilisation. Deployment schedules to be systematically developed and reviewed for ease of deployments Ministry has planned to purchase more additional sets to have them stationed at regional level and next FY 2018/19, we shall start with Western and Northern Uganda while Namalere will continue serving and support all regions Ministry plans to revitalise and operationalise the tractor units and sheds in districts country wide with Namalere as a referral centre. Plans to promote draft animal power utilisation in the North, East and parts of Central region have been completed and will be rolled out
Inadequate budget released to sustain operations in the field	Continuing to lobby for increased budget for operations, maintenance and purchase additional equipment
Delays in procurement of spares and responding to emergencies in the field.	Framework contracts have been initiated and emergency funds in form of cash advances/ imprest to ease maintenance

Limited equipment, space and tools for maintenance of Heavy equipment and tools	Ministry Plans to rehabilitate and equip Namalere referral workshops and the **2** regional centers Ministry also plans to open up a training institute for agricultural engineering, mechanization, water, irrigation and farm land planning in Namalere

6. Sustainable land Management

(a) MAAIF facilitated 9 Zonal training workshops for Zonal SLM teams to build skills of Community Trainers of Trainers (ToTs) and line extension staff (district and sub county) targeting identified land degradation hotspots.

(b) A total of 3477 farmers, extension officers and local leaders were trained on the various SLM technologies and landscape approach across the nine ZARDIs. Of these, 1588 were female and 1889 male. The trainings focused on soil and water conservation, tree planting and nursery management, small-scale irrigation, Conservation Agriculture, enterprise platforms and land degradation neutrality. The trainings also included aspects of soil test kit use for soil fertility assessment, bio-fertilizer application, group dynamics, savings and cooperative formation and oxen draught minimum tillage technology.

(c) A total of 20 farmer field days were held across all the ZARDIs. The farmer field days were used to showcase the SLM project success stories and achievements targeting crop production improvement and soil and water conservation. These events were also used to create awareness on SLM climate change issues. They also attracted private sector, researchers, local government officials and leaders as well as other service providers.

(d) A total of 19 intra zonal farmer learning visits were conducted in all the nine ZARDIs with a total of 418 participants of which 255 were male and 163 female. In addition, 15 inter zonal farmer learning visits involving 176 farmers of which 94 and 115 were female and male respectively were conducted. The learning visits enabled farmers to learn from other farmers' experiences and best practices and pick lessons for improvement.

(e) 40 degraded landscapes across the 9 ZARDIs, covered an area approximately 40,000 ha were rehabilitated. The Integrated Land Scape Management (ILM) approach accelerated the scaling up of SLM technologies and practices by catalyzing actions that put 20,930 ha (52.3%) of total landscape area under sustainable land management practices. Furthermore, the approach facilitated the engagement of 25,020 local community members of which 50.69% are women.

(f) 9 ZARDI specific guidelines for integrating SLM into district local government enterprise technology demonstrations were developed and disseminated, The guidelines enabled the integration SLM practices in at least 40% of the technology upscaling demos instituted by DLGs

(g) A concept note on rolling out micro irrigation schemes in Uganda's drought prone agro-ecological zones was developed jointly by the SLM team and the MAAIF Department of agricultural infrastructure, mechanization and water for agricultural production (DAIMWfAP). The Concept guides ZARDIs and other stakeholders in identification, selection, establishment and management of micro irrigation schemes.

(h) 50 Small scale irrigation schemes were established in the 9 ZARDIs puting 291.2 ha under irrigation .targeted for production of high value crops including (vegetables, citrus, apples, passion fruits and pasture etc.).

Table 1: Summary of SLM Beneficiaries

No.	Item	Amount
1.	Districts	40
2.	Sub counties	77
3.	Landscapes	40
4.	Groups	201
5.	Households	11,670
6.	Female	12,684
7.	Male	11,476
8.	Total	25,020
9.	ToTs	517
10.	Extension officers	240
11.	Area under SLM (ha)	20,929.7

(i) Uganda's National Land Degradation Neutrality (LDN) targets in response to implementation of Sustainable Development Goals (SDG) target 15.3 were developed and launched. These activities included setting up LDN Core Team, LDN working group and stakeholders' validation and and launch events. The key outputs of this process include: the National and Zonal LDN targets, a note on legal and policy measures, a high level note and guidance on LDN transformative projects.

(j) MAAIF in cooperation with a consortium of five international NGOs (iNGOs) led by Oxfam including World Vision, Concern International, CARE and Action Aid under the Umbrella of the CSA Alliance reviewed the draft Country Climate Smart Agriculture

Program working jointly with the MAAIF led Climate Smart Agriculture (CSA) Task Force. Through the joint effort the following activities are under implementation: (i) CSA stakeholder mapping (ii) A costed implementation plan for the CSA program and (iii) A CSA policy brief. .

(k) MAAIF established a Climate Smart Agriculture Village at the National Agricultural show ground at Jinja to raise awareness on SLM and climate smart agriculture technologies, practies and approaches. The CSA Village demonstrates SLM and CSA technologies for show goers and is also used for training farmers and other stakeholders throughout the year.

(l) MAAIF in partnership with the Ministries of Water and Environment (MWE), Lands, Housing and Urban Development (MLHUD), Energy and Mineral Development (MEMD) and Trade Industry and Cooperatives (MTIC) reviewed and updated the Uganda Sustainable Land Management Strategic Investment Framework SLM USIF (2010 – 2020) to integrate new and emerging issues. The review process was carries out by the SLM Technical Committee, Stakeholder workshops and the SLM National stakeholder forum .

(m) A National SLM Stakeholder Forum held on 13th June 2018 at Imperial Royale Hotel Kampala review SLM implementation progress, validate the updated SLM USIF (2018 - 2030), Launched the Uganda's Land Degradation Neutrality (LDN) Targets and recognized a a number of outstanding community level actors in SLM and CSA.

SLM benefits and success stories

Presented below are representative success stories of practicing farmers across the 9 agro ecological zones. The framers who are implementing SLM technologies and practices under SLM project have experienced improvement in household income, crop productivity, soil fertility, reduced incidents of soil erosion among others. Below are the success stories narrated by the farmers:

(a) Ms. Jovia Nakimuli (0772075765) of Nyakahanga village, Ndeija sub county, Mbarara district used to rear poultry and would give or sell the bedding to her neighbours. After training on manure for integrated soil fertility improvement along with soil and water conservation structures, Jovia applied poultry manure to the

bananas and established stone lines for SWC. She reported banana yield increases from average of 10-15 kg to 25-40 kg.

(b) Mr. Geoffrey Musiime (0779-548888) of Mabona community, Isingiro Town Council, Isingiro district confessed that although his banana plantation was also affected by the recent drought in the region, he continued selling big banana bunches unlike some of his neighbours who have not integrated SLM technologies. He said that he dug contour bunds (1.5ft wide x 1.5 ft deep) which conserved water in the plantation. In addition he harvested run off water from paths separating his plantation with his neighbours and diverted it to his garden. He also applied manure and adequately mulched the plantation which contributed to soil fertility improvement and soil and water conservation in the bananas. As a result of application of SLM interventions, the size of his banana bunches increased from average of 15-20 kg to 25-50 kg. The farmer used the income from the sale of bananas to buy 10 herds of cattle and goats to integrate into the farming system. He has also constructed another house and paid school fees for his 3 children at the University..

(c) Mr. Patrick Twebaze (Tel. No. 0784825746) of Kariko Abahingi Tukore na Amani, Kitumba S/C in Kabale district practicing terracing, contour bunds, grass bunds, manure, fertilizer, integration of agroforestry trees has improved soil fertility and productivity in Irish potatoes has increased from planting 4 bags (320kg) potato seeds in an acre and harvest 12 bags (1680 kg). After integrating SLM and planting the same area with the same bags of seed, he is harvesting 50 bags (7000kg). He said that his household income from sale of potato seed a bag of 80 kg at 250,000/=. Therefore, his 7000 kg he packs 87.5 bags of 80 kg (87.5 x 250,000 =**21,875,000**) compared to 21 bags (from 1680 kg) X 250,000 = **5,250,000** before application of SLM technologies.

(d) Mr. Eli Mushabe & Asimwe Eunice (Tel. No. 0773450420/0779547904) of Katojo group, Katagiramaizi village, Katojo Parish, Rutenga S/C in Kanungu district, planted Irish potatoes in ½ acre and harvested 5000 kg (50 bags of 100 kg per bag), in the same area before SLM interventions they used to harvest 500 kg (5 bags). They are implementing SLM technologies i.e. terracing, contour bunds/ water retention trenches, grass bunds and they applied fertilizer. He sold the potatoes as seed at 2000 per kg. (5000 kg x 2000 =**10,000,000**) previously he would get (500 x 2000 **=1,000,000**), He said he bought 2 acres of land from the income from irish potato

sales. He also mentioned that most farmers are now replacing pine trees with potatoes because they get money in short time compared with trees which takes above 15-20 years before you make any money.

(e) In Adra, Erussi a lady called Joyce Ajarova was found harvesting beans from a demo planted on her land and said from the 1 ½ kg she plated on 500 m^2, she harvested 50 kg yet in the past she would harvest at most 15 kg. Secondly, she used to have a lot of soil erosion from her garden which has almost been reduced to zero through contour trenches, mulching and permanent planting basins.

(f) A farmer in Kandhe Village, Erussi Subcounty, Nebbi District called Onyuethu Stephen planted 1 kg of beans on 300 m^2 under CA and harvested 40 kg of beans yet before these interventions, from the same piece of land because of the degradation, he could at most harvest 5-10 kg.

(g) Tusiime Teopista (0778103588) from Rugashari landscape in Kagadi district reported that after acquiring knowledge on permanent planting basins, she immediately put this in practice and planted one acre of maize during season B 2017. She was able to harvest 2000kgs (20bags) yet before the SLM project intervention; she used to harvest 700 – 1000kgs of maize from the same acreage. Teopista has already bought a plot of land 50x156ft where she plans to construct a residential house just one season of putting in practice the knowledge she acquired from the SLM project.

(h) In Panyadoli landscape, farmers resettled from Bududa in Kiryandongo District in eastern Uganda reported that the soil fertility had greatly declined after Sudanese refugees had used it for Tobacco production for many years. After receiving training on SLM technologies and practices, the yield realized from one acre of land was reported by Nandutu Edith (0778192435) to have increased from 1 bag of maize to 15-20 bag each weighing 100kgs. ‘‘This yield is so high that a farmer gets more money in his pocket. He retorted that ‘’*an empty pocket and an empty stomach triggers domestic violence.’’* Following this achievement, the number of farmers participating in the SLM project activities has grown from 60 to 200 members. Some farmers had started migrating to look for land that is more fertile outside the resettlement area but there is a reverse in this trend.

(i) Nabende Milton- Onion farmer from Wanale highland group in Mbale district- confessed that after constructing the contour bunds and planting the nappier grass to

stabilize it. He then sowed the garden with 1 kg of onion seed and applied NPK fertilizer and was able to harvest 3000 kg, a fourfold increase from a mere 700 kg which he used to obtain without the use of SLM technologies.

(j) Kyabaggu Godfrey is a farmer of Mikomago Coffee Farmers group found in Mikomago village, Kyanamukaka sub-county, Masaka District. Kyabaggu has been growing coffee as a source of livelihood for the past 10 years. Before he adopted SLM technologies, the most yield he had ever attained in his seven acres garden were 70 bags. But, when Kyabaggu dug water retention trenches, constructed cut-ditches to harvest water from road runoff and also used poultry manure, within just one season (first season of 2016), he got an overwhelming 170 bags from the 7 acres and the coffee beans were much heavier than before

(k) Kuule Tusabe is a farmer belonging to Twerwaneko Farmers' group found in Nateete village, Kitenga Sub county, Mubende district. In the past, during a good season (i.e. early rains that last for up to 3 months), Kuule used to harvest a maximum of 300kg of maize from his 0.5 acre. However, after adopting the use of permanent planting basins and water retention trenches, last season when it was relatively dry, he managed to harvest one metric ton (1,000kg) and earned an income of over UGX 1m from the maize sales.

(l) **Mr. Tebanyang Festo** (0782149119), a farmer in Namorotot- Kodiket landscape in Kakomongole sub county, Nakapiripirit district testifies: "I am already a rich man. I have harvested 19 bags of beans from 6 acres and 98 bags of threshed maize this season from 10 acres of maize." The farmer who belongs to a group, Nakapiripirit Town Council Green Farmers Association is expecting not less than 6,000,000 (Six Million Shillings) from sale of beans and maize grown under conservation agriculture. With support from MAAIF-ATAAS-SLM, the farmer planted established soil and water conservation structures and maize and beans in basins. The farmer experienced remarkable crop yield.

(m) Tebanyang reports that he had never harvested more than 4 bags of maize from his gardens before. But this year (2017), after receiving training from ATAAS SLM he established soil and water structures in his gardens and established planting basins. Using DAP and kraal manure he planted maize and beans. ''When we were digging these planting basins the farmers passing by were laughing at us. They thought I was running mad. They claimed I was destroying my land by digging holes. Now all my

neighbors are admiring the yield of from maize and beans as they see from the roadside.'' Mr. Tebanyang and his group of 30 farmers have promised to continue using planting basins for more yields.

A. Key Challenges

1. Inadequate release of funds
2. Inadequate Human and Technical Capacity due to low staffing levels and tools/equipment
3. Protracted procurement processes

B. Recommendations

1. Fill the vacant positions in the department and recruitment of addition project staff (Engineers, Sociologist etc) to support implementation of ongoing projects
2. Establish Region/Zonal Technical Support units
3. Skill the staff through Continuous Professional Development (CPD) trainings and retooling
4. Increase funding levels for the Agricultural Infrastructure, mechanization and water for Agricultural production activities.

CHAPTER EIGHT: HUMAN RESOURCE MANAGEMENT

2. Human Resource Management

Introduction

As part of the implementation of the ASSP, the Human Resource Management (HRM) department in the FY 2017/18 identified and implemented a number of interventions, which focused on ensuring that sector institutional structures and systems were in place and optimally configured to achieve impact.

Key Institutional Issues

The key institutional issues that HR Department sought to address included:-

a.) Finalization of Review of the MAAIF Structure

In 2017/2018, HR Department planned to implement the following interventions:-

i. Recruit and fill vacant positions under the approved establishment to strengthen capacity to provide quality services to its clients.

b.) Linkages and Coordination between MAAIF HQ and Agencies

During FY 2017/18, the Ministry planned for the following interventions:-

i. To mainstream the National Farmers Leadership Centre project and have an approved staff structure for the Centre. Approved structure for NFLC was approved by Ministry of Public Service.
ii. There was construction of one semi- detached staff house which enabled improvement of the welfare of the staff.
iii. Under the National Farmers Leadership Centre (NFLC), 409 farmers were trained in mind-set change and agricultural production technologies, 645 district staff trained in mind-set change for Agricultural transformation, nutrition and family life education, 45 youth champions trained in mind-set change and community transformation and 65 MAAIF staff oriented in mind-set change and their roles. As a result of this training, trained farmers engaged in self-help community activities and value addition for agricultural products.

c.) Capacity Gaps in the Agricultural Sector Staff

To address the issue of capacity building MAAIF identified and planned for two outputs namely:-

i. Enhancing capacity and competences of sector personnel;
ii. Retooling and equipping personnel of MAAIF and agencies.

Progress Registered

a.) Reconfiguring MAAIF and its Agencies

i. Restructuring MAAIF

HR Department has achieved the following under the restructuring:-

1. Six (6) temporary staff deployment under DAES were submitted to the Public Service Commission (PSC) to assess their suitability and have now been substantively appointed;

2. Out of the 313 vacant positions reported at the beginning of FY 2017/2018, 67 have been filled of which 39 staff were appointed on promotion.

b.) Improved Linkages and Collaboration with Stakeholders

To improve linkages and collaboration with stakeholders, the following interventions were undertaken:-

i. Strengthening the Top Policy Management (TPM) through holding more regular meetings and sharing of information;

c.) Mainstreaming Agricultural Training Institutions (ATI) into MAAIF

HRM Department, Under the SATIP Project undertook the following interventions in order to improve the ATIs performance:-

i. Bukalasa Agricultural College was supported to review curricula of certificate in Agricultural Mechanization, diploma in Agribusiness Management and diploma in Horticulture Management for students admitted in the Academic Year2017/18 males No. 1,095 and females No. 607 and staff recruited in FY 17/18 No. 27. This has enabled the Institution to graduate student with the modern and marketable skills which positively impact on the society.

ii. Bukalasa Agricultural College was also supported to re-equip workshop equipment and tools and renovate the mechanical workshop. This has resulted in reduced cost of operations, as students are no longer transported to workshops outside the Institution to conduct practical's; The Kitchen and Dining hall were also renovated .

iii. Welfare of the students and teaching staff of the Fisheries Training Institute and Bukalasa Agricultural College has been improved with the installation of 2(no) water tanks at each Training Institution of capacity of 10,000 litres and water harvesting technologies that will store 10,000 litres. This has resolved the challenges of water supply that the institutions were suffering from;

iv. Fisheries Training Institute was supported to renovate and equip the food processing laboratory with food testing and processing equipment e.g Autoclaves improve on installations like electrical, plumbing and food store. This has enabled the students to learn the best methods of food processing.

d.) Under support to institutional development

six (6) building blocks were renovated at National Animal Disease Diagnostic and Epidemiology Center (NADDEC) i.e. the library, Administration block, laboratories, MAAIF Tent plus procurement of one Vehicle.

e.) Filling Vacant Posts in the Approved MAAIF Structure

The following interventions were undertaken to address the vacant positions in the current structure so as to strengthen capacity as follows:-

i. Out of 886 of the approved establishment, 601 positions have been filled representing 67.83%;

ii. Out of the 285 vacant positions, 30 positions are already with PSC for filling. No cannot control process time

iii. MAAIF received an additional UGX 5,171,263,458 to cater for salary enhancement for scientists and wage shortfalls experienced in FY 2017/2018 and enable filling of critical positions under different Directorates

CHAPTER NINE: AGENCIES

A) NAADS

1. Introduction

The National Agricultural Advisory Services (NAADS) has, since the refocusing of its mandate to supporting farmers with the provision of agricultural inputs through the implementation of Operation Wealth Creation (OWC) programme, focused on the following interventions of the Agricultural Sector:

i. Management of agricultural input distribution chains;
ii. supporting strategic interventions for priority commodities under the commodity approach, including supporting the multiplication of planting and stocking materials;
iii. Agribusiness development; and
iv. Value chain development focusing on the upper end of the chain.

Under the new mandate, procurement of agricultural inputs is handled centrally at the NAADS Secretariat, whereby the Secretariat undertakes procurement of the various agricultural inputs from contracted suppliers who deliver the inputs to the respective beneficiary District Local Governments (DLGs).

For the case of planting materials (seed & seedlings) and stocking/livestock materials in particular, the materials provided are based on both national priority commodities (as per the strategic direction of Government for the Agricultural sector) and Zonal/district specific priority commodities for particular agro-ecological zones and districts. In the latter case, the NAADS Secretariat requests all the DLGs to submit their priorities before the beginning of each financial year to enable harmonising the national priorities with the individual district priorities to the extent possible.

2. Focus of the NAADS programme during the FY 2017/18

In line with the strategic direction of Government aimed at concentrating resources on strategic priority areas to ensure greater impact on household incomes and national export earnings, the planning and budgeting for FY 2017/18 for activities under the NAADS Vote

focused more on the key strategic crops for income generation and export. In the case of the NAADS programme these included Tea, Fruits (Citrus, Mangoes, Pineapples, Apples) and cocoa.

However, the programme also continued to support the food security intervention to address food security concerns in the affected parts of the country focusing on provision planting materials for major food crops including maize, bean, cassava, banana and Irish potatoes.

Additionally, there were new developments during the course of implementation (of the FY 17/18 budget) that required mobilization of funds through re-allocations for supporting strategic government interventions that led to changes and/or modifications in the initial priorities within the budget, notably;

- Support for the Atiak Sugar cane out growers scheme to implement the sugarcane production project in Northern Uganda being implemented under a Memorandum of Understanding (MOU) between Atiak Sugar out growers Cooperative Society Limited and Horyal Investment Holding Company, which owns a newly established sugar cane factory with located in Atiak sub county, Amuru District. The funds for supporting this intervention were mobilized mostly from the budgets for farm mechanization (tractors and hoes) and value addition equipment (mostly fruit processing, milling equipment for grain and milk coolers).
- Mobilization of more funds for procurement of milling equipment for grain (maize and rice) and milk coolers
- Mobilization of more funds to support the food security intervention through provision of maize seed during the second season of the FY (i.e. (Season 2018 A).

This report highlights the support to farmers and other target beneficiary groups in the various District Local Governments through provision of agricultural inputs supported by NAADS under Operation Wealth Creation (OWC) during financial Year 2017/18. The support included a range of agricultural inputs, with emphasis on planting materials (seeds/seedlings) and stocking/livestock materials as well as some limited support for agricultural production machinery and value addition equipment, in line with the national

priority commodities and district/zonal specific priorities and other agricultural inputs requirements.

3. Key Achievements under the NAADS Interventions under OWC during the FY 2017/18

This section presents the key achievements of the NAADS interventions against the planned targets for FY 2017/18. The achievements are presented with regard to the main intervention areas on provision of priority and strategic commodities as well as other strategic agricultural inputs to farmers and support to upper end Agricultural Value Chains and Agribusiness Development. The performance is reported based on (immediate) outputs, including quantities of materials distributed, number of beneficiary Districts and households covered; and projected acreage.

3.1 Provision of planting materials for priority and strategic crop commodities to farmers

With regard to provision of priority and strategic commodities, NAADS/ OWC interventions involved the procurement and distribution of improved planting materials including seeds and vegetative materials and seedlings to all categories of farmers, including youths, women, PWDs and older persons.

These interventions are aimed at increasing production and productivity of the various priority and strategic crop commodities for improved household food and income security; as well as export earnings in the case of the strategic crop commodities.

3.1.1 Improved seed and vegetative materials for food security intervention

The food security intervention focused on the procurement and distribution of improved planting materials to farmers in the district local governments for the major food staple crops for the respective regions of the country, particularly those of quick maturing nature, notably maize and beans, as well as cassava, banana and Irish potato.

The key achievements against the target in terms of quantities procured and distributed, number of beneficiary districts and households covered; and projected acreage are presented in Table 1.

Table 1: Planned targets and achievements for the planting materials procured and distributed for the food security intervention under NAADS vote during FY 2017/18

Type of planting material	Planned target (Quantities)	Achievement (quantities)	Remarks
Maize seed (Kgs)	3,508,000	4,734,500	For 104 districts in all zones to stablish 473,450 acres for over 946,900 households *Variance (increase) arose from arrears of previous FY*
Bean seed (Kgs)	3,278,450	2,037,399	For 102 districts in all zones to establish 84,892 acres for approximately 169,785 households *Variance (decrease) shortage of seed on the market*
Cowpeas seed (Kgs)	132,000	-	Not procured due to lack of seed on the market
Sorghum seed (Kgs)	140,000	-	Not procured due to lack of seed on the market
Groundnuts seed (Kgs)	35,000	-	Not procured due to lack of seed on the market
Cassava Cuttings (Bags)	210,000	213,701	For 82 districts in 16 sub zones to establish 30,529 acres for 30,529 households *Variance (increase) due to increase in demand*
Banana suckers (Tissue cultured material)	1,793,000	1,358,000	-For 66 districts in 14 sub zones to establish 3,018 acres for 6,036 households *Variance (decrease) shortage of material on the market*

Irish Potatoes (Bags)	5,266	11,642	-For 27 districts in 9 sub zones to establish 1,940 acres for 969 households. *Variance (increase) due to additional demand for Irish seed due to special intervention for Rubanda, Bundibugyo and Budada districts which experienced natural disasters*

Demonstration of enterprise mix of banana and pineapple at a farmer's garden in Kayunga District

3.1.2 Provision of planting materials for priority/strategic crop commodities

The intervention for the priority/strategic crop commodities focused on the procurement and distribution of planting materials to farmers in various district local governments involving

the major perennial crops, notably tea, fruits (citrus, mangoes, pineapples, apples) and cocoa for household incomes and export earnings.

This intervention also included procurement and distribution of planting materials for other income generating crop commodities targeting special interest groups often considered to be in the socio-economically vulnerable categories, particularly the youth and women.

The key achievements against the target in terms of quantities procured and distributed, number of beneficiary districts and households covered; and projected acreage are presented in Table 2.

Table 2: Planned targets and achievements for the planting materials procured and distributed for the priority/strategic crop commodities under NAADS vote during FY 2017/18

Type of planting material	**Planned target (Quantities)**	**Achievement (quantities)**	**Remarks**
Tea seedlings	59,500,000	109,575,085	-For 20 districts in Kigezi, Ankole, Rwenzori, Mubende, West Nile and Bunyoro sub zones to establish 21,915 acres for 21,915 households *Variance (increase) due to procurement of more seedlings on credit against FY 2018-19 Budget*
Citrus seedlings	9,625,000	13,570,444	-For 78 districts across 15 sub zones to establish 109,439 acres for over 109,446 households *Variance (increase) due to procurement of more seedlings on credit against FY 2018-19 Budget*
Mangoes seedlings	6,437,500	11,504,275	-For 101 districts in 17 sub zones to establish 143,803 acres for 287,607 households *Variance (increase) due to procurement of more seedlings on credit against FY 2018-19 Budget*
Grafted Apples seedlings	770,000	1,359,124	-For 19 districts to establish 3,020 acres for 12,083 households *Variance (increase) due to procurement of more seedlings on credit against FY 2018-19 Budget*
Provision of Pineapples suckers	10,000,000		-For 24 districts for distribution to farmers to plant 1,383 acres for

		13,830,780	1,383 households *Variance (increase) due to procurement of more seedlings arising from a lower price*
Cocoa seedlings	5,714,286	7,406,572	-For 21 districts in 6 sub zones to plant 16,459 acres for 16,459 households *Variance (increase) due to procurement of more seedlings on credit against FY 2018-19 Budget*
*other income generating commodities for special interest/ vulnerable groups (*youth and women)*			
Passion fruits Seedlings	600,000	1,006, 500 (801,100 Local purple; 205,400 Kawanda hybrid	-For 32 districts to establish 1,600 acres (local purple) for 1,600 households; and 1,994 acres (Kawanda hybrid) for 1,994 households -*Variance (increase) arose from arrears of previous FY*
Ginger seed (Bags)	1,412	1,724	-For 21 districts establish 172.4 acres for 172 households *Variance (increase) due to procurement of more seedlings arising from a lower price*
Grapes (Potted) Cuttings-mother gardens	166,667		
Onion seed (Kgs)	-	762	For 7 districts to establish 762 acres for 1,524 households *Variance (increase) due to special demand through MPs for special intervention for constituencies in (selected) Districts in the Elgon Sub-region and Rubanda West in Rubanda district.* **Funds mobilized through re-allocation from the bean seed budget.*
Mushroom spones	133,333	-	*Did not implement due to operationalization challenges*

NAADS Board Members inspecting a citrus garden in Sironko belonging to the LC3

An apple plant in Kapchorwa District from apple seedlings supplied under NAADS programme already fruiting after 18 months

3.1.

The Government of Uganda, through the National Agricultural Advisory Services (NAADS) is supporting the members of Atiak Sugar Cane Out Growers Cooperative Society Limited to implement the sugarcane production project using an out growers' scheme arrangement in Northern Uganda. This project is being supported and implemented under a Memorandum of Understanding (MOU) between Atiak Sugar out growers Cooperative Society Limited and Horyal Investment Holding Company which owns a newly established sugar cane factory located in Atiak sub county, Amuru District in Northern Uganda.

The goal of the project is to empower and uplift the most vulnerable groups including women in the Sub-region who are members of the cooperative society to have a source of livelihood through sugar cane growing.

Additionally, at the national strategic level the intervention is aimed at boosting sugarcane production for increased sugar production for both the domestic and export markets

The key achievements to date include the following;

a) Total land bush cleared is approximately 13,180 acres out of 13,841 acres
b) Total land ploughed is approximately 8,450 acres out of 13,841 acres
c) Total sugar cane planted is on approximately 994 acres out of 13,841.
d) Total of 2,023 tons of seed cane was harvested and loaded out of 41,523 tons
e) Total land harrowed 668 acres and furrowed 1,349 acres.
f) Total land weeded (manual weeding) is 461 acres.
g) A total of 994 bags (50 kgs bag) of DAP fertilizer applied to plant sugar cane.
h) 4,700 co-operative members have been recruited to grow sugar cane as out growers out of the 4,700 planned.

Atiak Sugar factory under construction by Horyal Investment Holding Company Limited. The Company has supply agreement and an MOU with the members of Atiak sugarcane outgrowers cooperative Society	NAADS field based technical supervisors superving the planting of seed sugarcane at Atiak sugarcane outgrowers scheme in Amuru District

3.1.3 Provision of stocking/livestock materials for priority livestock to farmers

The interventions in the area of livestock aimed at increasing production and productivity of priority livestock for improved household food, nutrition and income security; as well as export earnings in the case and some livestock and livestock products, such as milk, meat and eggs.

These interventions focused on the procurement and distribution of improved livestock/stocking materials to farmers and special interest groups in the various district local governments for a range of livestock include dairy and beef cattle, pigs, goats, poultry; and fish and feeds for the case of poultry and fish; as well as pasture seed and Artificial Insemination (AI) kits and related AI services. It is worth noting that these interventions put special emphasis on special interest groups, especially youth and women and beneficiaries in urban and semi-urban areas, especially in the case of livestock materials for heifers, poultry and pigs.

The key achievements against the target in terms of quantities procured and distributed, number of beneficiary districts and households covered; and projected acreage are presented in Table 3.

Worth noting that generally implementation of the livestock interventions posted slow progress, especially in the case of dairy heifers and beef cattle, goats and pigs, for which progress was mostly hampered by the standing Quarantine in the major sources of livestock in South Western Uganda due to high incidences of diseases notably foot and mouth disease (FMD) and swine fever.

Table 3: Planned targets and achievements for stocking/livestock materials procured and distributed under NAADS vote during FY 2017/18

Type of stocking/livestock materials	**Planned target (Quantities)**	**Achievement (quantities)**	**Remarks**
Dairy cattle-Heifers	7,200	1,609	-Issued Call off orders 5753 in calf heifers for 121 districts -So far 1,609 in calf heifers had so far delivered in over 16 district; distribution is ongoing to be completed in the first Quarter of FY 2018-19 -Delayed supply partly due to the standing Quarantine in the major sources of livestock in South Western Uganda V*ariance (less quantity than planned) as part of the earlier budget was used to cover arrears from commitments under FY 2016/17*

Beef Cattle –Beef bulls	1,600	2,800	-Procured 2,800 young beef bulls for the National Enterprises Corporation (NEC) Katonga farm for fattening under the MAAIF Meat Export Support Services Project (MESSP) - Issued Call off orders for 378 beef cattle (beef bulls) for distribution to 21 districts for community level improvement of beef production; distribution is ongoing to be completed in the first Quarter of FY 2018-19
Poultry (Layers/broiler /Kroilers chicks-number) + Poultry feeds	19,000 Broiler chicks 38,000kgs Broiler starter & 76,000kgs Broiler finisher 193,500 Layers 494,400kgs Chick and Duck mash 387,000kgs Growers mash 25,000 Kuroilers birds	19,000 broiler chicks 38,000 kgs of broiler starter & 76,000kgs Broiler finisher 180,000 birds (layers chicks) & 400,000 kgs Chick and Duck mash 200,000 kgs of Growers mash	For 3 districts and special interest groups especially youths and women For 39 districts targeting mainly youths and women Delayed delivery by supplier Not available with the sole supplier (NAGRIC)
Improved goats i.e. boer/ savannah Crosses (Number)	3,100		-Issued Call off orders for 3,100 goats for 20 districts; distribution is still on going to be completed first Quarter of FY 2018-19
Provision of Pigs i.e Gilts/Boars (Number)	6,750	6,175	For 67 districts targeting especially special interest groups particularly youths and women

Fish fingerlings, Fish cages and Fish feeds	3,113,427 tilapia 1,489,052 Catfish, 270,148 mirror carp 314,305 kg fish feed	478,844 (Tilapia) 389,524 (catfish) - 8,700kgs of fish feed	-So far 3 districts covered; -So far 7 districts covered; -Delayed supply by the supplier *Distribution is on-going, to be concluded during the first Quarter of FY 2018-19.*
Fish hatcheries	1		
Artificial Insemination (Kits) & related services for breed improvement	90	4 AI kits Trained 28 veterinary extension workers	-AI kits for 4 districts- Rukiga, Bushenyi, Bunyangabo & Butebo -28 veterinary extension workers from 28 district trained on Artificial insemination *Procured much less of the planned kits;* *- as priority was put on address the gap of lack of trained AI inseminators in DLGs;* *-Some of the funds were re-allocated to procurement of diagnostics for testing for diseases during selection of animals*
Semen & Liquid Nitrogen	34,800 doses of semen 29,928 litres of liquid Nitrogen	-	-Delayed supply, delivery ongoing -Uptake low in DLGS due to lack of trained AI inseminators and mode of delivery to DLGs from NAGRIC
Pasture seed (Kgs) (Chloris gayana) for the pasture improvement intervention	-	9,745	For pasture seed multiplication in 8 pilot districts in South Western Uganda, including Isingiro, Ntungamo, Kiruhura, Mbarara, Sheema, Lyantonde, Ibanda and Sembabule

			-Part of the funds re-allocated to support a piggery and dairy catlle unit at the UWESO Masurita Children's Village

	
Improved dairy heifers selected for distribution to farmers under NAADS programme	Improved goats selected for distribution to farmers under NAADS programme

3.2 Provision of Agro machinery to support farm mechanisation

This intervention is aimed at increasing farm production and productivity for increased household food security and incomes through adoption of improved and efficient production technologies, enhancement of timeliness and profitability of farm operations and intensified farm production systems; as well as provision water for production to address adverse effects of climate.

These interventions focused on the procurement and distribution and/ or installation tractors, solar water pumping systems and green houses.

The key achievements against the target in terms of quantities procured and distributed, number of beneficiary districts and households covered; and projected acreage are presented in Table 4.

Table 4: Planned targets and achievements for production agro-machinery procured and distributed under NAADS vote during FY 2017/18

Type of agro-machinery	**Planned target (Quantities)**	**Achievement (quantities)**	**Remarks**
Tractors	168	110	Procured 110 tractors and implements (plough and harrow); due for delivery into the country by September 2018 *Procured less than initial target as some funds were re-allocated to support the Atiak Sugar cane out growers scheme*
Solar water pumping systems	28	15	Solar water pumping systems (solar pump, solar array, electrical components) for small scale farm level irrigation systems in 13 Districts: i.e. Katakwi, Kibuku, Kamuli, Bukedea, Buikwe, Kayunga, Mpigi, Lyantonde, Kiruhura, Mbarara, Kamwenge and Rubirizi, Mukono *Performance less than initial target; due to limited time relative to the scope and complexity of the works involved*
Green houses	-	5	Installed 3 greenhouses at farmers' sites in Nakaseke, Wakiso and Mukono districts. *Not in the initial plan; demand arose during the course of implementation funds mobilized by re-allocation from*

			solar water pumping systems

A joint technical team (NAADS/MAAIF/MoWT) conducting pre-shipment inspection of the 110 tractors at a manufacturer's factory in India

3.3 Value addition equipment and agribusiness Development services

This intervention aims to enhance production and productivity for increased household incomes and export earnings through reduction of post-harvest losses and improved shelf-life of agricultural produce, increased profitability of agricultural enterprises and job creation and/or employment for rural and urban population especially the youth.

a) Value addition equipment

These interventions focused on the procurement, distribution and installation of milk coolers and matching generators, fruit processing plants, construction of fish hatchery and maize and rice milling and matching equipment.

The key achievements against the target in terms of quantities procured and distributed, number of beneficiary districts and households covered; and projected acreage are presented in Table 5.

Table 5: Planned targets and achievements for value addition equipment procured and distributed under NAADS vote during FY 2017/18

Type of agro-machinery	Planned target (Quantities)	Achievement (quantities)	Remarks
Milk Coolers and Matching Generators	20	20	-Procured 20 sets of milk coolers and matching generators; delivery into country is expected in September 2018; also distributed and installed 20 Milk Coolers and Matching Generators in 10 Districts-Kiruhura, Sembabule, Lyantode Nakaseke, Kamuli, Serere, Kwen, Busia, Kyankwazi and Gomba; with funds from FY 2016/17 Budget -Targeting farmers in 11 districts: Kiboga, Kyankwanzi, Palisa, Kibuku, Kamuli, Luwero, Nakaseke, Ssembabule, Lyantonde, Isingiro, and Kiruhura
Fruit processing plants	2		-Procured one set of semi-automated pineapple processing plant for the communities in Kayunga district which is yet to be installed -Procurement of a Medium Scale (6 MT capacity per hour) mango processing equipment for establishment of a Mango processing plant for farmers in Yumbe district is on-going
Fish hatchery	1	1	-Construction works for fish hatchery at Nalugulu in Sironko district at 70% completion; expected to be complete and operational by end of August 2018
Maize mills and matching equipment	20	15	Delivered, installed, tested 15 maize milling equipment and are operational in 14 districts: Mayuge, Butambala, Buvuma, Omoro, Bugiri, Kyotera, Kamwenge, Iganga, Jinja, Kamuli, Kaliro, Moroto, Bukedea and Bulambuli
Rice mills and	5	5	Delivered, installed & tested 5 rice milling equipment and are

matching equipment			operational in 4 districts: Bugiri, Albetong, Lira, and Gulu

Inspection of the Component equipment for the pineapple processing plant by a joint technical team of UNBS and NAADS upon shipment into the country

A sample Rice mill equipment installed under NAADS intervention at a beneficiary site in Bugiri District. Others have been installed at beneficiary sites Lira, Gulu and Albetong Districts

Maize milling equipment installed under NAADS intervention being inspected and test run at beneficiary sites in Bugiri and Mayuge Districts.

Milk coolers installed under NAADS intervention and operation the beneficiary sites in Sembabule and Kiruhura districts respectively.

b) Agribusiness development services

i. To revitalizing the role of farmers and their institutions in the implementation in NAADS interventions farmer committees were established at different levels in the 14 pilot districts: 7,244 village farmer committees; 813 parish farmer committees; 141 Sub county farmer committees as well as 10 District level farmer committees formed and oriented.

ii. Conducted Market assessments on prices of crop and livestock materials in the 5 main agro ecological zones covering 26 districts for guide a review of prices for the planting and stocking materials.

iii. Carried out assessment of potentials beneficiary farmer groups, associations and cooperatives for support with value addition equipment (such as milk coolers, milling equipment, fruit processing) and agro-machinery (such as tractors, solar irrigation equipment, green houses).

iv. Commissioned combined thematic studies and value chain analysis studies for the tea, dairy and fruits (mangoes, oranges & pineapples) value chains. The studies are aimed at assessing current performance, identifying constraints and opportunities to guide

and strengthen the current and future interventions for improving the performance of the respective value chains.

3.4 Implementation of activities in support of management of input distribution chains

To facilitate the operations for management of input distribution chains and to assure quality of agricultural inputs and assess and monitor the performance of the NAADS programme interventions the following activities were supported and implemented;

a) Conducted seasonal verification of availability and quality planting materials (seed, seedlings and/or vegetative materials) among the suppliers under the NAADS frame work contract arrangement.
b) Conducted verification of availability and quality of stocking/livestock materials among the suppliers under the NAADS frame work contract arrangement
c) Conducted seasonal inspections of cassava mother gardens to identify potential sources of clean planting materials.
d) Conducted technical supervision and backstopping to support and guide the key actors and stakeholders in the District Local Governments for effective implementation of NAADS activities.
e) Carried out periodic routine monitoring of implementation of NAADS activities among the sampled district local governments in the respective zones. The process is aimed at tracking progress on implementation of NAADS interventions for lesson learning & corrective action.
f) Facilitated quarterly NAADS Board monitoring activities in the various zones to identify emerging policy issues and action areas to strengthen implementation of the NAADS programme interventions
g) Conducted the implementation review of the NAADS programme interventions to inform future implementation of the programme for better performance and impact. The final report will be disseminated to various stakeholders during the NAADS/OWC Stakeholders' Annual Review and Planning Meeting during Quarter One FY 2018/19.

4. Challenges and Recommendations

Challenges;

Notwithstanding the many achievements realised during the implementation of the NAADS programme interventions during the period under review, several challenges were experienced, key among these included the following;

i) Unpredictable and unfavorable weather conditions in a rain-fed agricultural production system which adversely affects production and productivity.
ii) Inadequate integration of agricultural extension services and provision of agricultural inputs due mostly to limited mobility and facilitation for field level operations
iii) Continuing incidences of poor quality of quality planting and stocking materials partly due to inadequate capacity and malpractice among suppliers and poor farm level management practices as evidence in the low survival rates
due to inadequate capacity among suppliers for provision of quality planting and stocking materials.
iv) Growing incidences of pests and diseases notably the recent outbreak of the fall army worm which cause devastating effects crops. With regard to livestock, the recurring outbreaks of foot and mouth disease (FMD) and swine fever; and the challenge of tick resistance continue to adversely affect production and productivity.
v) Limited post-harvest handling and storage capacity maize grain arising from bumper harvest of maize during the Season 2017 B and Season 2018 A (FY 2017/18) resulting in post-harvest losses and vulnerability to very low prices among farmers
vi) Most beneficiary groups lack capacity both financial and technical to put up appropriate structures to house value addition equipment as required by NAADS strategic intervention in value addition.

Recommendations

In order to address the above challenges, the following recommendations are proposed;

i. Developing capacity for water for production infrastructure and strengthening the promotion of appropriate farm and community level water harvesting and solar water pumping system to improve farmer's capacity for irrigation
ii. Strengthening licensing and supervision, regulation and enforcement of standards of private sector stockists by relevant government Agencies
iii. Explore use of voucher system instead of direct inputs provision through agro-dealers.
iv. Strengthening capacity for agricultural input supply and distribution system through public-private partnerships.
v. Strengthening and encouraging development of agro-dealer associations for empowerment of input users/farmers for effective lobbying and advocacy, access to credit and benefit from economies of skill
vi. Strengthening integration of input provision and distribution with other required agricultural support services notably agricultural extension services, research /technology development; as well as affordable financial/agricultural credit services, access to market and market information
vii. Strengthening extension services and information dissemination of information activities to improve farmer awareness and information on availability and benefits of using quality of agro-inputs and improved farm level management practices
viii. Development of district based inputs procurement and distribution systems that are tailored to the different agro-ecological potential and existing socio-economic conditions
ix. Development of capacity for storage and value addition for agricultural produce through establishment of appropriate farm and community level post-harvest handling, storage and processing infrastructure

CONCLUSION

Despite the several challenges experienced, there have been notable achievements during the implementation of the NAADS programme interventions in the period under review. This has especially been demonstrated by the increased production of maize as a result of the bumper harvest of maize during the Season 2017 B and Season 2018 A (FY 2017/18).

The above challenges and achievements are a clear demonstration that access to affordable critical Farm Inputs for improved agriculture production and productivity remains crucial for realizing the strategic objectives of the agricultural sector for increased household food and income security and increased export earnings.

As way forward, there is need for interventions aimed at addressing the current constraints notably limited capacity for water for production, post-harvest handling, storage and processing of agricultural produce as well as low prices for agricultural produce.

B) NARO

Introduction

The National Agricultural Research Organisation (NARO) is an agency under the Ministry of Agriculture Animal Industries and Fisheries (MAAIF) mandated to undertake research in all aspects of Agricultural activities. It is comprised of the Council as its governing body, committees of the Council as its specialized organs, and a Secretariat for its day-to-day operations. It has 16 semi-autonomous Public Agricultural Research Institutes (PARIs). These include seven National Agricultural Research Institutes (NARIs) and nine Zonal Agricultural Research and Development Institutes (ZARDIs) mandated to carry out research on national and zonal focus, respectively.

In an effort to fulfil her mandate, NARO undertakes periodic identification of research areas through demand articulation and priority setting of agricultural production and productivity constraints and opportunities. In addition, socio-economic, gender, market potential, consumer preference, environmental and social safeguards concerns are considered.

NARO receives budgetary support from the Government of Uganda and other development partners according to comprehensive annual work plans guided by the NARO budget policy and procedures that are aligned to the Public Finance and Accountability Act (2015) of Uganda as well as the NARO Financial Management Manual.

Overall Goal of NARO

The overall goal of NARO is to enhance the contribution of agricultural research to sustainable agricultural productivity, economic growth, food security, wealth and job creation through generation and promotion of appropriate technologies, knowledge and information. The core business is grounded on generation and promotion of technologies, innovations and management practices (TIMPS) in crops, livestock, fisheries and integration of Indigenous Knowledge with modern scientific methods including biodiversity conservation, characterisation and bio-prospecting.

Through the CGS NARO operates a pluralistic research agenda that brings on board the private sector, academia, farmers groups, NGOs, and CBOs.

5. NARO Performance during FY 2017-2018

During the FY 2017/18, progress was made in plant variety and animal breed genetic improvement; developing improved animal and crop management practices; plant and animal health management; product development and diversification along the value chain; agro-machinery and cross-cutting research areas. A total of 96 technological innovations were generated, well over the planned target of 80. A total of 41 new varieties were submitted to Variety Release Committee. A total of 121 technological innovations were delivered to uptake pathways, over and above the set target. Overall, NARO delivered on all targets set against the key performance indicators for the FY 2017/18.

Table 2: NARO Financial Performance during FY 2017/18

Source	Approved Annual Budget (Ug.X)	Annual Budget Released	Annual Budget Spent
Recurrent Wage	22.472	22.472	22.472
Recurrent Non-Wage	7.319	7.319	7. 319
Development Gou	8.780	7.122	7.122
Gou Total	38.571	36.913	36.913
Development Donor	45.540	45.540	45.540
Total Gou+Donor	84.118	82.460	82.460
Non Tax Revenue & Supplementary	7.627	6.188	5.590
Grand Total	91.745	88.648	88.050

Progress on technology and research extension interface during FY2017/18 in Table 1 below.

Table 1: Summary of NARO 2017/18 Performance

Key Performance Indicator	Planned Target FY 2017/2018	Actual Achieved	Reasons for the Variations in 2017/18
New varieties submitted to Variety Release Committee	60	41	Timely convening of the variety release committee
Production technologies generated and released	80	96	Effective evidence based target setting
Research studies under CGS	47	47	Effective review and award systems
Technological innovation platforms established/supported	39	24	
Technological innovations delivered to uptake pathways	116	121	

Generation of Agricultural Technologies

Livestock Research

Great progress has been made in various areas of livestock research, namely; vaccine development, nutrition, pests and diseases, among others.

Vaccine

Great progress has been made in livestock in advancing the work on vaccine development. Three anti-tick vaccines were found 80% efficacious on the larvae, nymphs and adult stages of the three important ticks-Brown ear tick, Bont-legged tick and Blue tick. Entomo-pathogenic-fungal (EPF) bio-acaricide (water based and oil based) formulations were evaluated. It was found to cause mortality of 50% and reduce engorgement by about 25% for bont-legged and brown ear tick.

Three (3) NARO Anti-tick Vaccines Molecules Developed

- The burden of tick and tick borne diseases is estimated at UGX 3 trillion annually
- The vaccine molecules can control tick and tick borne diseases
- The vaccine molecules are being adjuvenated into vaccines
- NARO and NDA, will be validated the adjuvanted vaccines for efficacy
- The best bets will be registered with NDA and commercialised

Two (2) NARO Bioacaricide Formulations Developed

- Contains a combination of native micro-organisms with proven acaricidal properties
- Causes up to 80% mortality of Brown ear tick which transmits East coast fever
- The mode of action of the micro-organisms is being elucidated
- Next steps; cultivation, extraction of active compound, purification, structural analysis, constituting the commercial product

Evaluation and optimization was undertaken of dosages of acaricide NH01 methanol extract against *Ripicephalus Appendiculatus* larvae at concentrations (30, 60 & 120mg/ml) on calves-invivo efficacy at 120mg/ml and was not significantly different from Amitraz; NH-A anti-helmitic drug against mixed nematodes in goats - concentration of 900mg/ml causes 100% mortality after 21 days of administration and comparable to lavamisole.

NARO Botanical Acaricide

- Contains a combination of native plant active compounds with proven acaricidal properties
- Causes 80% mortality of Brown ear tick which transmits East coast fever
- Next steps; extraction of active compound, purification, structural analysis, constituting the commercial product
- The commercial product will be constituted to confer 100% mortality within limits of allowed LD toxicity

NARO Botanical Dewormer

- Contains a combination of native plant extracts with proven anti-helminthic properties
- At a concentration of 30 mg/ml, it leads to 94% mortality of nematode larvae (*Haemonchus Contortus*) in 24 h
- Similar next steps as described for the NARO botanical acaricide will be followed to arrive at the commercial product

➢ **Use of NARO dewormer has a potential to save the country approx. 9.6 billions annually invested in imports of over 1.5 million liters of levamisole**

Efficacy of 4 acaricide against blue ticks generated for western region 95.7% for organophosphates + pyrethroids, 68.6% for synthetic pyrethroids, 57.6% for Amidines and 96.3% for organophosphates. Eastern region 100% for co-formulation, 74.3% for synthetic pyrethroids, 99.7% for Amidines and 100% for organophosphate: Blue ticks are developing resistance to synthetic pyrethroids in eastern and western regions but also to amidines in western region. Optimized color and wavelength for Ngu-B2 trap which enhanced tsetse fly capture efficiency.

Nutrition

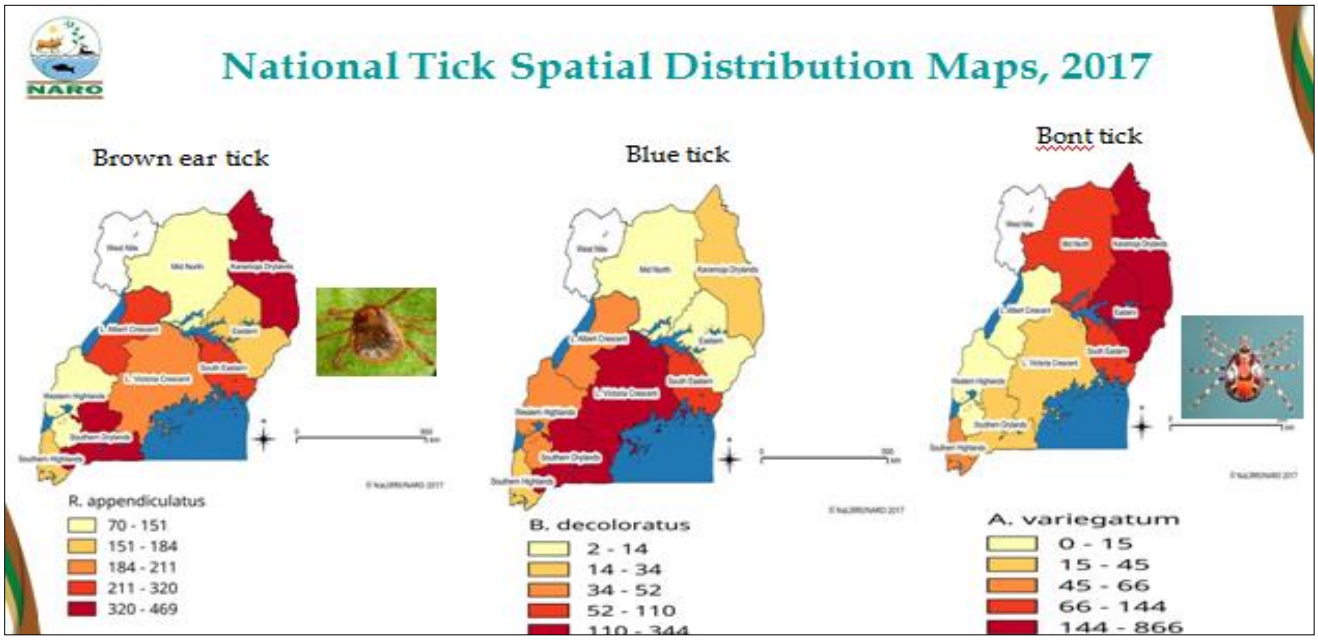
Growth performance evaluation studies done in which mean live weight of bulls were supplemented with diets containing 9, 11 and 13% Crude protein was 142, 162 and 169kg respectively, all of which was significantly different from 120 kg for the non-supplemented bulls maintained on grazing alone. Protein and press cake were extracted from Alfalfa, and Napier grass. Nutritional profiles of extracted protein and press cakes were determined.

Pests and diseases

Field surveys were conducted in one district in the SWZ. A total of 300 samples on farms with abortions were collected. 28% of the 157 samples analyzed are positive with brucellosis. The rest of the samples are yet to be analyzed. Another high impact disease documented has been FMD which is mainly spread by gift livestock.

A field based kit was developed and tested to detect udder micro-flora among dairy animals in the SWAE region.

Major livestock diseases associated with repeat breeding on farms using AI, tested and confirmed, these included; Brucellosis accounting for an estimated 55% of repeat breeders, Trichomonus Vaginalis (17%) and Vibriosis 7.34%. AI techniciams and farmers in the SWAE region have been sensitised on prevention and control of these diseases. Other factors that have been identified to influence AI use in the region include; herd size, grazing system and breed kept.



During the review period, milk samples were analyzed for bacterial contamination. Results indicated that the most prevalent bacteria are; Staphylococcus, Streptococcus, Klebshiella and E.coli. Farmers in the region were sensitized on improved farm milk handling practices.

Epidemiological studies undertaken and documented on the high impact zonotic diseases in the region. Brucellosis was identified in 55% of samples collected while sarcocysts were identified in 53.5% of samples analysed. Risk factors as well as spatial and temporal distribution have been documented.

Apiary

A trial established to compare the effectiveness of different queen rearing methods. Preliminary data shows that cup kit is the best performing method.

Inventory of important bee forages conducted in Kasese district, preliminary findings show, calliandra callorthyrsus, angel's trumpet, citrinus carlistermons, ocimum basil are the most important propagated bee forages among others.

Fish

A trawl survey was conducted in trawlable areas of Lake Victoria and standing stock biomass of commercial fish species was determined.

Four diets of 35% crude protein were developed with 0%, 30%, 40% and 50% yeast . Analysis of their proximate composition showed that they can provide the minimum requirements for normal growth of catfish fry. On-farm trial hosts were identified and infrastructure rehabilitated.

Information was refined on the status and management of Kariba weed and prepared dissemination packages (poster, brochure and a Technical Report) for internal review.

A set of guidelines for managing environmental factors that influence proliferation of Kariba weed on Kyoga minor lakes was updated. A draft policy brief for improved water quality for optimal fish production on Lake Kwania was developed.

Adoption levels of livelihood options to fishing (majorly apiary and mushroom growing) at Kishenyi, Kazinga and Kayanzi landing sites on Lake Edward was established. The changes in fishing behavior by fishers due to engagement in livelihood options among fishers were recorded.

Technology for weaning African catfish larvae from moina (live feed) to dry feed was developed. It was established that weaning starts on day 9 after hatching with feed ration of 75% live feed and 25% dry feed, day 10 with 50 % live feed and 50% dry feed, day 11 with 25% live feed and 75% dry feed and thereafter 100 % dry feed in the diet.

Energy returns for Nile tilapia and African catfish from Lake Albert were determined. Results indicated high energy in the range of 9,000 to 14,340 Cal/g of fish flesh. Information dissemination packages were prepared (technical report and brochure) on sustainable utilisation of natural fish foods in Lake Albert.

NaFIRRI cage culture technologies demonstration site were rehabilitated and maintained.

A manuscript on best practices for cage culture submitted for publication. A proposal seeking for funding to carry on cage culture research activities beyond ATAAS submitted to the Nature Conservancy.

Fish stock biomass of two commercial species, Nile perch and Nile tilapia in Lake Victoria 2017 was established.

A policy to guide the exploitation and management of the Mukene light fishery on Lake Victoria prepared & currently was developed. Information dissemination packages (Poster & brochure) to sensitize and create awareness among fisher folks on the status of fish stocks and management implications in Lake Victoria were produced.

A technology for generating Nile perch fish size from swim bladder specimen applicable in regulating and managing the Nile perch's' swim bladder business in Uganda was generated.

The growth performance evaluation of Victoria strain of Nile tilapia in Northern Uganda was completed - Amuru, Gulu and Kore Districts - preliminary analysis indicated that fish were growing at 2.12g/day and 1.67g/day in Amuru and Kore Districts respectively.

Experiments to evaluate the performance of surface, floating and submerged lights on concentration and attraction of Mukene on Lake Victoria was conducted, with the submerged lights recording better (2-fold) Mukene catch compared to the surface and floating. A draft technical report on "Improving light attraction technologies for enhanced harvest of Mukene on Lake Victoria" was updated. A fact sheet (Solar light technology adoption for Mukene harvest on Lake Victoria was prepared and exhibited/disseminated at the National

Agricultural Show in July 2017. A draft policy brief on exploitation and management of Mukene light fishery on Lake Victoria was prepared.

It was established that the powdered samples of Brycinus nurse fish (local: onang nang) contained higher protein levels of 50.8 g/100 g protein, compared to 39.1 g/100 g protein and 17.8g/100 g for fried and raw samples respectively. Fried samples contained higher levels of Zinc and potassium compared to raw and powdered samples.

A socio economic survey was conducted in Ntoroko district and in selected sub-counties in Kabarole district. The findings revealed fewer farmers are involved in fish farming, major challenges such as inadequate water sources, and poor soils with poor water retention or holding capacity, land tenure.

Crops

Coffee

NARO coffee research has developed, released and promoted three coffee wilt disease resistant and high cup quality clones. The varieties NARO KR8, NARO KR9, and NARO KR10 yield 3.1, 3.9 and 4.8 t/ha/year respectively. The mean yield is 3.9t/ha/year, which is worth UGX 11.7 million. In collaboration with UCDA, NARO has supported and strengthened coffee nursery operators through provision of seed and planting materials, training and gap filling of coffee mother gardens.

VARIETY NAME	NARO-KITUZA ROBUSTA 8
ACRONYM	KR-8

Coffee KR - 8 Variety Attributes

- ✓ Good yielding:
  - ➢ 3,120kg of hulled coffee per hectare per annum earning 17.2m
  - ➢ X5.2 more yielding and paying than traditional varieties
- ✓ Resistant to coffee wilt disease (CWD)
- ✓ Resistant to coffee leaf rust disease
- ✓ Resistant to Red blister disease
- ✓ Good cup quality (Good flavour, good taste, 73% overall quality grade)
- ✓ Good physical been quality (large, heavy beans, 53 % retained by screen 18/64) and 92% screen 16/64
- ✓ Suitable for cultivation in all areas suitable for Robusta coffee growing

VARIETY NAME	NARO-KITUZA ROBUSTA 9
ACRYONYM	KR-9

Coffee KR – 9 Variety Attributes

- ✓ Excellent yield:
  - ➢ 3,890kg of hulled coffee per hectare per annum earning 21.4m
  - ➢ X6.5 more yielding and paying than traditional varieties
- ✓ Resistant to coffee wilt disease (CWD)
- ✓ Resistant to coffee leaf rust disease
- ✓ Resistant to Red blister disease
- ✓ Excellent cup quality (Good flavour, good taste, 79% overall quality grade)
- ✓ Good physical been quality (large, heavy beans, 12 % retained by screen 18/64) and 78% screen 16/64
- ✓ Suitable for cultivation in all areas suitable for Robusta coffee growing

VARIETY NAME	NARO-KITUZA ROBUSTA 10
ACRONYM	KR-10

Coffee KR – 10 Variety Attributes

- ✓ Excellent yield:
  - ➢ 4,800kg of hulled coffee per hectare per annum earning 26.4m
  - ➢ x8 more yielding and paying than traditional varieties
- ✓ Resistant to coffee wilt disease (CWD)

- ✓ Resistant to coffee leaf rust disease
- ✓ Resistant to Red blister disease
- ✓ Excellent cup quality (Good flavour, good taste, 82% overall quality (premium) grade)
- ✓ Excellent physical been quality (large, heavy beans, 55% retained by screen 18/64 and 86% screen 16/64)
- ✓ Suitable for cultivation in all areas suitable for Robusta coffee growing

A Coffee Management Season Calendar has been developed for the mid-western (Toro and Bunyoro) coffee agro-ecology of Uganda and validated in the region.

A consultative meeting and a field survey was conducted on BCTB and BBW assessment in Kayunga, Nakaseke & Masaka districts, as a follow up on the previous training conducted. Incidence of BCTB was still high due to the high cost of the pesticides and the cultural methods (manual removal of twigs) being labour intensive. Of the sampled coffee plantations 15% were infested with BCTB. BBW was only recorded in one plantation in Kabonera, Masaka. Cultural control methods of BBW (male inflorescence removal) was done on-farm and on-station and BCTB control was demonstrated by regular field inspection and removal of the infested primaries.

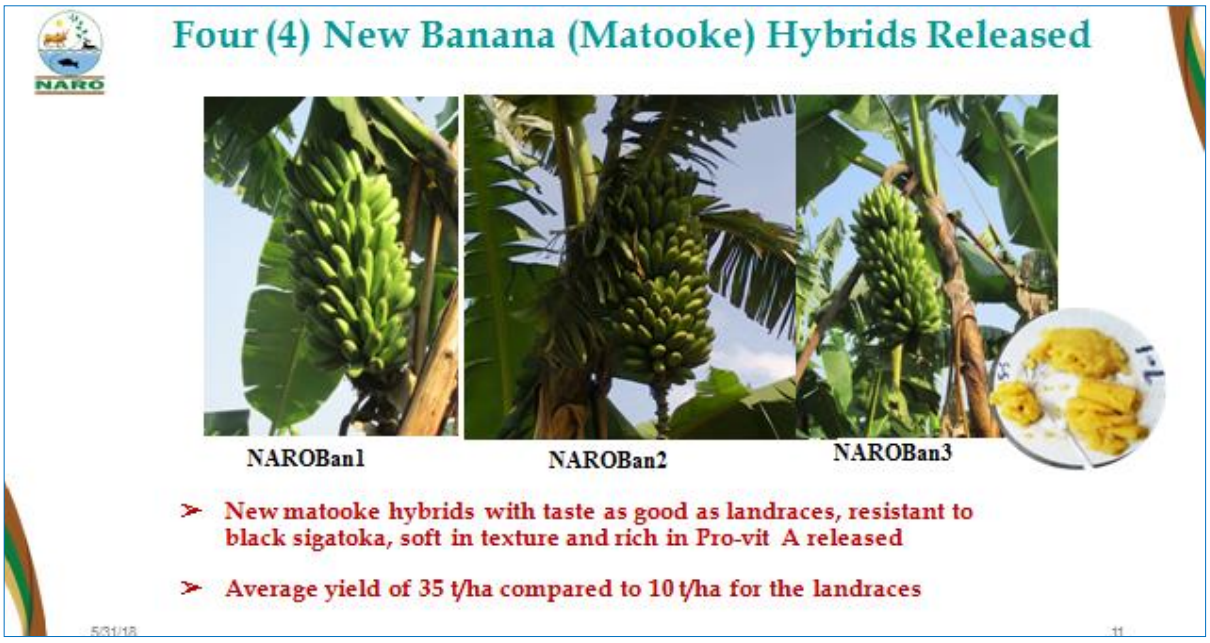
An assessment was conducted in a village that was trained and a village that was not trained. Farmers in trained villages had better knowledge on management practices for BCTB & BBW than in villages that were not trained.

Banana

New hybrids of banana have been developed. These are NABIO1011, NABIO306, and NABIO808. The hybrids taste as good as landraces: soft and rich in pro-vit A and yield twice that of land races.

Technologies for the control of banana bacterial wilt have been promoted. The benefits of banana bacterial wilt control have been a 71% banana weekly sales recovery from previously affected fields countrywide. This is worth US$ 103 million annually in banana dependent communities.

Survey of pests and diseases was done in Ntoroko. Pests found included Banana weevils with prevalence 10% and severity of 5.4%. BBW disease incidence was 7% and severity 4.4%. Fusarium wilt disease incidence was 6.5% and severity 3.4%. Sigatoka disease incidence was 20% and severity 10%.

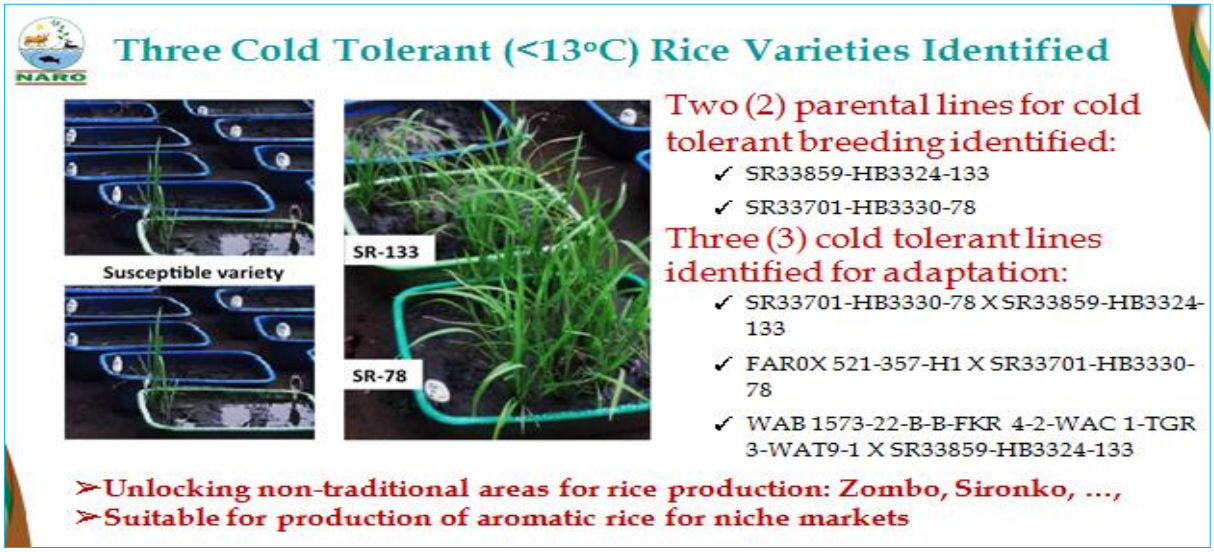


Bean

Five recently released Iron (Fe) and Zinc (Zn) nutrient dense bean varieties; NAROBEAN 1, NAROBEAN 2, and NAROBEAN 3, NAROBEAN 4 and NAROBEAN 5, were promoted. Establishment of 11 Brazilian accessions under field hotspot conditions for anthracnose resistance in beans was undertaken. Bean lines 7lines (SCR2l6, SEN70, SEN80, SCN1, Nabe10C, Nabe12C, Nabe9C were screened for adaptation to water stressed environments.

NARO beans research has developed and released 11 new varieties: Bush type (7) and Climbers (4). Bush type: NABE 17, 18, 19, 20, 21, 22 and 23. The research efforts contributed to beans and other legumes being one of the non-traditional export crops with 0.6 percent ($9.7 million). This generated US$26, 19 million for the country. A total of 1,236 farmers from Bushenyi, Kibaale, Rakai and Wakiso were trained in bean seed production and utilization of different bean based products.

Rice



Early maturing and drought tolerant 14 upland varieties were released and promoted. The varieties are resistant to rice yellow mottle. NARO has availed 10 MT of foundation seed to seed multipliers. The new varieties established have the potential to increase per capita income in Uganda by US$ 16. The six major commercial farmers took upland rice as their major commercial enterprises included Omer Farm, (4,000 ha cropped rice each year), Vinayak Agro Farm Limited (7,000 ha cropped rice each year), Amatheon Limited (1,000 ha cropped rice each year), Victoria Farm (8,000 ha cropped rice a year), Panyimur Farm (1,000 ha cropped rice a year) and Lii Farmers group (600 ha cropped rice per year). In 2016 Uganda produced up to 320,000MT of rice (FAO, 2015). This is equivalent to an import substitution of about 104 M USD per year. Due to rapid expansion of rice production in the Lake Albert crescent agro-ecological zone, the number of the rice mills increased to about 760 units in 2016.

3.3.5 Maize

NARO maize research is addressing key stresses including, economic diseases such as Maize lethal necrosis (MLN), and pests such as fall army worm, drought, and low nitrogen. Maize contributes to food security by provision of over 40% of the population's calorie requirements. A total of 19 drought tolerant varieties have been released (9 DT and 10 Drought Tego) and promoted. NARO is supporting and backstopping development of a vibrant maize seed industry by training, quality assurance, and provision of breeder and foundation seed. The research on development and dissemination of stress tolerant maize varieties has increased national average

from 1.8 to 2.7 Mt in the last five years. National production increased from 2.9 to about 4.0 Million Mt in same period. Maize exports increased from 640,000 MT valued at 38.2 million USD in 2011/12 to 787,000 MT, valued at 79.8 million USD (BoU, 015/2016).

Appropriate maize agronomic practices for the LACZ sub agro ecologies were established. The small spacing of 50x30 cm resulted in higher yields for the different varieties compared to wider spacing's of 75x30cm and 75x60 cm across all the three sub-ecological zones. In the mid altitude zone, the closer spacing of 50 x30 cm gave better yields translating into a 30% yield increase from 5587kg/ha.

It was established that it was profitable to grow Longe 10H, Bazooka, 6H and 11H in Mid-altitude agro-ecological areas. It is also most profitable to grow WE 3109 in the drier Semi-arid agro-ecological areas and Bazooka in the Tropical Rain forest agro-ecological areas of LACZ.

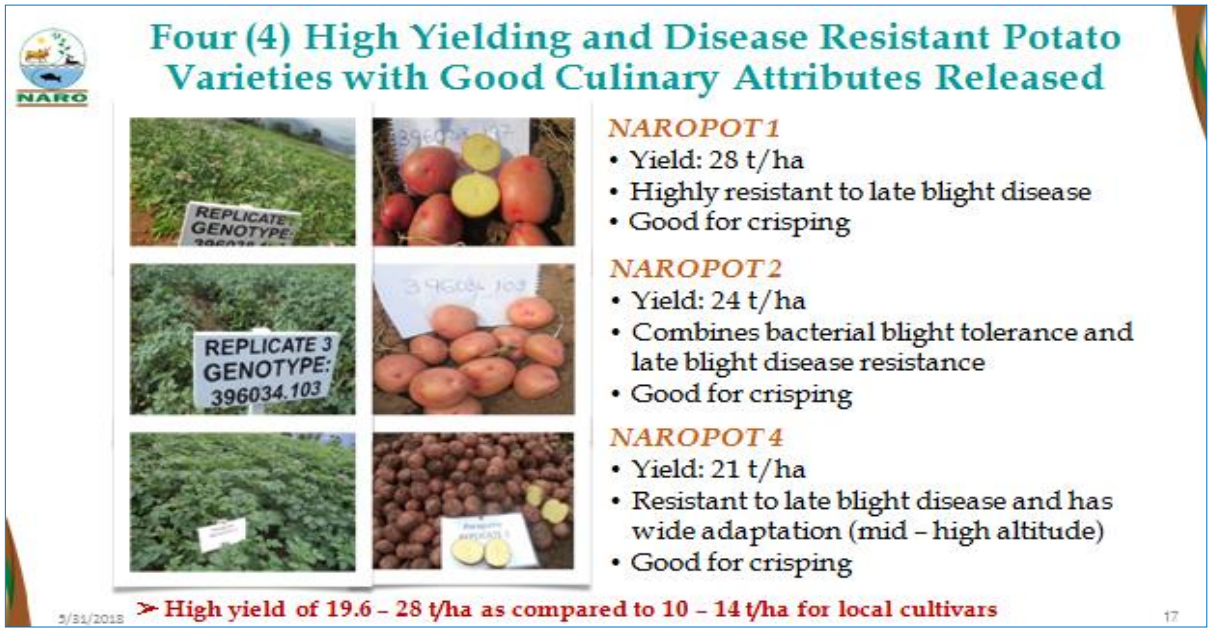
Cassava

NARO cassava research released and has promoted 21 cassava varieties. These have been widely disseminated, with adoption rate of 77%. The improved varieties are superior in terms of yield (20-45 t/ha), disease resistance and consumer-tagged storage root qualities. This has resulted in increased average yields from 9.7t/ha (2010) to 15.6t/ha (2015). NARO established a reduction in national cassava brown streak disease (CBSD) incidence (20.4% in 2017 from 27.3% in 2011), and similarly controlling cassava mosaic disease (CMD) occurrence below 20%. These outputs and gains have directly contributed to food and nutrition security of 70% of the population. NARO is developing disease tolerant cassava varieties enriched with high levels of pro-vitamin A carotenoids in storage roots.

Potato

NARO research developed and released nine (9) Orange- fleshed sweet potato (OFSP) varieties adapted to farmer needs and consumer preferences. The released OFSP varieties have been promoted and grown in Uganda and several other countries to alleviate vitamin A deficiency. By 2015 a total of 348,000 households had been reached with OFSP. This has resulted in increased vitamin A intakes among children and women, and improved vitamin A status among children.

Participatory variety selection of sweet potato in was carried out in Mayuge, Luuka, Kamuli and Namutumba Districts. NAROPOT 8 was the farmers' most favourite variety in all locations.



Groundnut

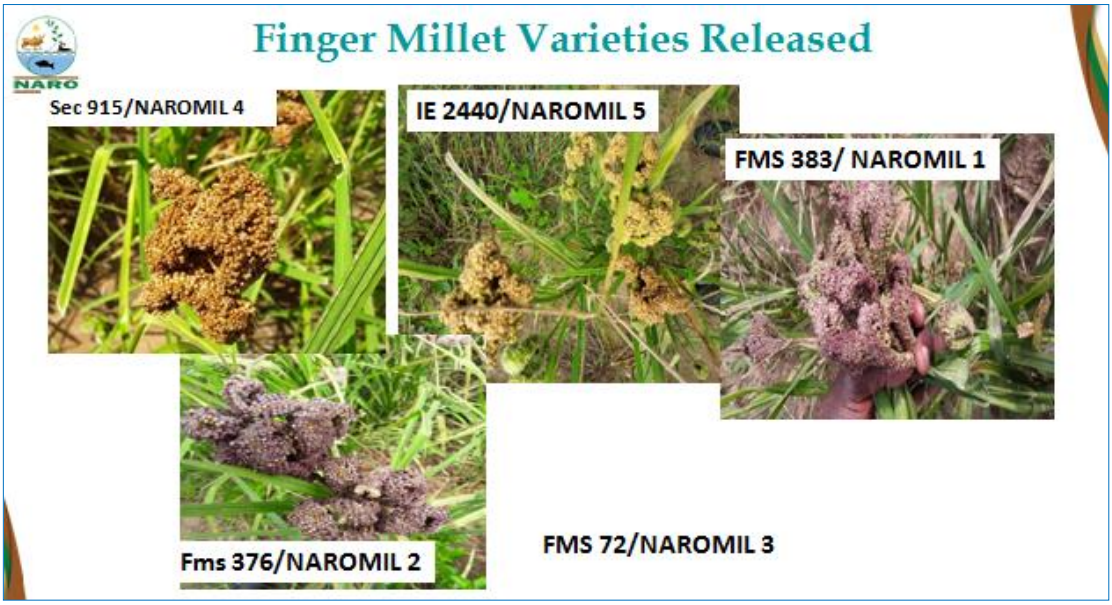
NARO groundnut research has developed, released, and widely promoted 24 varieties, with an adoption rate of 60%. Improved varieties are superior in terms of yield (2-3.5t/ha), diseases and pest-resistance, drought tolerance, early to medium maturity, high oil and confectionery attributes. The average on-farm yields from 620kg/ha (2010) to 1000kg/ha (2016) with potential of 3.5t/ha. 25% of Uganda arable land is now covered under groundnuts. The management and wide adoption of groundnut rosette resistant varieties could fetch US$ 440 million in grain sale. Research benefits of US $32.3- $47 million are generated

by adopting rosette resistant seed varieties (Kassie et al., 2010). Adoption of improved groundnut varieties increases the net value of income by US$130–254 per hectare and significantly reduced poverty by 7-9%. NARO is developing multi-stressed tolerant and high yielding groundnut varieties enriched with high oleic which has superior chemistry increasing self-life, healthy oils. NARO is a continental center of excellence in the groundnut research.

Small Gardening Technologies

Productivity and profitability of three (3) small gardening technologies for urban farming of tomatoes and nakati were investigated. Preliminary results indicate that for nakati planted on a food tower performed best (14,083Kg/ha), followed by the ridge (11,506kg/ha), bag/sack (3,406kg/ha) and least in the bucket (2,739kg/ha). On- farm demos on home gardening (food tower, boxes polythene bags, sacks, ridges) were established in Masaka District, central zone (Masaka and Lwengo (6 locations, in sub-counties of Nyendo Senyange & Mukungwe) and at Kamenyamiggo satellite station, Lwengo District.

Millet

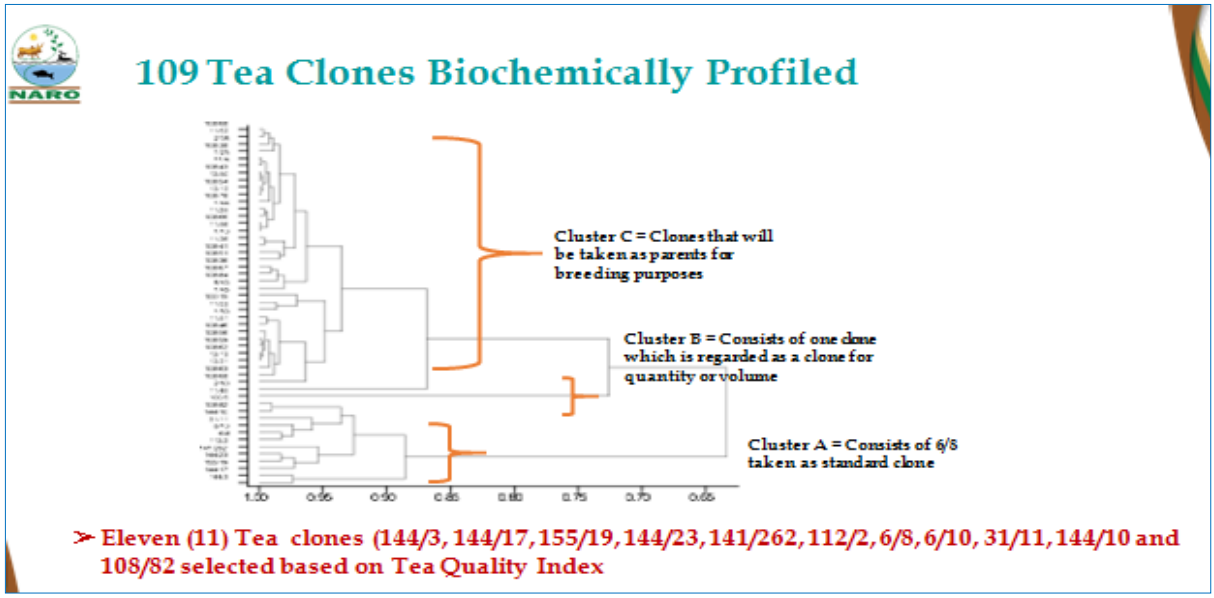


Tea

A pest survey was conducted on tea farms in Kabarole district and results indicated that Red spider mites had higher severity of over 60% on clone 303/577 followed by 108/82. Clone 31/8 had least attack of 14%. Tea thrips had the highest incidence of 80%, also on clone 303/577 followed by 108/82. Information on pests' incidence and severity collected. In all treatments Red spider mite had the highest damage of 40% followed by Mosquito bug with

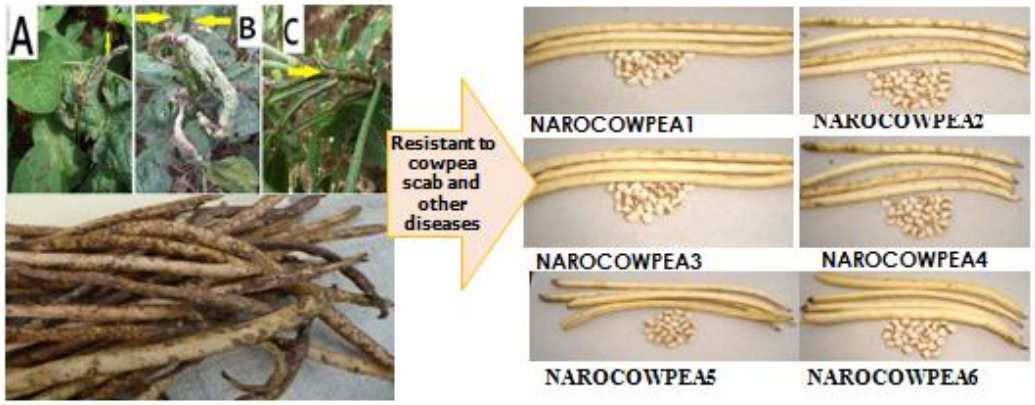
20% damage; Scales had the least damage of less than 10%, pests (Red spider mite, Thrips, Mosquito bug and Defoliators had 100% incidence in all treatments. Chloropyrifos has shown reduction in pest damage from 30%-14%, followed by neem leaf extract (25%-14%) . Pest damage was high (40%) in the control.

Twenty two tea clones were evaluated on station using fertilizer NPK 25:5: 5. Nine months after fertilizer application, clone 303/577 and 108/82, increased yields to 1.4 and 0.98 kg per bush respectively.



Cowpea

Six (6) New Cowpea Varieties Released



➢ Cowpea resistant varieties yielding 1.5 – 2.2 t/ha, expected to increase yields by >30%

Fisheries Research

Faster Growing Strain of Nile tilapia Developed

➢ Improved growth of Nile tilapia from a rate of 0.52 g/day to 2.47 g/day

➢ F_3 has been developed and is under on-station performance evaluation

➢ Developed guidelines for Nile tilapia seed production, brood stock management and hatchery management

Appropriate Cage Culture Technologies and Aqua Parks Introduced

➢ 31 potential sites identified suitable for cage culture on Lake Victoria

➢ Masese fish aquapark (a consortium of 40 farmers) has set up 155 cages measuring 5 x 5 x 2.5m, each. The aquapark produces 60 tones of fish annually equivalent to UGX 500M

➢ Jinja District Fishermen Association (30 farmers) has 110 cages measuring similar dimensions as above

Agricultural Machinery

Five-row animal-drawn planter prototype for maize and beans was evaluated. Planter performance: Seeding rate 24.2 kg/ha of maize and 60.8 kg/ha of beans which are all within the recommended values (24.7 and 61.8 kg/ha).

Prototype power tiller or Single Axle Tractor (SAT) planter and weeder were evaluated. Planter performance: Seeding rate 74 kg/ha for rice and 63 kg/ha for maize and fuel consumption 3.3 to 3.5 L/ha. Seed rates were higher than the recommended 60 kg/ha for rice and 62 kg/ha for maize due to clogging. Weeder performance: Weeding rate 7.5 hr/ha, fuel consumption 2.6 L/ha.

The 2m and 3m width maize venturi-cribs structures were improved.

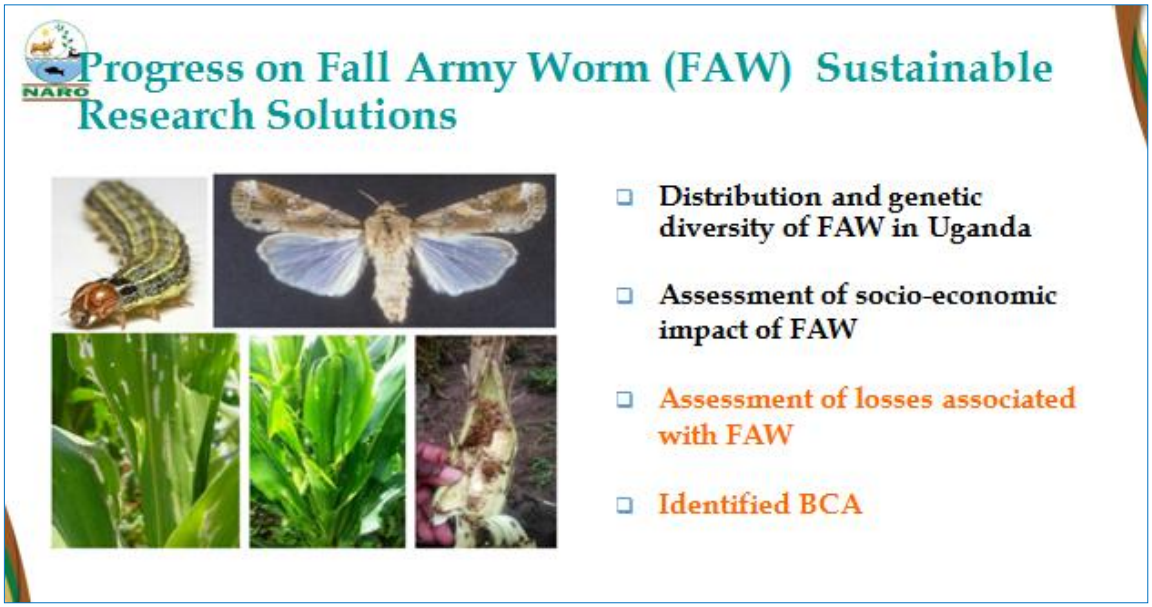
Market linkages

Linkages between fish famers and traders in central Uganda were evaluated. Results show that 74% of the farmers and 64% of the traders used personal selling against other product promotional activities. In addition, respondents adopted the use of mobile telephone. The

extent of adoption of technology in fish marketing in the region (25% of farmers & 26% of traders use mobile telephone for marketing) was evaluated. Benefit cost rations for traders were conducted indicating that market segmentation yielded higher returns (1.14) against personal selling (0.52) and exhibitions (0.25). Personal selling stood-out among all the other strategies for farmers because 90% of farmers sold fish beside their ponds. Efficient market linkages used by farmers were established; linkages through a leading farmer, linkages through cooperatives and contract marketing to reduce transaction costs along the value chain.

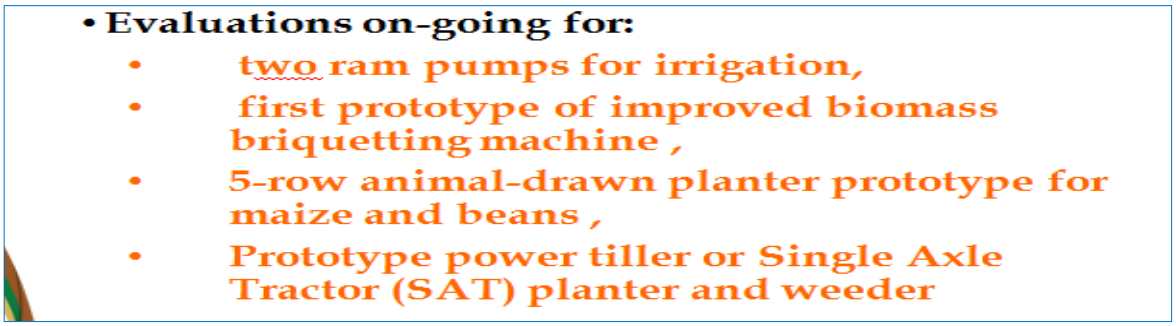
It was established that the most lucrative marketing channels for key agricultural products are in Sebei subzone. Direct channel (producer-consumer) was the most lucrative in the region for potato depending on scale of production. Choice of marketing channel used has a bearing on the profit farmers make. Access of market information, price, experience, transportation and storage infrastructures influence choice of marketing channel. Culture limits women to access markets in Sebei region.

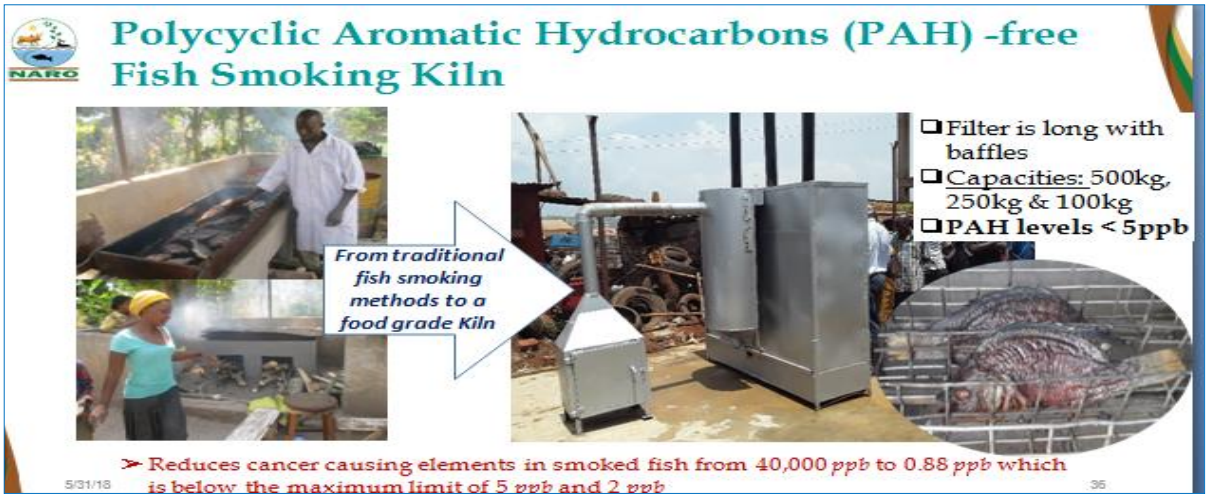
Fall Army Worms



Agriculture Engineering Research

Two ram pumps connected in parallel for pumping 10 m3 into a raised tank, performance evaluation on drip irrigation of Irish potatoes on-going at Mirongo village Nyantaboma parish, Kabarole district.





Two (2) Water Abstraction Technologies Adapted

Hydraulic ram irrigation system

Solar irrigation system

- The hydraulic ram pump uses flowing water energy to pump; no need for fuel or electricity.
- 49.8% increase on average in annual production by ssmallholder commercial vegetable farmers along rivers and streams with water falls

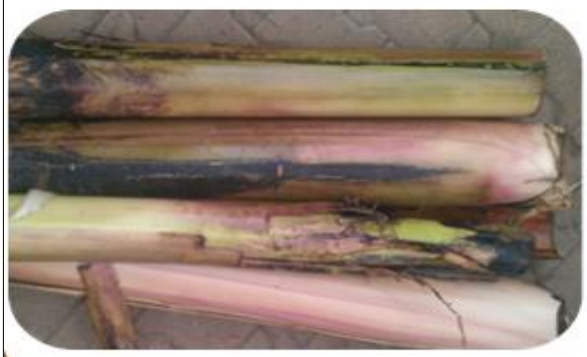
Skin Sanitizer Lotion
Carissa edulis (Omuyonza) Root Extracts

Two forms of skin ointment (oil-based and aqueous extract) formulated from *Carissa edulis* (Omuyonza) roots.

Harnessing Wild Fruits for High Value Products for both Food and Nutrition Security

5/31/18 40

Turning Waste From Banana Harvests into Silk Fiber and other Assorted Products



Banana Fiber assorted products

- Banana fiber has potential as a raw material for textiles thereby boosting social enterprises for social economic development

IP Identification and Protection Status; 1st May 2018

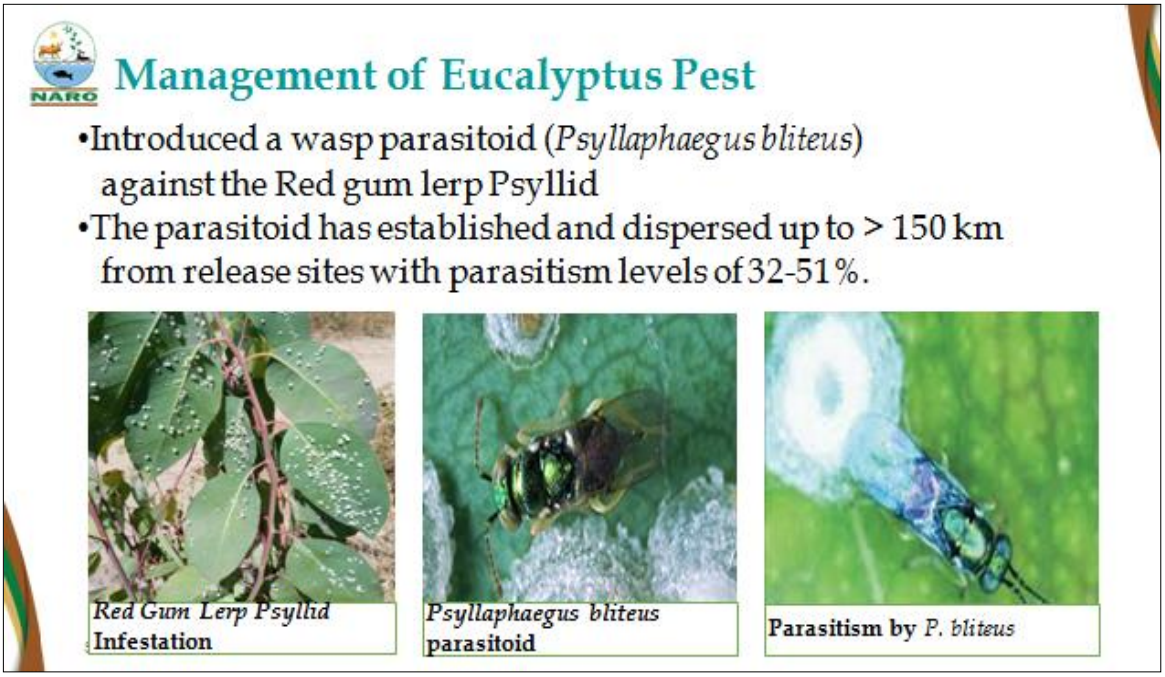
Form of protection	Number of technologies identified with intellectual property	Filed applications	Certificate granted
Patent	25	5*	-
Utility model	16	4	2**
Trademark	21	-	-
Plant Variety Protection	4	-	-
Geographical Indication	3	-	-
Total	69	9	2

* Application for patent are undergoing substantive examination at ARIPO

** Bioacaricide, Biomass cookstove have been granted protection for utility model

3.4 Forestry Research

Abundance and dispersal of Glycaspis brimblecombei and its biological control agent (Psyllaephagus bliteus) in the two (2) biological agent release sites (Kikinjaagi ward, Ocomai Village) and one control/non-biological release site (Opuyo Village) in Soroti district were monitored and documented.



Suitable release sites for Selictrodes neseri established in Kikinjaagi village in Soroti district, while for Cleruchoidesi nockae and Psyllaephagus bliteus, Kihado and Hakibale villages in Itwara sub county Kabarole district in Western Agro-ecological Zones were found suitable for release.

Draft technical report about factors influencing adoption of reducing emissions from deforestation and forest degradation) REDD+ by small holder farmers in Western Uganda and policy brief on enhancing smallholder adoption of REDD+ prepared and ready for review, following validation workshops held in Hoima and Masindi districts.

Profitability of clonal eucalyptus under two (2) management objectives (construction poles and transmission poles at rotation of 3 and 8 years respectively) was determined. Based on present values (construction poles = UGX 5,744,199; Transmission poles = UGX 29,696,410) per ha at an interest rate of 10 %, investment in both alternatives is profitable.

It was established that Investment in bamboo for culms (poles) at an interest rate of 10 % is profitable based on a positive Present Value (UGX 5,979,093) of a perpetual periodic payment.

At NaFORRI, the first prototype of improved biomass briquetting machine evaluated. Preliminary results showed 12 briquettes per stroke and 120-144 briquettes per hour. Fifteen (15) biomass energy saving stoves developed.

6. Research Extension farmer interface Strengthened

4.1 Technologies delivered to Uptake pathways

4.1.1 Cassava

Three cassava (*Manihot escalenta*) field sites at on-farm were established, demonstrating the effective options managing pests and disease limiting increased cassava productivity in Nabuin. The options include phytosanitery measures, application of botanicides (neem oil), chemicals (cypermethrin5%) and tolerant varieties (NAROCAS1, 52TME14).

The prevalence of cassava pests (red and green mite, mill-bugs, scales) and diseases (CBSD, Mosaic, Bacterial blight, soft rot, stem cankers) in the main cassava cropping systems in Teso and Karamoja was mapped.

A cassava germplasm performance evaluation for adaptability to abiotic stresses (drought, nutrient deficiency) and prevalent pests and diseases at Nabuin ZARDI was established.

Four cassava field sites (2 acres each) were established with four cassava varieties (NAROCA1, 52TME14, Nase19, Nase18) in Iriri (Napak Dostrict), Kakomongole resource center (Nakapiripirit District), Morulem (Abim District) and at Nabuin ZARDI. The cassava fields are currently demonstrating the performance and availability of good cassava varieties with qualities of famine control and attributes preferred by root consumers.

A total of five (5) ha of cassava (NAROCASS 1 was established at Ikulwe & at vegetative stage. A total of 200 bags of NAROCASS1 cassava cuttings availed to farmers in the Buginyanya Zone. A total of 3 ha of NAROCASS1 and 1 ha of Nasse 14 is at sprouting stage. A total of 500 bags of cassava stems were generated and accessed by 50 farmers in BuZARDI.

Twelve (12) acres of cassava seed multiplication site were maintained by NaCRRI.

4.1.2 Bean

Five (5) demonstration sites for NAROBEAN varieties established in NaCRRI, Kabale, Rwebitaba, Bulegni and Nakabango.

Four (4) sites were selected and 8 bean varieties planted on each site in the sub-counties of Bukimbiri, Rugyeyo, Kaharo and Bubare.

Farmers who had obtained seed from formal sources had a higher technical efficiency than those who had obtained seed from informal sources. The technical efficiency for the farmers that had obtained seed from the formal sources ranged between 0.5 to 94.2 percent while the one for those who had obtained seed from the informal sources was between 16.3 and 91.3 percent. 2.5 tons of bean seed were produced and in store.

A total of 13 demonstration plots of bush bean varieties established in each of the districts of Arua, Zombo, Koboko, Yumbe and Adjumani.

One (1) acre of 6 bean varieties was planted (NABE 4, 15, 16, 17, 18 & 19) in BuZARDI.

4.1.3 Coffee

Coffee Management Season Calendars for the mid-northern region were also disseminated to farmers.

A Coffee Management Season Calendar has been developed for the mid-western (Toro and Bunyoro) coffee agro-ecology of Uganda and validated in the region.

Developed tools for establishing gender inclusiveness of FFSs and FGs. FFS sessions were conducted in Kimbowa United FFS in Buwasa sub-county in Sironko district (11 participants), Kesemulira FFS in Bupoto sub-county in Namisindwa district (19 participants) and Ssosyo FFS in Bumbo sub-county (21 participants).

A total of 19,400 coffee seedlings nursery established. A total of 2,000 seedlings were availed to farmers and 78,000 under nursery. A total of five (5) farmers trained in production of washed Arabica and selective harvesting, nursery management at Bugusege

Over 1,000 stakeholders sensitised and given information materials on coffee technologies during the annual district coffee show at Isingiro, Agricultural show at Jinja, Coffee Technology Expo and Farm Clinic for the Central region.

A total of 1,000 seedlings of recommended shade trees were availed to farmers and 32,000 under nursery. Over 1,000 stakeholders were sensitised and given information materials on coffee technologies during the annual district coffee show at Isingiro, Agricultural show at Jinja, Coffee Technology Expo and Farm Clinic for the Central region

4.1.4 Rice

NERICA 6, NERICA 10, SUPERICA 1, E22 & local upland varieties) established on-station and on-farm (13 site in Mitooma and Rubirizi districts). Thirteen improved rice variety (NAMCHE 1, NAMCHE 3, NAMCHE 4, NAMCHE 5, NAMCHE 6, NERICA 4, NERICA 6, E20, SUPARICA 1, NERICA 10, E22, NERICA 1 & local FS) demonstrations established on-station.

Two acres of NERICA 4 established on-farm (Mitooma and Rubirirzi district) and 1 acre (NAMCHE 4, NAMCHE 5 & NERICA 6) on-station (MbaZARDI) for seed multiplication. One adaptive trial for 7 rice cultivars improved genotypes (NAMCHE 4, NAMCHE 5, NERICA 6, NERICA 10, SUPERICA 1, E22 & local upland varieties) established on-station and on-farm (13 site in Mitooma and Rubirizi districts).

Five hundred (500) guides on integrated weed management on rice developed by NgeZARDI.

4.1.5 Tea

In Rwebitaba ZARDI, 15,000 Tea plantlets were raised for efficient tea seed system and 10,000 tea cuttings availed to nursery operators. Two (2) acres of seed fields were established on-station. Thirty thousand (30,000) tea seedlings are being raised at Rwebitaba tea research centre.

4.1.6 Banana

Three Sites identified for on-farm banana decapitation trials in Kasese in Sub counties of Bugoye, Karusandara and Munkunyu ; and field preparation initiated. Data collection is on-going in 3 trial sites in Kyenjojo. Five thousand (5000) banana suckers produced and distributed to uptake path ways.

A total of 1,050 banana suckers were generated and accessed by 15 farmers in BuZARDI ,LACZ.

In BugiZARDI, a total of 1430 banana suckers of assorted varieties availed to individual farmers to initiate mother gardens.

4.1.7 Apiculture

The apiculture research and demonstration unit (10 Langstroth, Kenya top bar and 10 local bee hives, 1 acre of Calliandra and 0.5 acres of Ocimum) was maintained in BuZARDI. BuZARDI participated in World food day in Kabale and exhibited different apiculture technologies (value addition on different bee products) and distributed 200 brochures to farmers (How to Harvest and Process Quality Honey).

Establishment of on-farm and on-station demonstration apiaries are on-going. Rwebitaba ZARDI participated in a One honey week organized for all bee stakeholders to promote marketing of bee products and showcase.

4.1.8 Maize

In Nabuin, twenty five (25) maize (*Zea mays*) lines were evaluated and identified six (6) maize lines with expressive drought tolerance mechanisms (earliness and recovery traits) and biotic (Maize streak virus, Turscum leaf blight, stem borer and army worm) stress tolerance traits and better yield performance. Lines included MM3 (check 2.4MT/Ha; 45 days of anthesis), WH101 (2.6MT/Ha at 55 days of anthesis), SC403 (2.7MT/Ha at 56 days of anthesis), PAN4M-21 (2.42MT/Ha at 55 days of anthesis), EASH1456 (2.50MT/Ha at 59 days of anthesis), SC301 (2.4MT/Ha at 57 days of anthesis).

Five (5) groups (of 30 farmers) Community based maize seed growers sensitised/trained on quality seed production in Arua, Zombo, Koboko, Yumbe and Adjumani. Four (4) demonstration sites for maize farmer group's demos are being monitored in Abi zone.

An acre of maize varietal demonstration plot was established on station, in BuZARDI. A total of 1,309 stakeholders (33 farmers & 1276 pupils and students) exposed to maize production technologies in BuZARDI. Two radio talk shows on management of fall army worm and general maize production technologies were conducted on Kitara radio and KKCR for BuZARDI.

A total of 75 stakeholders (38Female, 37 Male) were empowered on the MLN epidemic and management practices in BugiZARDI.

Two (2) training tools for integrated drought and striga management were developed. Newspaper articles in Ateso were run in *Etop* on control of striga. Two (2) Demos on integrated drought and striga management technologies in striga were established in hot- spot locations in Pallisa.

4.1.9 Apple

A total of 200 new apple farmers(104 male and female 96) and five extension workers from four districts were empowered on soil and nutrient management, pest and disease management and other GAPs for apple orchards, one sub-county was selected from each district that is Benet sub-county in Kween, Sipi in Kapchorwa, Budwale in Mbale and Nabweya in Bududa district.

4.1.10 Irrigation

Four (4) demonstration & four (4) control farms established and supported at Mubuku Irrigation scheme to showcase best water management practices; The 8 host & 30 other farmers were trained on appropriate implementation of the agricultural practices guidelines.

4.1.11 Demo Trials, Training and Publicity

Forty eight (48) on-farm CA demos trials established in Nakasongola and Lira.

Eight (8) Training Manuals for training trainers were developed. A total of 150 farmers were trained to identify and manage citrus diseases. Citrus crop management calendar were designed based on project research findings.

With regard to maize and rice demos, four (4) maize & rice demonstration farms and 4 corresponding control farms were characterized; Agricultural practices guidelines validated; 8 farmers hosting the demonstrations and control farms trained; 4 demonstration farms established for monitoring.

Improved bean production technologies were packaged into a video and training manual, mass produced and disseminated.

Final editing and formatting of the Sustainable Land and Environmental Management training manual were completed.

Technologies were validated and up-scaled (runoff water harvesting tanks, hydroponic units, improved varieties, soil and water conservation practices, post-harvest handling, seasonal characteristics tool).

Reviewed Agronomic Tips for maize, sesame, bean and soybean production; conducted demos in central, eastern and northern Uganda, backstopping MUIIS activities.

Capacity built for three (3) innovation scientists in management of Agricultural Innovation Platforms

Three SLM advertorials were run each in Rupiny, Orumuri, Bukedde, New Vision, Etop and Rupiny newspapers.

4.1.12 Citrus fruit

Citrus orchards devastated by leaf and fruit spot diseases in Lango and Acholi sub regions were identified for rehabilitation. Farm tools and chemicals (fungicides and insecticides) for demonstration were procured.

One citrus disease management guide developed. One poster on citrus disease identification developed. One (1) citrus pest and disease management demonstration site established at Kitgum satellite station

Experiment on bio-pesticide options for management of orange fruit fly is on-going in at Nabuin.

One hundred (100) improved citrus seedlings produced at Nabuin.

Citrus management demonstrations have been established in Kamuli and Kayunga

4.1.13 Fish

Information was refined on the status and management of Kariba weed and prepared dissemination packages (poster, brochure and a Technical Report) for internal review.

A set of guidelines for managing environmental factors that influence proliferation of Kariba weed on Kyoga minor lakes was updated. A draft policy brief for improved water quality for optimal fish production on Lake Kwania was developed.

Adoption levels of livelihood options to fishing (majorly apiary and mushroom growing) at Kishenyi, Kazinga and Kayanzi landing sites on Lake Edward were established. Changes in fishing behavour by fishers due to engagement in livelihood options among fishers were recorded.

Energy returns for Nile tilapia and African catfish from Lake Albert were determined. Results indicated high energy in the range of 9,000 to 14,340 Cal/g of fish flesh. Prepared information dissemination packages (technical report and brochure) on sustainable utilisation of natural fish foods in Lake Albert was updated

Cage fish farm site suitability assessments for Iguluibi, Mpodwe and Masese for fish farmers concluded, NaFIRRI cage culture technologies demonstration site rehabilitated and maintained, a manuscript on best practices for cage culture submitted for publication, proposal seeking for funding to carry on cage culture research activities beyond ATAAS submitted to the Nature Conservancy.

Fish stock biomass of two commercial species, Nile perch and Nile tilapia in Lake Victoria 2017 was established. A draft policy to guide the exploitation and management of the Mukene light fishery on Lake Victoria prepared & currently under peer review. Information dissemination packages (Poster & brochure) to sensitize and create awareness among fisher folks on the status of fish stocks and management implications in Lake Victoria were produced. A technology for generating Nile perch fish size from swim-bladder specimen applicable in regulating and managing the Nile perchs' swim bladder business in Uganda generated.

A total 5,200 base population African catfish brood-stock for use in selective breeding was raised to maturity.

On-going cage demonstration experiments on Lakes Bunyonyi and Mutanda registered a lower growth rate (10- 15 %) for Nile tilapia than in Lake Victoria, thus requiring more time (approximately 1-2 additional months) to attain the same table size (500 g) as those in Lake Victoria.

Draft information packages (i.e. policy brief on Fish breeding and nursery areas challenges and management strategies) were reviewed

Reviewed and submitted manuscript on "Fish breeding Areas as a management tool for fisheries resources in Lake Victoria", East Africa for publication.

Map outputs of fish breeding areas for gazetting and protection on Lake Victoria were generated and incorporated in draft Statutory Instrument. The Fish (Fish Breeding Areas) Order, 2017 SOPs for identification, characterization and mapping fish breeding and nursery areas on lakes Edward and Albert were drafted.

Identified & screened a database of 201 farmers in the central region; (ii) Mobile app is 80% completed & will be linked to NARO HYBRID

A total of 20 participants (producers, processors, traders) were trained in principles of Business Plans.
Information was disseminated to a total of 5,019 pupils from schools in Uganda; disseminated technologies and information to stakeholders during the Annual agricultural show from in July 2017.; Disseminated research information to stakeholders during the science and technology conference on Technology and Innovation in harnessing opportunities for Africa's Agricultural transformation in September 2017. Support was given to five (5) prospective farmers by characterising sites planned for cage fish farming; 20 participants (producers, processors, traders) trained in principles of Business planning.

Live fish feed handling and maintenance was carried out in two fish farms in Wakiso and Busia Fish health surveillance at a hatchery in Busia. Trainers of trainers in Environmental and social safe guards were trained.

Monitoring interventions were maintained to mitigate impacts of cage fish farming on SON fish farm; Monitoring to mitigate impacts of BEL on River Nile; project to promote Sustainable Land Management (SLM) practices around Lake Wamala in the Lake Victoria crescent.

The growth rate, survival rate and stocking density of Nile tilapia determined in four cages at Arecek dam. The fish grew by 0.93 cm in length and 4.63 g in weight at 2 months of age; initial weight was 10 g. Mortality rate was 0% at 2 months of age.

Three different products from Angara have been produced and displayed on different exhibitions. A total of 500 fish processors, handlers trained in aspects of fish handling, personal hygiene and packaging in Packwach district. A total of 100 fish processors trained in aspects of fish handling, personal hygiene and packaging in Packwach district.

A total of 2,000 brochures were produced and disseminated. One market centre comprising on Angara fish products established in Kampala (UMA).

A total of 430 stakeholders (30 farmers and 400 pupils and students) exposed to aquaculture production technologies under the auspices of BuZARDI.

4.1.14 Forestry and Fruit Trees and Fodder

A total of 25,000 seedlings of *M. volkensii* and 6,000 seedlings of *T. ivorensis* were raised and distributed to farmers.

One Farmers' training manual on above and below ground management of tree-crop interactions was developed. Potentially suitable sites for growing of *F. albida* trees in Uganda were selected and mapped out.

A total of 200 dairy farmers were selected in both L. Victoria Crescent (100) and Eastern highlands (100) AEZs; training needs determined as fodder tree growing for optimal biomass yield; minimizing of negative interactions e.g. invasiveness, competition and pest & disease hosting.

A total of 17 kg of *Calliandra* seed was distributed to 340 smallholder dairy farmers in Wakiso (120), Masaka (170) and Sironko (50); 5.5 MT of *Morus alba* cuttings was distributed to 80 smallholder dairy farmers in Wakiso (55) and Luwero (25).

Demonstrations were established of Tithonia optimum rates and application methods for enhanced soil fertility and cotton productivity. Tithonia and the recommended in-organic fertilizers (NPK and urea) were applied to the cotton for demonstration of results.

One (1) Shea tree orchard of 20 grafted Shea tree plantlets was established in Omodoi sub-county, Katakwi district.

A total of ten (10) farmers in Omodoi sub-county, Katakwi district were trained as ToTs on grafting of Shea trees using top-cleft method. Shea tree demonstration established by NaFORRI in Aduku sub-county, Apac district covering 2 acres.

A total of 25,100 seedlings of avocado were raised in the nursery at Kifu. A total of 13 avocado cultivars (Esther, Sheppard, Fuerte, Nabal, Ettinger, Semile 34, Semile 43, Wilson, Rincon, Reed, Hass, Dorsom 1 and 2) were identified in different parts of the country as sources of scions.

A total of 6 training needs of seed collectors, processors, suppliers and nursery operators in Buikwe, Mukono and Kayunga districts were identified. One (1) draft Training Needs Assessment report was produced. A total of 25 nursery operators and one (1) seed collector were identified for training. A total of 100 plants of hibiscus seedlings, 200 of Bougainvillea clones, were raised in the greenhouse. A total of 66,230 seedlings of assorted species were raised and managed ready for sale and research while 18 nursery beds were maintained.

A total of 64,430 clonal eucalyptus cuttings were harvested from mother gardens. A total of 8 tunnels for rooting of quality clonal germplasm were constructed. A total of 18,974 high quality clonal eucalypt were raised and ready for sale. A total of 12,000 assorted plantation tree seedlings were produced.
A total of 180 farmers were trained in mango fruit fly management techniques: Orchard sanitation, MAT and Baited sprays in Bamunanika sub-county, Luwero district. Farmers' practical guide for managing fruit fly was prepared.

A total of 2,500 pots for Maesiopsis eminii established in BuZARDI. A total of 500 Maesiopsis eminii planted in the pots seedlings generated and are still in the nursery. A total of 3,000 eucalyptus seedlings were generated.

RwebiZARDI acquired 1,000 seedlings for woodlot and evaluation trial establishment on-station.

One tree nursery established at Ikulwe satellite station, with capacity of producing 45,000 seedlings currently.

Three model mango orchards were established in Adjumani, Yumbe and Nebbi districts. Orchards maintained and monitored with survival rate of seedlings of 98%.

4.1.15 Potato

Three (3) on farm sweet potato fields were established, demonstrating various effective measures of managing sweetpotao (*Ipomea batatas*) weevils (*Cylus spp*), virus disease (SPVD) and alternaria disease in Iriri (Napak) Kakomongole (Nakapiripirit) and Nyakwae (Abim district). Effective measure applied include: healthy vine selection for planting, ridging mound cracks after vine establishment, 30 cm depth vine placement in soil at planting for deep root expansion, tolerant variety Naspot8 & 10 and roguing of infected plants and gap filling at 2WAP.

One acre of vine multiplication site of tolerant sweet potato varieties at Nabuin ZARDI for enhancing availability of vines at planting was established.

Harvesting of sweet potato trials in Mayuge, Luuka, Kamuli and Namutumba Districts was done. Naspot 8 was the farmers' most favourite variety in all locations.

A total of 50 bags of vines were given out to famers in Namayingo, Namutumba, Mayuge and Pallisa. An area of 0.6ha of sweet potato multiplication field is at sprouting stage. A total of 4.5 tonnes of seed potato harvested and cured ready for uptake in late May 2018 in Buginyanya Zone.
RwebiZARDI generated and harvested 20 bags of potatoes which will be converted into seed.

Training was carried out of Farmer Research Groups (FRGs) on potato agronomic practices, Post-Harvest Handling, positive selection and rapid multiplication techniques in Kasese, Kamwenge, Kyenjojo and Kyegegwa districts. Meetings were held to facilitate marketing of potato seed for the districts of Kabarole, Kyenjojo, and Kyegegwa between potato seed producers and potato producers.
Sensitization meetings were held in Kamwenge with stakeholders to identify gaps and action planning for the potato value chain.

A total of 5.7 tonnes Rwangume and Victoria seed potato, 0.6t of Kinigi were found not suitable for seed due to late blight infestation. 400Kg of Rwangume acquired from KaZARDI.

4.1.16 Groundnuts

Drafts of groundnut varieties album, brochures and posters were developed and reviewed. Current fact-sheets and manuals were updated and printed. Foundation seed of varieties serenut 5, 8 and 14 were planted on 0.5 ha & at germination stage in BugiZARDI.

4.1.17 Cotton

Demonstration sites for two new pre-released cotton varieties and applied with effective bio-pesticides and synthetic pesticides were identified and selected in Mubuku prisons in Kasese, in Barr sub-county in Lira district and in Bupadhengo sub-county in Kamuli district. Trials were planted in the selected sites and data on pest incidence before spraying collected.

Three demos new released varieties were established in the cotton growing regions were established in Lira, Nebbi, adjumani districts. Cotton was planted in Tororo, Luuka, Lira, Oyam, Kiryadongo and Arua districts in July for demonstration of foliar fertilizer use in cotton. Megacole and Bio-Zinc were sprayed to cotton in addition to the recommended soil applied in-**organic fertilizers (NPK and urea).**

4.1.18 Green-gram

A total of 6 six on-farm demonstrations of drought tolerant and early maturing green-gram was established in Okulonyo and Akoboi. A total of 320 farmers (180 female and 140 male) trained in Alebtong, Kumi and Kitgum districts on green-gram seed production and general agronomic practices. Two thousand (2000) copies of green-gram production guides were produced and distributed during national agricultural show at Jinja. A total of 800 green-gram leaflets produced and distributed during national agricultural show at Jinja and some were given to visiting farmers at NaSARRI.

4.1.19 Cowpea

A Draft Cowpea Disease and pest manual has been developed. Drafts for leaflets have been developed. Demonstration plots were planted at KaZARDI. A total 35 kg of breeder seed was multiplied.

4.1.20 Sorghum

A total of six (6) farmer groups in West Nile trained in production, post-harvest handling and marketing of improved sorghum varieties (Seso 1 and Seso 3). Copies of pearl millet socioeconomic and production characteristics in Uganda were generated for printing and to be distributed to stakeholders. Pearl millet production brochure was developed.

4.1.21 SLM

Training conducted on climate-smart soil and water conservation practices in Arua, Koboko, Maracha and Yumbe districts. A total of 165 (Male 88, Female 77) farmers attended the training.

4.2 Livestock research technologies dissemination

4.2.1 Pastures

A total of 276 bags of Napier (KAKA1) planting material and 45 kgs of Chloris gayana availed to various districts. Additional 120 and 20 bags of Napier (KAKA1) and chloris gayana were planting material availed to farmers in Sironko and Mayuge districts respectively.

A total of 12000 seedlings was generated (6000 of Brachiaria brizantha & 6000 of Brachiaria Hybrib) in BuZARDI. A total of 11 feed samples submitted to the lab for nutritional analysis. Feeding strategies and a feeding trial not carried out.

Two (2) acres of pasture were maintained RwebiZARDI on-station.

A total of 35 farmers (8 female & 27 male) in Mayuge district trained in silage and hay making as climate smart practices.

Dairy research technologies were exhibited at the source of the Nile agricultural show in Jinja and Gayaza high school open day. Information on seed production, feed utilisation and conservation was packaged, printed and distributed.

Two (2) new dairy production sites (cottages) were launched in Gulu & Hoima districts & facilitated with dairy pelleting equipment - Canaan Primary Sch., Hoima and Gulu Community Dairy Farmers Association.

Two 2 tons of calf and 8 tons of dairy pellets were produced; nine (9) marketing outlets were identified (Masaka, Gayaza, Gulu, Soroti, Hoima, Kajjansi, Nakyesasa, Bukomansimbi & Kampala). A total of 50,000 Calliandra seedlings were produced by youth groups, for production of ingredients.

A total of 1,250 stakeholders (770 female and 55 youth) were trained on NARO dairy feed pellets in Wakiso, Apac, Gulu, Mityana, Mubende, Hoima, Kole, Isingiro, Soroti and Sembabule districts.

A dairy book was reviewed/edited by two editors. One radio programme was presented on *Rupiny* Radio. Dairy pellets were exhibited during Jinja show. A total of 3 Newspaper articles were published in the New Vision, Rupiny & the Monitor papers. One (1) staff facilitated to conduct feedback workshop. Dissemination of management and selection information of improved indigenous chickens for high productivity under low input conditions was done at the source of the Nile Agricultural show in Jinja.

First draft of dairy feeding manual was developed by Ngetta ZARDI. Information on forage conservation protocol documented for developing training manuals and brochures.

4.2.2 Livestock

In NaLIRRI, a total of 25 bucks selected and procured for distribution to farmers. A total of 25 Elite goats were screened and procured (current established flock size is 60 goats), 7 out of 9 have produced twins.

A total of 74 goats (18 male and 56 female) at Bulegeni for breeding herd & 4 breeding pure Boer bucks were availed for farmers in nucleus breeding.

4.2.3 Poultry

A total of 100 farmers were trained on on-farm poultry management and on-farm performance evaluation in Lira and Tororo. A total of 100 farmers were trained on on-farm poultry management and on-farm performance evaluation in Lira and Tororo, 120 farmers were identified for on-farm evaluation in four districts.

4.2.4 Piggery

Two (2) cambrough pigs maintained on-station (Nabuin) as parent stock. Thirty (30) acres of pastures (*Chloris gayana*, *Brachiaria* Mulato, Glycine and *Centrosema pubescens*) established and maintained for animal experiments. Eleven (11) native pasture species most utilised by ruminants in Karamoja rangelands identified by participatory approaches as: *Sehima nervosum* (Rottler) Stapt., *Cymbopogon giganteus* Chiov., *Sporobolus festivus* A. Rich., *Cenchrus ciliaris* L., *Setaria sphacelata* (Schum.) Moss., *Sporobolus pyramidalis* P. Beauv., *Panicum maximum* Jacq., *Heteropogon contortus* (L.) Roem., *Cynodon dactylon* (L.) Pers., *Themeda triandra* Forssk., *Commelina africana* L.

A. Multi stakeholder Innovation platforms

NARO is working with multi-stakeholder innovation platforms to pilot up take of improved technologies through innovation platforms. 24 MSIPs have been supported in various ways as follows:

Number established or Supported	Description of the platform
3 potato supported	3 platforms supported. Chahi (3 farmer groups (30@) in group marketing and processing) , Bufundi (6 farmer groups in group marketing and processing). Bubale (6 farmer groups in processing and agronomy). (Kachwekano ZARDI)
1 potato supported	6 farmer groups (@ 25 farmers) in Manafa, Mbale, Kapchorwa, Kween districts. (Buginyanya ZARDI)
1 potato supported	Operates in Kyenjojo, Kamwenge and Kyegegwa districts viable seed industry and sustainable markets (Rwebitaba ZARDI)
2 bean supported	2 functional bean platforms maintained in Sheema and Rakai districts (NACRRI)
1 bean supported.	1 functional bean platforms maintained in Chahi, Kisoro districts. (Kachwekano ZARDI)
1 on Dairy supported	1 functional Milk platform supported (management, book keeping synergies and demand articulation) in Bushenyi (Mbarara ZARDI)
1 on Milk supported	1 functional ghee platform supported in Kiruhura (CGS-Mbarara Z)
1 on Dairy supported	In Bulisa . Training and information (Bulindi ZARDI)
2 cassava supported	2 cassava platforms established and maintained in Pader and Oyam.(NACRRI)

Number established or Supported	Description of the platform
1 cassava supported	Cassava- (Capacity development, synergies and demand articulation, farmers mobilization, Establish local level MSIP leadership structures) in W N zone (24F, 6M Moyo, Arua, Nebbi). (Abi ZARDI in collab. with OWC.)
4 Apiary (Honey, propolis, wax, bee venom) (26 groups supported for product development	4 Apiary MSIPs supported (for product development and marketing Honey, propolis, wax, bee venom). (CGS project coordinated by Rwebitaba ZARD and a consortium of 6 PARIs, TUNADO, Makerere University. Capacity strengthening of 26 farmer groups (Abi = 6 (Maracha, Yumbe, Arua); Nabuin = 5; Bulindi = 5; Rwebitaba = 5; NaLIRRI = 5) with 549 beekeepers. Marketing platforms established included the World of Bees Honey specialty shop (TUNADO) and KABECOS bee products shop (Kasanje sub county Beekeepers Association (KABEKA)).
1 mango supported	Mango - Capacity development, synergies and demand articulation, farmers mobilization, Establish local level MSIP leadership structures identification and up scaling (Abi ZARDI)
1 Fish supported	Koboko, Maracha, Arua (Abi ZARDI) Capacity development, synergies and demand articulation, farmers mobilization, Establish local level MSIP leadership structures.
1 Beans supported	Facilitated MSIP establishment Arua, Zombo (Abi ZARDI) in collab. with ISSD.
1 Irish potatoes supported	Zombo (Abi ZARDI) in collab. with ISSD.
1 cowpea supported	Nebbi-Panyango (Abi ZARDI) in collab. with Muni Univ.
1 Maize supported	Nakaseke, Mukono ZARDI
24 upported	

7. Challenges and opportunities

Although a number of technologies, innovations and management practices have been generated over the years, agriculture is still predominated by smallholder farmers who operate in very militating environments characterized by a suite of issues that include: predominance of traditional practices such as over reliance on the hand hoe, local land races, mindsets, Mother nature, land fragmentation; low adoption of improved technologies, inputs and knowledge; and asymmetrical information flow. These coupled with poor access to input and output markets as well as weak farmer-market-extension-research linkages affect agricultural growth. As a result, farmers continue to use poor husbandry; limited access to technical advice; poor access to credit; and insecure land tenure and user rights leading to observed low productivity.

The recurring pests and diseases outbreaks undermine the efforts by research and development agencies. The outbreak of pests like the fall armyworm greatly threatens crop production leading to likely incidences of food insecurity. However, NARO has built capacity in-terms of human and infrastructure resources to mitigate and control the effects of pests and diseases.

Predominantly rain-fed agriculture amidst climatic change and variability is a major challenge. Climate change affects agricultural production in various ways namely; droughts, floods, pest and disease outbreaks and new frontiers, and infrastructure breakdown.

Uganda's agricultural sector has continued to be characterized by inadequate and very low levels of mechanization in all aspects along the commodity value chains. Presently 90% of farmers are still relying on use of human muscle powered tools and methods for all farming operations and only 10% have access to improved mechanization technologies (MAAIF 2012). Such a persistent dependence on inefficient and unproductive technologies and methods affect value addition and also limit the ability of smallholder farmers to evolve from subsistence to commercial agriculture.

Agricultural research and investment continues to be faced with low funding and unsustainable investment for science and technology. Despite the Sub-Sahara Africa governments' continent-wide commitment to allocate 10 percent of national budget to the

agriculture sector, the sector remains under-funded, which constitutes a main challenge. It's time for government to deliver on this long overdue commitment to the agriculture sector.

The outputs of research in form of new varieties, technologies, effecient methodologies remain on the shelf if theres no direct link and a working relationship between researchers, extension and farmers. To mitigate this challenge, NARO has priotized institutional and human capacity strengthening for Research-Extension-Farmer (R-E-F) linkages in different agroecological zones. Information and communication materials on NARO technologies have been produced to equip extension workers with relevant tools to facilitated dissemination to farmers. Multi-stakeholder Innovation Platforms (MSIPs) approach has also been promoted alongside the predominant agricultural research technology dissemination to strengthen the research-extension–farmers linkages. The MSIPs guide Zonal research priorities and the uptake of its outputs by the end users along the technology path ways. NARO also supports and promotes joint priority setting, planning and implementation of on-farm adaptive research and demonstrations between NARO, MAAIF and district local government. The District Adaptive Research Support Teams (DARSTs), ZARDI scientists and extension workers in the Local Governments are trained and they received resources to set up adaptive trials and on-farm demonstrations to test new technologies, including participatory variety selection, under local conditions in response to client priority demands.

NARO in collaboration with MAAIF and other partners has employed a number of dissemination approaches including field days, exposure visits, radio and television programs, film shows (cinema), leaflets and posters, agricultural shows, on-station and on-farm demonstrations, community seed multiplication among others. Despite the dissemination and outreach efforts, there's still low technology uptake by farmers and other users. The uptake is currently estimated at 23% which is way below the desired level. To increase technology uptake, NARO through the research institutes supports seed multiplication and marketing initiatives. Strong linkages exist between NARO and MAAIF which plays a regulatory function in the seed value chain. Seed companies are brought on board to enhance seed distribution channels and maintenance of quality standards. To mitigate this challenge, a more robust technology transfer strategy will be developed and implemented to ensure that technologies are accessed by both public for subsistence use (farmers) and private sector (commercialization). The strategy will focus on pluralistic approach of bringing on board key actors and formalizing relationships to scale up

dissemination of technologies, an inclusive approach of tailor made approaches and targeted messages for different gender groups. NARO scientists' capacity will be refreshed to appreciate the role and different approaches of facilitating R4D for impact. Uses of Mobile application (ICT) in technology dissemination will be one of the key areas of focus moving forward. Climate Smart Interventions will be demonstrated to mitigate the effect of drought. To attract private sector, technology business centres will be facilitated in strategic locations to test and popularize technologies with commercial potential. Regular monitoring and tracking of adoption rates will be conducted through assessments and surveys. A database on technology uptake will be facilitated.

Other challenges to agricultural research and development include;

- Low participation and investment by the private sector in R&D
- Delay in enactment of Biotechnology and Bio-safety Bill 2012
- Gender and youth engagement
- Low technology uptake
- Declining soil fertility resulting from heavily degraded and depleted soils

Recommendation

For agricultural transformation to occur and move this country towards the mid-income economy, NARO has poised itself to sustain productivity and production levels. The growth in agricultural production achieved over the past fifteen years resulted largely from expanding the area under agriculture than increased productivity per unit input. To raise productivity, farmers need high-yielding seed and semen, effective fertilizer, pesticides and sufficient water. NARO will therefore continue to engage in cutting-edge science and innovations research leading to genetic improvement, development and deployment of improved technologies in crop, livestock, fisheries and forestry. However, it is important that the Biotechnology and Bio-safety bill is passed to allow application of modern biotechnology and support realization of the current efforts in developing resistant crop varieties such as maize transgenic varieties and the transgenic BBW resistant lines. About 80 transgenic bio-fortified pro vitamin A and enriched lines have also been generated and ready for confined trials. These technologies are ready for release and promotion to uptake pathways once the bill is passed. This is envisaged to improve yields and contribution to the fight against hunger and malnutrition. Further, efforts will be made to develop and establish sustainable control

methods to manage the Fall Army Worm (FAW) that will require building capacity (both human and infrastructure) in insectary research. Building capacity for basic and strategic pre-discovery science (new insights leading to new discovery) while require long-term funding, laboratory and human capacity development.

With a projected doubling of the population by the year 2050, strategic interventions targeting Pre-urban and Urban agriculture especially using the green house technologies is likely to contribute to food and income security. NARO envisages contributing to developing new technologies to guide Pre-urban and Urban agriculture while conserving the environment.

To achieve the envisioned vision 2040, youth and gender responsive innovation and technologies remain critical. Agricultural transformation in Africa will not happen without reaching and tapping into to the potential of women and young people. Vibrant rural communities depend in empowering women and the increasing numbers of the youth in rural areas with the means and opportunities to contribute to and make a living from profitable agricultural enterprises.

There is need for value chain mechanization of the entire agricultural sector. NARO will in the coming years focus on generating demand driven pre- and post-harvest mechanization technologies including generating irrigation technologies for all year round commercial farming for enhancing market competitiveness of small-holder farmers. In addition, options for utilization of agricultural biomass into industrial products such as bio-active carbon and bio-char will be explored. For the technologies to pay-off, there will be need to promote utilization of proven technologies including pre and post-harvest mechanization for impact. This will require strengthening Research-Extension-Farmer linkages as well as strategic partnerships with the private sector to engage in commercialization of proven technologies and research products.

In addition, NARO plans to employ climate smart agriculture by supporting farmers to engage in farming methods that increase productivity, enhances resilience (adaptation) to changes in climate for improved food security and venturing into research that reduces greenhouse gas emissions from agriculture (crops, livestock and fisheries). This will require

development of land and crop suitability maps and generation of policy recommendations to guide implementation.

Improving crop and animal management practices as well as management of plant and animal health will be critical. Vaccine development for livestock management will be priority on the research agenda. A suitable and efficacious tick control and vaccines needs to be developed. Specifically, efforts should concentrate on bio- ethno vaccines. There should be deliberate plans to engage the private sector in commercial products.

Intellectual Property Rights future direction considers bridging the gap between research and industry through the technology transfer; in continuous liaison the researchers identify demand and market driven research areas. There will be deliberates efforts to court the private sector to fund research and also commercialize the research technologies. Research plans to establish spin off companies to enhance commercialization of the research technologies generated in NARO

Bio-prospecting of indigenous plants: aquatic, terrestrial and subterranean will be an important area of focus in the coming years. NARO will conduct research in the use of Geno-medicines in aqua-culture, forestry, pest control (especially ticks) and bio-prospecting which includes the search for plant and animal species from which medicinal drugs and other commercially valuable compounds. This expected to reduce the costs of production. This will help in addressing persistent pests and diseases that are difficult to eradicate.

Accelerating the envisioned transformation in the agriculture sector will require an integrated approach that takes cognizance of the fragility of production environments, rich biodiversity and the complexity of agricultural systems. This necessitates increased partnerships and collaboration, human capacity and infrastructure development, heavy private sector engagement/linkages as well as increased and sustainable funding to facilitate science and innovation.

Annex table 1: Distribution of projects by beneficiary districts

No.	Project	Beneficiary districts
1	Agricultural Technology And Agribusiness Advisory Services	All districts
2	National Agricultural Advisory Services	All districts
3	Regional Pastoral Livelihoods Resilience Project	Karamoja sub region (Kotido, Kaabong, Moroto, Nakapiripirit, Napak and Abim), Teso sub region (Katakwi) and Sebei (Kween)
4	Global Agriculture and Food Security Program	Namutumba, Ntungamo, Bushenyi, Maracha, Nebbi
5	Reducing Climate Vulnerability Of Banana Producing Communities Project In South Western Uganda (UNIDO)	Isingiro, Rubirizi, Mitooma, Mbarara, Buhweju, Sheema, Ntungamo, Bushenyi
6	Support To Tea-Cocoa Seedlings (22 Districts)	Bundibugyo, Kanungu, Hoima, Masindi, Kibaale, Wakiso, Mpigi, Nakaseke, Mityana, Kiboga, Rakai, Bukomansimbi, Mukono, Jinja, Mayuge, Iganga, Kamuli, Luuka, Buikwe
7	Promotion Of Rice Development (Pride)	**Ngetta ZARDI;** Agago, Alebtong, Amolatar, Amuru, Apac, Dokolo, Gulu, Kitgum, Kole, Lamwo, Lira, Nwoya, Otuke, Oyam, Pader
		Abi ZARDI; Adjumani, Arua, Koboko, Maracha, Moyo, Nebbi, Yumbe
		Kachwekano ZARDI; Kanungu, Rukungiri
		Buginyanya ZARDI; Bugiri, Busia, Butaleja, Iganga, Kaliro, Kamuli, Kween, Mayuge, Mbale, Namutumba, Tororo, Sironko, Pallisa
		Bulindi ZARDI; Hoima, Kibaale, Masindi
		Mukono ZARDI; Mukono, Buikwe, Kyankwanzi, Luwero, Nakaseke, Wakiso
		Mbarara ZARDI; Rakai**,** Rubirizi

8	Livestock Disease Control Project	All Districts
9	Avian And Human Influenza	All Districts
10	Increasing Mukene For Human Consumption	Districts covered by Lakes Victoria, Kyoga, Albert/A. Nile and George/Edward
11	Support To Fisheries Mechanization And Weed Control	All districts covered by Lake Victoria, Kyoga, Albert, and River Kagera
12	Crop Pests And Diseases Control	All Districts
13	Vegetable Oil Development Project Phase 2	**Lira Hub;** Masindi, Kiryandongo, Oyam, Lira, Apac, Kaberamaido, Soroti, Serere, Amuria, Dokolo, Katakwi, Amolatar, Alebtong, Kole and Otuke.
		Eastern hub; Mbale, Bududa, Budaka, Bukedea, Bukwo, Kapchorwa, Kamuli, Kumi, Manafwa, Pallisa, Sironko, Bulambuli, Bugiri, Busia, Tororo, Butaleja, Iganga, Jinja, Namutumba, and Kaliro.
		Gulu hub; Gulu, Kitgum, Amuru, Adjumani, Pader, Nwoya, Agago and Lamwo.
		West Nile hub; Arua, Koboko, Moyo, Nebbi, Zombo, Yumbe and Maracha.
14	Commercialization Of Agriculture In Northern Uganda (CANU)	Lira, Kole and Gulu
15	Agritt Cassava Value Chain Development Pilot Project	Hoima, Masindi, Buliisa and Kiryandongo
16	Comesa Seed Harmonization Implementation Project	All Districts
17	Support To Agro Processing And Marketing Of Agricultural Products In Uganda	All districts
18	Technical Assistance Under The South-South Cooperation With The People's Republic Of China In Support Of The Development Strategy And Investment Plan	All Districts

19	Northern Uganda Farmers' Livelihood Improvement	Gulu, Kitgum, Pader, Omolo, Nwoya, Lamwo, Agago, Amuru
20	Farm-Based Bee-Reserves Establishment Project: Income And Food Security; And Ecosystems Balance	Lyantonde, Masaka, Mpigi, Luweero, Nakaseke, Nakasongola, Mubende, Kiboga, Lwengo, Bukomansimbi, Kalungu, Sembabule, Gomba, Wakiso, Mityana, Kayunga, Mukono, Buikwe, Kamuli, Buyende, Kaliro, Mayuge, Luuka and Iganga
21	Goat Export Project	Sembabule
22	Meat Export Support Services Project	National cattle corridor
23	Agriculture Cluster Development Project	Masaka, Kalungu, Mpigi, Rakai, Iganga, Bugiri, Namutumba, Pallisa, Tororo, Butaleja, Kapchorwa, Bukwo, Mbale, Soroti, Serere, Amuru, Nwoya, Gulu, Apac, Kole, Oyam, Lira, Dokolo, Kabarole, Kamwenge, Kasese, Kyenjojo, Kyegegwa., Mubende, Kibaale, Hoima, Masindi, Kiryandongo, Ntungamo, Kibaale, Bushenyi, Isingiro, Nebbi, Arua, Nyadri, Yumbe
24	Enhancing National Food Security Through Increased Rice Production (ENRP)	Iganga, Bugiri
25	The potato commercialization project	Mityana, Kyegegwa, Kibaale, Kanungu, Kabale
26	Multi-Sectoral Food Safety & Nutrition Project	**Phase 1**; Namutumba, Nebbi, Maracha, Ntungamo and Bushenyi.
		Phase 2; Kabale, Isingiro, Kasese, Kabarole, Kyenjojo, Arua, Yumbe, Kiryandongo, Iganga and Bugiri
27	Support to Sustainable Fisheries Development Project	Amolatar, Bugiri, Buliisa, Busia, Buyende, Hoima, Jinja, Kaberamaido, Kalangala, Kampala, Kayunga, Kibaale, Masaka, Mayuge, Mpigi, Mukono, Nakasongola, Ntoroko, Rakai, Serere, Soroti, Wakiso
28	Agro-Economic Impact Deepening in the Albertine Basin	Districts covering the Albertine basin

29	Support for Institutional Development	All districts
30	MAAIF Coordination/U Growth	All districts
31	The Project on Irrigation Scheme Development in Central and Eastern Uganda (PISD)-JICA Support	All districts in Central and Eastern Uganda
32	National Farmers Leadership Center (NFLC)	All districts
33	Support to Agricultural Training Institutions	All districts
34	Improving Access and use of Agricultural Equipment and Mechanisation Through the Use of Labour	All districts
35	National Food And Agricultural Statistics System	All districts
36	Uganda Strategic Analysis and Knowledge Support System (USAKSS)	MAAIF Head quarter
37	Dairy Market Access and Value Addition	All districts
38	NAGRC Strategic Intervention for Animal Genetics Improvement	All districts