THE REPUBLIC OF UGANDA

# MINISTRY OF AGRICULTURE, ANIMAL INDUSTRY AND FISHERIES

## DRAFT ANNUAL PERFORMANCE REPORT

**FINANCIAL YEAR 2019/2020**

**OCTOBER 2020**

**Foreword**

This agricultural sector annual performance covers the period July 2019 to June 2020. The report provides an assessment of the sector performance and it also highlights a review of undertakings agreed to in the JASAR 2018.

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, National Agriculture Advisory Services (NAADS) and National Agriculture Research Organization (NARO).* The document is an annual publication through which key statistical information derived from routine monitoring visits and administrative records of the Ministry Department and Agencies (MDAs) are disseminated.

The Ministry appreciates contributions of all stakeholders in implementation of the FY 2019/20 sector initiatives and the political leadership as well as the agricultural sector Development Partners for their guidance.

The Ministry welcomes constructive comments from stakeholders that aim at enhancing the quality of its future publications. At their convenience, readers are encouraged to send constructive comments to the under signed, and or the editorial team.

It is my sincere hope that the information in this publication will be 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 |
| ASYCUDA | **A**utomated **SY**stem for **CU**stoms **DA**ta |
| ASWG | Agriculture Sector Working Group |
| ATAAS | Agricultural 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 |
| CAIIP | Community Agriculture Infrastructure Investment Program |
| CBPP | Contagious Bovine Pleura Pneumonia |
| CBSD | Cassava Brown Streak Disease |
| CDO | Cotton Development Organzation |
| COCTU | Coordinating Office for the Control of Trypanosomiasis in Uganda |
| CoE | Centre of Excellence |
| COMESA | Common Market for East and Southern Africa |
| CSO | Civil Society Organzation |
| 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 |
| EAAPP | East Africa Agriculture Productivity Project |
| EADDP | East Africa Dairy Development Project |
| EEA | Enabling Environment for Agriculture |
| EURTTEP | European Union Regional Tsetse and Trypanosomiasis Eradication Project |
| FAO | Food and Agriculture Organization |
| FETF | Fisheries Enforcement Task Force |
| FEW | Field Extension Workers |
| FFB | Fresh Fruit Bunches |

| | |
|---|---|
| FFS | Farmer Field School |
| FIP | Framework Implementation Plan |
| 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 |
| GEF | Global Environment Facility |
| GMO | Genetically Modified Organisms |
| 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 | International Development Bank |
| IDB | Islamic Development Bank |
| IEC | Information Education Communication |
| 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 |
| JTC | Joint Technical Committee |
| 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 Organization |
| LGs | Local Governments |
| MAAIF | Ministry of Agriculture, Animal Industry and Fisheries |
| MBAZARDI | Mbarara Zonal Agricultural Research and Development Institute |
| MCC | Milk Collection Centre |
| MGLSD | Ministry of Gender Labor and Social Development |
| 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 |
| NEMA | National Environment Management Authority |
| 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 |
| SNV | Netherland Development Agency |
| SOP | Standard Operating Procedures |
| SPS | Sanitary and Phyto Sanitary |
| TAD | Trans boundary Animal Diseases |
| TDS | Technology Development Sites |
| TPM | Top Policy Management |
| UNADO | Uganda National Apiculture Development Organisation |
| TV | Television |
| UAE | United Arab Emirates |
| UBOS | Uganda Bureau of Statistics |

| | |
|---|---|
| UCDA | Uganda Coffee Development Authority |
| UNDHS | Uganda National Demographic Household Survey |
| 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 |
| UGX | Uganda Shillings |
| UMPCU | Uganda Meat Processors 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 |
| VF | Vote Function |
| VODP | Vegetable Oil Development Project |
| WB | World Bank |
| WFP | World Food Program |
| WHO | World Health Organization |
| ZARDI | Zonal Agricultural Research and Development Institute |

## CHAPTER ONE: BACKGROUND

### 1.1 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) 2019/20-2019/20 implementation modalities, obliged 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 9 reviews conducted to date with the latest to be held on the 2$^{th}$ and 29$^{th}$ September 2017.

This document is 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 2019/20. The document is composed of four sections that include; an introduction; detailed sub sector, department and agency performance at outputs level.

### 1.2 MAAIF Structure and Mandate

#### 1.2.1 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.*

#### 1.2.2 MAAIF Structure

The structure for the Ministry of Agriculture, Animal Industry and Fisheries in the Financial Year (FY) 2019/20 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) **4 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) 3 Specialized Units namely: -**
a) Procurement and Disposal of Public Assets Unit;
b) Internal Audit Unit;
c) ICT Unit.

7) **2 Agricultural Training Institutions (ATIs) namely: -**
a) Bukalasa Agriculture College (BAC);
b) Fisheries Training Institute (FTI).

8) 7 **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); and
g) Uganda Coffee Development Authority (UCDA).

### 1.3 Institutional Composition of the Agriculture Sector

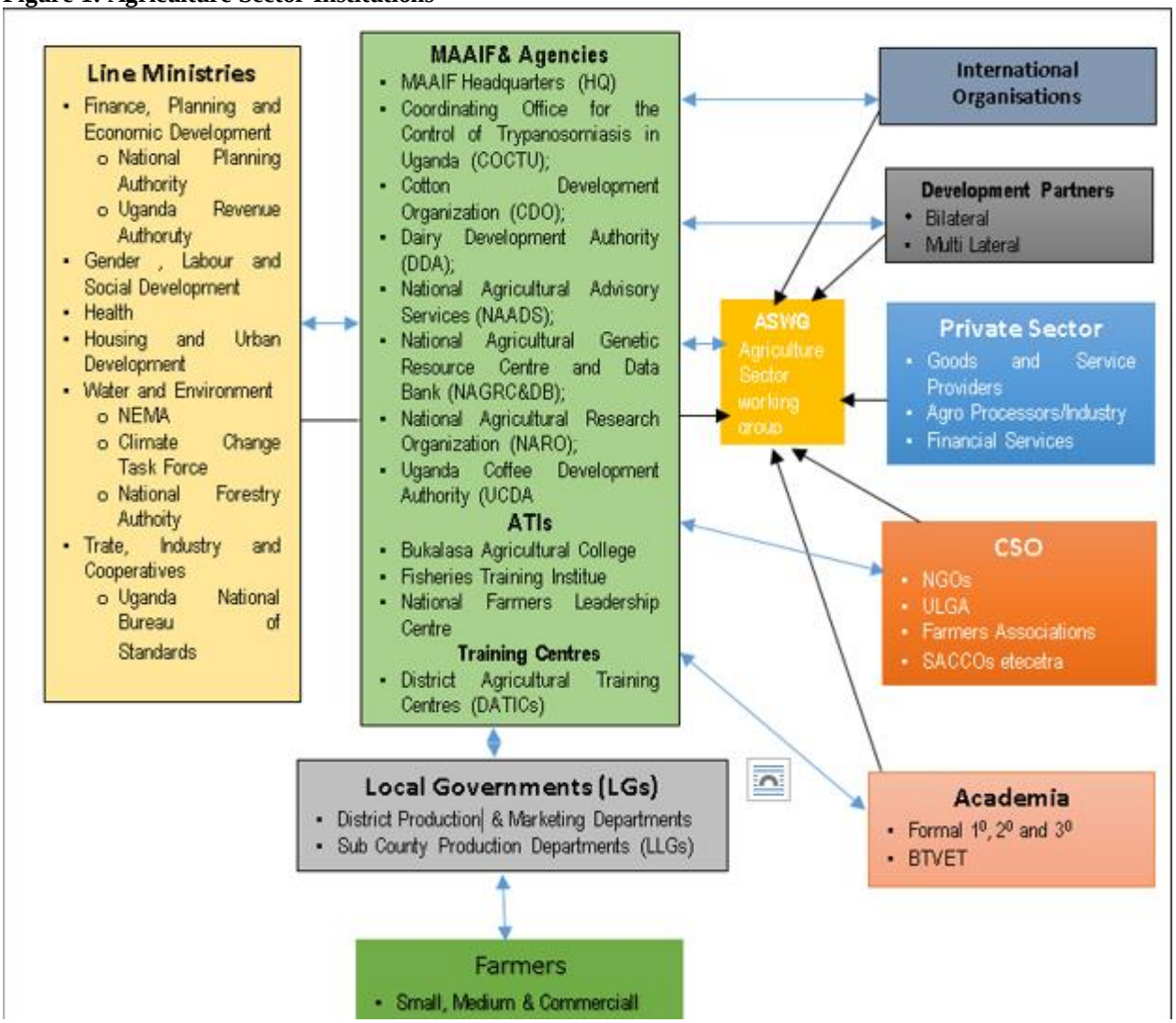
The agriculture sector is composed of the following institutions: -

1) MAAIF its Agencies, Departments, Agriculture Training Institutes and District Agricultural Technology and Information Centers (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.

**Figure 1: Agriculture Sector Institutions**




*Source: MAAIF 2020*

### 1.4 Document Structure

The report is presented as follows: -

1) The executive summary which has not yet been presented will cover a synthesis of the report featuring to the extent 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 covers overall sector performance and includes trends and progress measured against outcome indicators including at macro level as well as progress towards achievement of impact indicators;
4) Chapter 3 covers a review of agreed actions; and
5) Chapter 4 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 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 2018 issues and recommendations as well as plans for the FY 2019/20.

## CHAPTER TWO: OVERALL SECTOR PERFORMANCE

### 2.1 Trends and Progress Measured Against Outcome Indicators 2019/20

#### 2.1.1 Macro Level Performance of the Economy

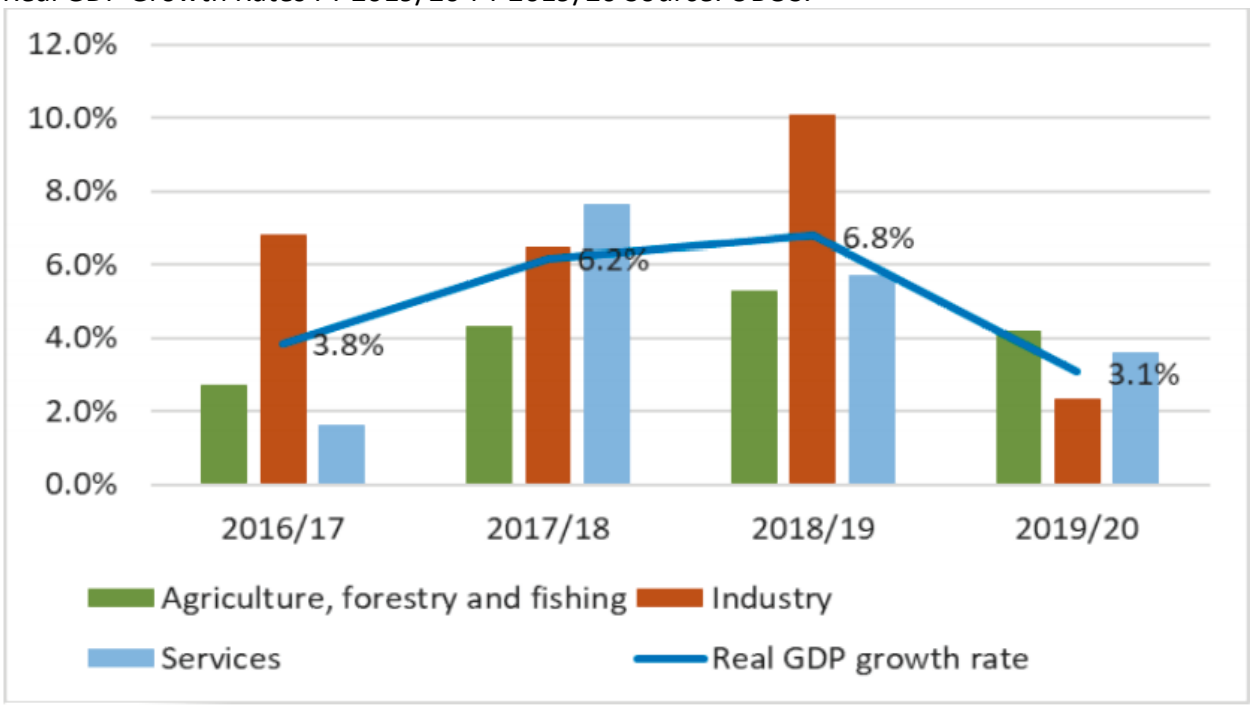
This section reviews the country's economic performance during FY 2019/20 in terms of growth, inflation and exchange rate. All these affects and are affected by the performance of agriculture sector growth and exports.

##### *2.1.1.1 Economic Growth*

The size of the economy in FY 2019/20 is estimated at UGX 138,283 billion in nominal terms. Recent estimates from the Uganda Bureau of Statistics (UBoS) indicate that the economy grew by 3.1 percent in FY 2019/20, which is lower than 6.8 percent growth registered in FY 2018/19 and lower than the projected growth rate of 6.0 percent during the Budget Framework Paper (BFP) preparation time. The main driver of the dampening in economic activity is the triple effect of the COVID-19 pandemic, locust invasion and flooding on the economy.

All sectors are estimated to register lower growth rates compared to FY 2018/19. Agriculture, forestry and fishing grew by 4.2 percent, lower than 5.3 percent registered in FY 2018/19. The Services and Industry sectors have been most hit by the COVID-19 pandemic. The services sector has grown by 3.6 percent compared to 5.7 percent in the last financial year, while growth in the Industry sector is estimated to have slowed to 2.3 percent from 10.1 percent in FY2018/19.

Real GDP Growth Rates FY 2019/20-FY 2019/20 Source: UBOS.



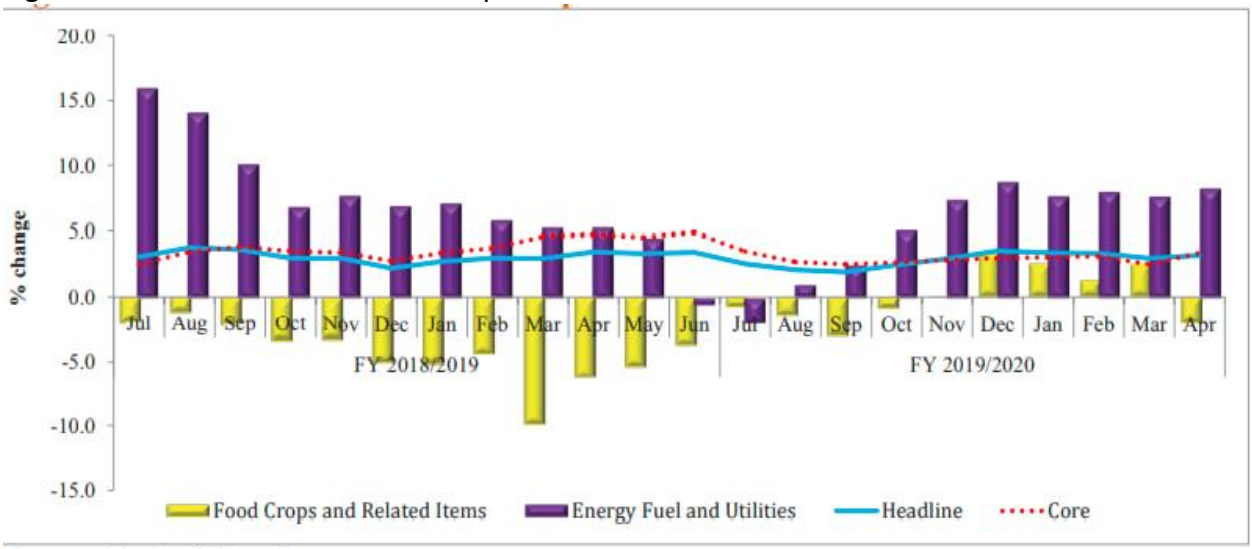

***Source: UBOS.***

Agriculture, Forestry and Fishing sector is estimated to have grown by 4.2 percent in FY 2019/20. This growth is due to increased production of cash crops, food crops and livestock which were supported by Government interventions through extension services as well as favourable weather conditions that were experienced in the first three quarters of the financial year. However, this growth is lower than 5.3 percent registered for FY 2018/19 partly explained by lower agricultural productivity, the locust invasion and flooding in some parts of the country.

### *2.1.1.2 Inflation*

Inflation remained relatively subdued, with both annual headline and core inflation averaging 2.9 percent in the ten months to April 2020 on account of lower clothing and footwear, as well as transport inflation. Annual food crop inflation increased to an average of 0.2 percent in the ten months to April 2020 from minus 4.3 percent in the same period last FY; largely due to an increase in annual vegetable inflation. As depicted in Figure 4.2 below, annual headline, core, as well as food crops and related items inflation has remained below 5 percent for close to two financial years.

Figure 4.2: Domestic Inflation Developments




***Source: Bank of Uganda***

### *2.1.1.3 Exchange Rate*

In the first half of FY 2019/20, the Uganda Shilling strengthened against the US Dollar, appreciating by 0.53 percent on average, from UGX 3,696.49 in July 2019 to UGX 3,676.73 in December 2019. However, depreciation pressures ensued in February 2020, with the shilling depreciating by 2.5 percent between January and March 2020, to an average exchange rate of UGX. 3,772.91 per US Dollar. There were further depreciation pressures in April, with the shilling per US Dollar rate dropping to UGX. 3,805.0 on the 29th April 2020, largely driven by panic buying of foreign currency on account of negative sentiments around the COVID-19 pandemic, which saw the exit of offshores, coupled with increased demand associated with dividend payments,

and speculative tendencies. This was exacerbated by the reduction in the supply of foreign exchange, particularly from tourism and remittances.

### *2.1.1.4 Agricultural Insurance, Financing and Risk Management*

The GoU established the Uganda Agriculture Insurance Scheme (UAIS) in FY2018/17, as a pilot whose objective is to cushion farmers from risks associated with losses arising from natural disasters; and also attracting financing to agriculture. The UAIS is implemented by the Agro Insurance Consortium (AIC). By September 2019, total claims payout stood at UGX 5.5 billion, and utilization of the subsidy stood at UGX. 12.8 billion. Overall, by December 2019, the scheme had provided cover for 175, 000 farmers. Mostly covered were farmers who signed up for multi-crop insurance and crop weather index insurance. The consortium currently consists of ten insurance companies offering agriculture insurance covering crop and livestock risks. The consortium offers the following specific products Multi-peril Crops, Livestock, Drought Index, Poultry, and Aquaculture Insurance. Discussions are underway to encourage embedding of insurance in the Agricultural Credit Facility, currently under the management of the BoU.

### *2.1.1.5 Agricultural Credit Facility (ACF)*

The scheme has registered a significant growth in its loan book from UGX. 21.02 billion in 2009 to UGX. 455.24 billion in total disbursements at March 31st, 2020, extended to 741 eligible projects across the country; of which GoU contribution amounted to UUGX 231.38 billion. Also, UGX. 61.56 billion had been committed for projects pending the fulfilment of disbursement conditions by the respective PFIs. The ACF financed the grain trade by providing working capital to address the drastic fall in grain prices especially maize following the bumper harvests, and long term finance for capital expenditure items such as post-harvest handling equipment and storage facilities. Total disbursement and commitments for the grain trade stood at UGX. 125.71 billion on March 31st, 2020.

## 2.1.2 Progress Towards Achievement of Impact Indicators

| Description | Target 2018/2019 | Actual Q4 2018/2019 | Target 2019/20 | Quarter 1 2019/20 (performance against the base year 2014) | Quarter 2 2019/20 (performance against the base year 2014) | |
|---|---|---|---|---|---|---|
| **Crop Resources**<br>**Increased production and Productivity of 8 (beans, cassava, tea, coffee, Fruits & Vegetables, rice, banana, and maize) priority and 3 strategic (Cocoa, vegetable oil and Cotton) Commodities and Increased value addition along the value chains and agriculture markets for the priority and strategic commodities** | | | | | | |
| Percentage change of farming households that have adopted | **5%** | **18.0%** | **20.0%** | **18.0%** | **8.3%** | • *Enhancement of extension service delivery to farmers through recruitment and equipping of skilled 3,867 agriculture extension workers is changing the* |

| Description | Target 2018/2019 | Actual Q4 2018/2019 | Target 2019/20 | Quarter 1 2019/20 (performance against the base year 2014) | Quarter 2 2019/20 (performance against the base year 2014) | |
|---|---|---|---|---|---|---|
| commercialised agriculture | | | | | | *perception of farmers from subsistence to commercialisation.*<br>• *The percentage of commercial farming households increased from 3.6% in 2014 to 11.9% according to the Annual Agriculture Survey by the Uganda Bureau of Statistics representing an increment of 8.3%.* |
| Percentage increase in yields of priority and strategic commodities | **5%** | **28%** | **27%** | **28%** | **22.6%** | • *The average yield increased by 22.6%. This was re-computed using data from the Annual agriculture survey which was concluded in 2019.*<br>• *The increment was a result of the improved technologies generated and disseminated by the recruited extension workers, and also increased farmer access to the improved technologies* |
| Percentage of farmers equipped with skills in post-harvest handling technologies, and value addition | **40%** | **41.2%** | **50.0%** | **41.2%** | 41.2% | • *The Ministry embarked on training farmers through the extension workers at the district local government in post harvest handling in order to increase the quality of the outputs and ultimately access to market.* |
| **Animal Resources**<br>**Sustained Control of Animal Disease and Vector, and Improved Market-Oriented Production of Quality and Safe Animal Products** | | | | | | |
| Percentage change in animal disease and vector outbreaks | **16%** | **14.2%** | **12.0%** | **14.2%** | **14.2%** | • *The performance was attributed to the increased disease surveillance activities and increase in the number of inspectors recruited along the major animal movement routes. The indicator is compiled with reference to the animal disease register.* |

| Description | Target 2018/2019 | Actual Q4 2018/2019 | Target 2019/20 | Quarter 1 2019/20 (performance against the base year 2014) | Quarter 2 2019/20 (performance against the base year 2014) | |
|---|---|---|---|---|---|---|
| Percentage change in number of animals produced for market | **7%** | **12.7%** | **31.0%** | **12.7%** | **17.7%** | • *This was computed using the number of animals exported and traded locally using records from the animal movement permits. This indicator is compiled at the end of every financial year.* |
| Percentage change in rejection of animal and animal products due to poor quality and safety | **15%** | **8%** | **10%** | **8%** | **8%** | • *The increase in the number of inspectors recruited and deployed along the major animal routes to control animal movement resulted in a reduction in animal and animal products rejected.* |
| **Agricultural Extension and Skills Management**<br>**Improved provision of extension services to value actors** | | | | | | |
| Percentage of generated technologies promoted to value chain actors | **50%** | **76.1%** | **60.0%** | **53.0%** | **53.0%** | • *Equipping of the recruited 3,867 agriculture extension workers with vehicles and motorcycles enabled them conduct their daily operations which included promoting the new generated technologies* |
| Percentage of value chain actors applying technologies | **50%** | **51.3%** | **60.0%** | **51.3%** | **51.3%** | • *Equipping of the recruited 3,867 agriculture extension workers with vehicles and motorcycles enabled them to extend knowledge on the existing technologies to very many farmers* |
| Percentage change in production and productivity of priority and strategic commodities | **5%** | **33%** | **31%** | **33%** | **26.6%** | • *The average production increased by 26.6%. This was re-computed using data from the Annual agriculture survey which was concluded in 2019. The increment was a result of the improved technologies generated and disseminated by the recruited extension workers, and also increased farmer access* |

| Description | Target 2018/2019 | Actual Q4 2018/2019 | Target 2019/20 | Quarter 1 2019/20 (performance against the base year 2014) | Quarter 2 2019/20 (performance against the base year 2014) | |
|---|---|---|---|---|---|---|
| | | | | | | *to the improved technologies* |
| **Fisheries resources**<br>**Increased fish production, productivity and value addition along the fish value chain while ensuring safety and quality** | | | | | | |
| Percentage change in yield per production system | **10%** | **23.3%** | **26.0%** | **23.3%** | **23.3%** | • *Provision of quality fish seed and feed to farmers coupled with enhance extension services enabled the performance. This was compiled from the recently concluded aquaculture baseline study* |
| Percentage change in fish trade volumes and value | **10%** | **27.9%** | **29.0%** | **27.9%** | **21.2%** | • *Enhanced enforcement along the major water bodies led to an increase in fish stocks along the major lakes and thus increase in fish traded volumes and value* |
| Percentage change in fishing effort in major water bodies | **10%** | **20%** | **18%** | **20%** | **31%** | • *This was attributed to the enhanced enforcement along the major water bodies. This indicator is computed as fish stocks in the major water bodies using data from frame surveys. The fish stock increased by 31%.* |
| ***Agricultural Infrastructure, Mechanization and Water for Agricultural Production***<br>***Improved access by farmers to agricultural infrastructure, water for agricultural production and mechanisation*** | | | | | | |
| Percentage of farmers using labour saving technologies | **8%** | **33%** | **38%** | **33%** | **33%** | • *The Ministry has invested heavily in developing labour saving technologies and ensuring farmers' access to these technologies across the country given the enhancement in extension service delivery. The robust data collection system within the Ministry enabled finding out the actual status of farmers using labour saving technology.* |
| Percentage change in farmers accessing water | **8%** | **28.2%** | **30.0%** | **28.2%** | **28.2%** | • *The Ministry has invested in construction of valley tanks and irrigation schemes both large scale* |

| Description | Target 2018/2019 | Actual Q4 2018/2019 | Target 2019/20 | Quarter 1 2019/20 (performance against the base year 2014) | Quarter 2 2019/20 (performance against the base year 2014) | |
|---|---|---|---|---|---|---|
| for agricultural production | | | | | | *and small scale across the country. The robust data collection system within the Ministry enabled finding out the actual status of farmers accessing water for agricultural production.* |
| Percentage of farmers accessing Sustainable Land Management services | **10%** | **31.7%** | **40.0%** | **31.7%** | **31.7%** | • *The Ministry through research has developed sustainable land management technologies and through extension workers trained farmers on the use of good agronomic practices, in order for the soil to retain its fertility. This figure was obtained from the process evaluation study.* |

## CHAPTER THREE REVIEWED AGREED ACTIONS FROM JASAR 2018

The following table presents the agreed actions that were identified in the last JASAR 2018.

| AREA | ISSUE | DRAFT AGREED ACTION | TIME FRAME/ STATUS | REPONSIBILITY CENTRE |
|---|---|---|---|---|
| Agricultural Extension Services | Low technical capacity for extension | Undertake recruitment of extension workers to fill up gaps couple with registration and accreditation of all private extension service providers | Following the adoption of the Single Spine Extension System, Government embarked on the recruitment drive of Agricultural Extension Staff in Local Governments 4,063 extension workers have been recruited which is 66% of the targeted 6,172 extension workers to be recruited. Since FY 2018/19, this has been an unfunded priority (Ministerial Policy Statements refer | Ministry of Public Service<br>Ministry of Finance, Planning and Economic Development<br>Directorate of Agricultural Extension Services |
| | | Retool and equip extension workers for market-led /demand driven extension | FY 2020/21. Transport modalities provided for mobility; sensitization on value chains on going, through the extension conditional grant | Directorate of Agricultural Extension Services |
| | Legal framework is not in place to run extension | Expedite extension bill | FY 2019/20 Principles of the extension bill submitted. | Directorate of Agricultural Extension Services |

| AREA | ISSUE | DRAFT AGREED ACTION | TIME FRAME/ STATUS | REPONSIBILITY CENTRE |
|---|---|---|---|---|
| Research | Limited uptake of research technologies | Promote private sector/farmer-led research | FY 2020/21 Research agenda being aligned to agro industrialization; in line with market needs | Director General, NARO |
| | Depilated research infrastructure | Rehabilitate and equip research infrastructure | FY 2020/21 This is one of the key areas in the NARO strategic plan and only constrained by low funding to research | Director General, NARO |
| In put supply systems | Fake and substandard in puts on the market | Strengthen enforcement of legal and regulatory frameworks | FY 2019/20 FY 2020/21 Being undertaken through strengthening of regulatory services | Departments of Crop Inspection &Certification/Animal Health /Fisheries Control, Regulation and Quality Assurance |
| | | Build capacity to identify fake inputs, including renovating and equipping of laboratories . | FY 2019/20 FY 2020/21 Being undertaken through strengthening of regulatory services. Proposals for equipping laboratories developed. | Department of Crop Inspection and Certification |
| | low quantity and unaffordable | Promote production/use of quality and affordable inputs through partnerships with private sector(PPPs) | FY 2020/21 On going. | Department of Agricultural Investment and Enterprise Development |
| Pests, Vectors and disease control | Weak infrastructure for disease management | Establish/equip disease control infrastructure (labs, cattle dips among others) | FY 2020/21 This is on going –largely through projects | Departments of - Crop Protection, Animal Health |

| AREA | ISSUE | DRAFT AGREED ACTION | TIME FRAME/ STATUS | REPONSIBILITY CENTRE |
|---|---|---|---|---|
| | Emerging and remerging pests and diseases | Develop contingency plans and early warning systems to manage emergency of pests and diseases | FY 2020/21 These have been developed for Desert locusts and Fall Army Worm | Department of - Crop Protection, Animal Health |
| Agricultural mechanisation | Limited access of farmers to mechanization | Promote appropriate technologies e.g. walking tractors, ox-ploughs | FY 2020/21 FY 2019/20 The Ministry has finalized formulation of the new Agriculture Mechanization Policy which will soon be tabled to Cabinet. The policy is meant to streamline farmers' access to mechanization equipment, streamline tractor hire services, streamline access to credit for mechanization equipment and also guide private sector investments in agriculture mechanization/ tractorization | , Department of Agricultural Infrastructure. Mechanization and Water for Agricultural Production |
| | | Operationalize regional mechanization service centres | FY 2020/21 Ongoing.<br><br>The Government is constructing 4 regional mechanization centres in Buwama – Mpigi district | Department of Agricultural Infrastructure. Mechanization and Water for Agricultural Production |

| AREA | ISSUE | DRAFT AGREED ACTION | TIME FRAME/ STATUS | REPONSIBILITY CENTRE |
|---|---|---|---|---|
| | | | (Central Region), Agwata – Dokolo district (Northern Region), Kiryandongo district and Mbale district | |
| | | Skill machinery operators and local artisans | FY 2020/21 FY 2019/20 Plans for operators and technicians training and skilling were developed. To this effect, the Ministry trained 50 private heavy equipment operators, engineers, technicians, and mechanics in equipment operation, maintenance and management | Department of Agricultural Infrastructure. Mechanization and Water for Agricultural Production |
| | Poor land use management | Undertake Farm land use Planning | FY 2020/21 Farmland planning strategy under development | Department of, Agricultural Infrastructure. Mechanization and Water for Agricultural Production LGs |
| Water for agricultural production | Mechanism to guide on water harvesting and use of grey water , run off water at domestic, | Develop a Policy and regulatory framework on Water Harvesting | FY 2020/21 Ministry developed the Framework Implementation Plan for Water for Agricultural Production. | Department of Agricultural Infrastructure. Mechanization and Water for Agricultural Production |

| AREA | ISSUE | DRAFT AGREED ACTION | TIME FRAME/ STATUS | REPONSIBILITY CENTRE |
|---|---|---|---|---|
| | institutional and Industrial level | | This includes strategies for water harvesting. | |
| | | Promote water harvesting technologies for on farm production | -do- | |
| | Non functionality of water for agricultural production infrastructure and facilities | Develop an O& M Framework for the irrigation systems | FY 2020/21<br>FY 2019/20 Provided for under the TORs for Water User Associations | Commissioner, Agricultural Infrastructure. Mechanization and Water for Agricultural Production |
| Agro-processing and post-harvest management | Post-harvest losses and storage | Enact bye-laws and ordinances on post-harvest handling practices | FY 2020/21<br>On-going for specific commodities e.g. coffee | District Local Governments |
| | | Establish agro-processing and Storage facilities under PPPs | FY 2020/21<br>Ongoing under ACDP, NAADS. Proposal developed | Department of Agricultural Investment and Enterprise Development |
| | | Revitalize commodity platforms | FY 2020/21<br>Planned for 3rd quarter of FY 2020/21 | Departments for Crop & Animal production |
| Market access | Mismatch between production and market needs | Undertake and disseminate market research on the selected commodities to inform production and investment along the value chain | FY 2020/21<br>TORs developed and under review for market research studies | Department of Agricultural Investment and Enterprise Development |
| | Limited market competitiveness | Promote development of market infrastructure | FY 2020/21<br>Ongoing - MAAIF(RPLRP) MTIC | Ministry of Trade and Cooperatives Department of Agricultural Investment and Enterprise Development |
| | Continued rejection of products on the market | Strengthen mechanisms/systems for quality and standards | FY 2010/21<br>Being strengthened through | Ministry of Trade and Cooperatives. Departments responsible for |

| AREA | ISSUE | DRAFT AGREED ACTION | TIME FRAME/ STATUS | REPONSIBILITY CENTRE |
|---|---|---|---|---|
| | | | recruitment of more inspectors | inspection and certification |
| Human capital development | Inadequate capacity of staff to address to emerging sector dynamics/issues | Complete the restructuring of the Ministry | FY 2010/21 This was completed, Report submitted to MoPS for approval | Ministry of Public Service<br>Ministry of Finance, Planning and Economic Development<br>Department of Human Resource Management |
| | | Develop and implement a capacity building plan, including the agricultural colleges | FY 2020/21 Undertaken, the Capacity Building Plan has been forwarded to MoPS for review | Department of Human Resource Management |
| | Weak capacity of farmers/farmers institutions | Provide for Framer Group Institutional Development | FY 2020/21 This is one of the priority activities funded under the ?? | Local Governments<br>Department of Agricultural Extension and Skills Management |
| Legal and Policy frameworks | Poor implementation of policies | Development of workplans be informed by policy mandates | 2010/21 On going | All Departments & SECTOR agencies |
| | Management of animal drugs and agrochemicals | MAAIF to take responsibility for management of animal drugs and agrochemicals in line with requirements for agro industrialization | FY 2020/21 Ministry is developing the regulatory frameworks; pending the repealing of the NDA act as by cabinet directive to Attorney General | Directorate of Animal Resources |
| Institutional arrangements/Development | Weak inter and intra sector coordination | Designate focal offices to represent the sector in relevant sector working groups | FY 2019/20 The new direction is Program approach as by the Agro industrialization programme in NDP3 | PS-MAAIF |

| AREA | ISSUE | DRAFT AGREED ACTION | TIME FRAME/ STATUS | REPONSIBILITY CENTRE |
|---|---|---|---|---|
| | Unrecorded contributions of NSA contributions to the sector | Establish Mechanism that tracks NSA contributions towards the sector | FY 2020/21 To be undertaken in the context of program approach | Department of Agricultural Planning and Development |
| Poor quality and standards along the value chain | Non-compliance to set standards | Simplify, translate and popularize standards | FY 2020/21 Planned for 3rd quarter of FY 2020/21 | Directorate of Agricultural Extension Services |
| | Limited access to food-grade machinery | Lobby MoFPED to provide tax waivers/incentives to food grade material | FY 2020/21 Yet to be undertaken | PS-MAAIF |
| Access to Finance | Low access to agric finance and credit | Hasten the agricultural finance policy | FY 2019/20 The policy is Still under review | Ministry of Finance, Planning and Economic Development |
| | | Build capacity of extension workers to provide financial literacy to farmers and popularizing existing financial products (ACF, Agro insurance) | FY 2020/21 Planned for 3rd quarter of FY 2020/21 | Directorate of Agricultural Extension Services , |
| Food and nutrition security | Low production and consumption of diverse foods | Develop and popularize dietary guidelines and food composition tablets | FY 2020/21 Proposal developed for developing guidelines, implementation awaits funding | Division responsible for Food and Nutrition Security-MAAIF |
| | | Develop programmes that address production, access and consumption of health diets | FY 2020/21 Undertaken through the UMFSNP | Division responsible for Food and Nutrition Security-MAAIF |
| | Production and consumption of unsafe food | Strengthen the monitoring and surveillance of production and | FY 2020/21 Ongoing through the Dept of CIC; | Division responsible for Food and Nutrition Security-MAAIF |

| AREA | ISSUE | DRAFT AGREED ACTION | TIME FRAME/ STATUS | REPONSIBILITY CENTRE |
|---|---|---|---|---|
| | | utilization to ensure compliance to food control systems | Program for pesticide residue surveillance developed | |
| | | Establishing laboratory infrastructure for aflatoxin and contaminants testing | FY 2020/21 Under the scale up proposal for the Uganda Multisectoral food security and Nutrition project, funded by the World Bank under GAFSP, provision has been made for laboratory infrastructure and building systems for food safety. | Division responsible for Food and Nutrition Security-MAAIF |

## CHAPTER FOUR: SUB SECTOR PERFORMANCE

This chapter presents an overview of sub sector performance for the 3 Directorates of Crops, Livestock, Fisheries and the Directorate for Agricultural Extension Services. In addition, it presents performance reviews from NARO and NAADS Agencies as well as from the departments of Agriculture Infrastructure, Mechanization and Water for Agricultural Production (AIMWfAP) and Human Resource Management (HRM).

### 3.1 Crop Sub Sector Performance

### 3.1.1 Introduction

The Directorate of Crop Resources constitutes three (3) departments namely; Crop Production, Crop Protection and Crop Inspection and Certification, each headed by a Commissioner. Two of MAAIF's agencies namely Coffee Development Authority (CDA) and Cotton Development Organization (CDO) are directly linked to the Directorate. This report focuses on the performance of the Directorate based on the recurrent and development activities implemented through its departments, agencies and projects during the Financial Year (FY) 2019/2020. The report outlines the mandate and functions of the Directorate, subsector performance, challenges and mitigation strategies.

### 3.1.2 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 and the promotion of sustainable use of natural resources.

### 3.1.3 Functions of the Directorate

The functions of the Directorate of Crop Resources are to: -

1. Provide technical guidance for formulation and implementation of policies, plans and strategies in crop production, marketing, protection, inspection and certification.
2. Support, supervise and monitor;
3. Sustainable market oriented production
4. Crop pests and diseases control
5. Plants and plant products quality and safety
6. Primary processing and value addition of crop products
7. Improved food and nutrition security

### 3.1.4 Crop Production Department

3.1.4.1 Introduction

Crop production Department is comprised of two divisions: i. Crop Production ii. Food and Nutrition Security. The Department implements a number of projects including: The Agriculture Cluster Development Project (ACDP), Uganda Multi-sectoral Food Security and Nutrition Project (UMFSNP), Banana Livelihoods Diversification Project, Northern Uganda Farmers' Livelihoods Improvement Project, Sustainable Cashew nut Value Chain Program, Enhancing National Food Security through increased Rice Production in Eastern Uganda, Rice Development Project (PRiDe).

**Mandate of the Department**

To support, promote and guide:-

1. Sustainable Market Oriented Production,
2. Value Addition,
3. Quality Assurance and capacity building (ToTs),
4. Food and Nutrition Security.

**Functions of the Department**

1. Formulate and review policies, standards, guidelines, strategies and plans on crop production, post-harvest handling, primary processing, Food and Nutrition security.
2. Provide quality assurance on good agricultural practices and advisory services on crop production, primary processing, food and nutrition.
3. Build capacity (ToTs) of DLGs Extension workers on crop production, primary processing, food and nutrition.
4. Support the provision of improved seed/planting materials and suitable use of natural resources.
5. Conduct food and nutrition security surveillance in the country.
6. Develop and guide implementation of programmes for integration of the women and youth in crop production, primary processing and value addition.

**Performance during FY 2019/20**

During the FY 2019/20, the Department of Crop production addressed the following issues:

1. Development/formulation and reviewing of policies. Laws, plans, guidelines, handbooks, Standard operating procedures and strategies,
2. Increasing production and productivity of priority and strategic enterprises,
3. Supplying of critical farm inputs,
4. Post-harvest Handling and Quality assurance of the priority value chains and
5. Food and nutrition security.

**a). Policies, Laws, Guidelines, Plans and Strategies**

1. During FY 2019/20, the Department targeted to develop, review and /or finalize and print 03 policies, 03 strategies, 03 guidelines, 03 handbooks, 01 project proposal, promote and strength the National priority commodity platforms.

**Achievements under Policies, laws, guideline, plans Standard Operating Procedures and strategies**

1. National Organic Agricultural Policy finalized, approved by cabinet, printed and disseminated.
2. Draft National Tea Development Policy and Implementation Strategy developed awaiting Cabinet approval.
3. One (01) Food and Nutrition Security strategy in the advent of Covid-19 pandemic drafted.
4. Developed, reviewed and/or drafted guidelines/handbooks/standard Operating procedures.
    a) One (01) Standard Operating Procedure for School Demonstration Gardens developed, printed, launched and disseminated.
    b) Two (02) commodity Handbooks for Cassava, Rice; finalized, printed and disseminated.
    c) Three (03) farmer guides for Coffee, beans and maize developed, printed and disseminated to 57 districts.
    d) Three (03) handbooks on i. Food and Nutrition ii. Home economics and iii. Banana value addition and utilization reviewed awaiting printing and dissemination.
5. Developed a proposal to extend funding for UMFNSP project under the Covid-19 response window.

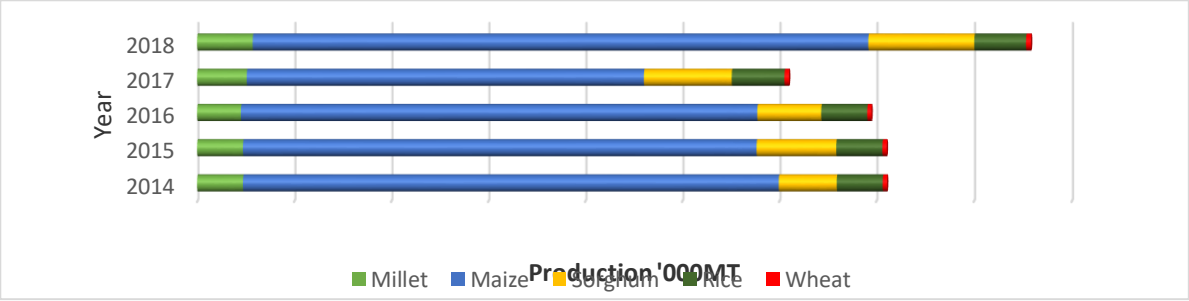
**b) Increasing Production And Productivity Of Priority And Strategic Commodities**

The performance of the Department is presented in respect of specific priority and strategic crop commodities namely: Coffee, rice, tea, maize, beans, cassava, Potatoes, banana, Fruits and Vegetables, cashew nut, cotton, oil palm and oil seeds and Cocoa**.**

**Cereals**

Cereal crops in Uganda include; maize, rice, millet, sorghum and wheat. The production of maize increased from 2.6 million MT in 2018 to 5 million MT in 2019 according to (MAAIF/UBOS-2019 provisional figures from AAS). The improved performance is attributed mainly to distribution of seeds by Government, Increased adoption of improved maize varieties by farmers, increase value addition by private sector and increased vigilance by government in control of pests and diseases. The National Rice Development Strategy (NRDS) enabled stakeholders develop and implement interventions in the sector. Many of these were in Research, Irrigation Infrastructure and capacity building. The interventions resulted in doubling rice production over the last ten years (2008-2018) from 177,000MT to about 350,000MT. The current rice production is about 260,000MTs and is insufficient to meet the local demands. The Formulation of the NRDS II (2019-20 -2029/30) policy framework is ongoing.

**Cereal Production from 2014-2018 (000'tons)**



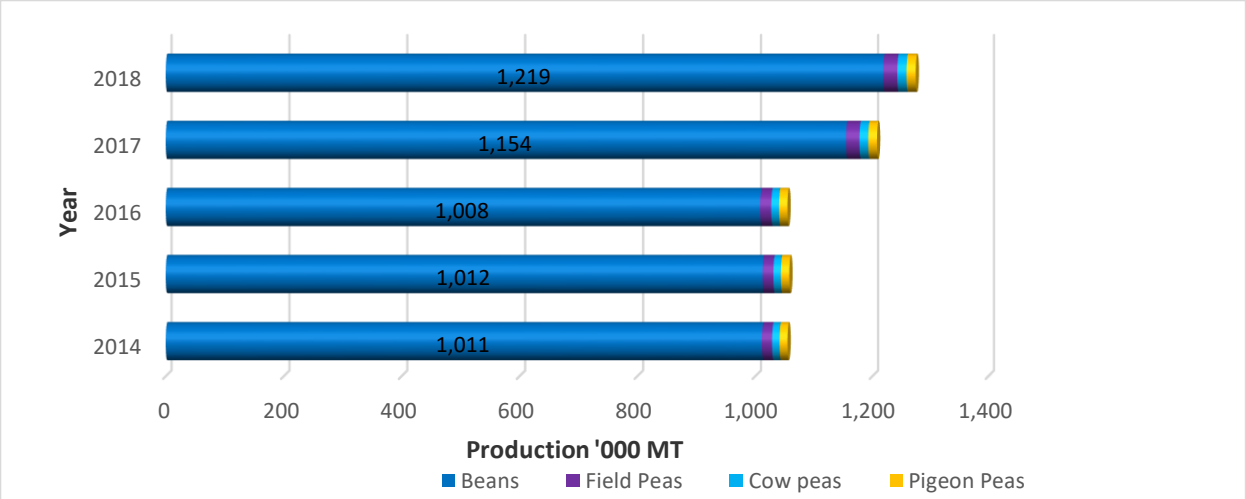

***Cereals Production trends (*Source: MAAIF and UBOS)**

*Farmer trainings in rice planting – line planting technology*

**Pulses**

The production of the major pulses which includes; beans, field peas, cow peas, pigeon peas increased by approximately 5% in 2018. However, the production of beans is known to have decreased from 728,000MTs in 2018 to 627,000MTs in 2019 (MAAIF/UBOS-provisional figures from AAS)

**Pulses Production from 2014 to 2018(000'tons)**



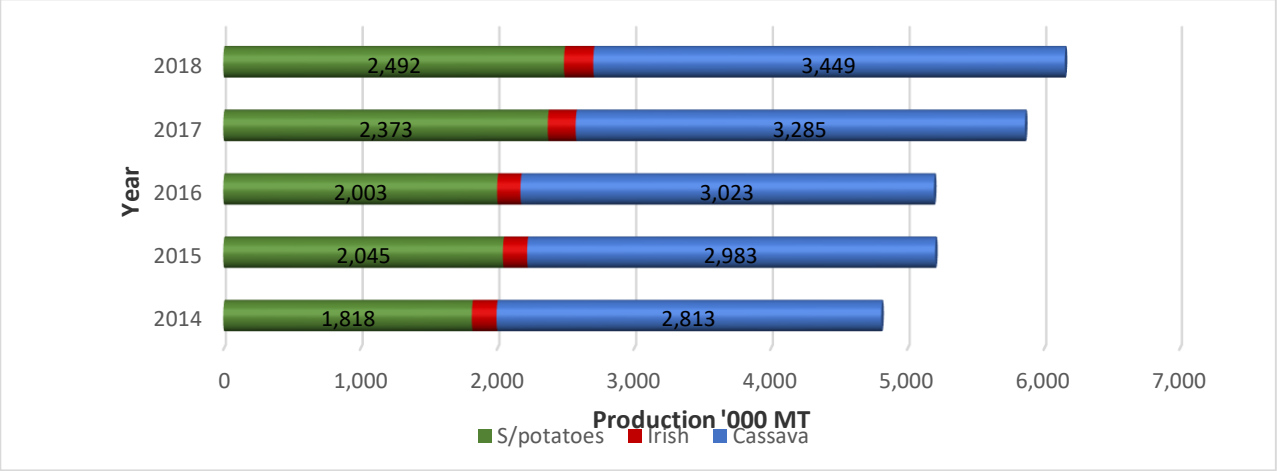

***Production trends for pulses 2014-2018 (Beans, Field Peas, cow peas, pigeon peas)***

*Source: MAAIF*

**Root Crops**

Cassava is one of the priority crops especially for food security. Production of the major root crops (sweet potatoes, Irish potatoes and cassava) increased from 5,862,280 tons in 2017 to 6,155,390 in 2018 indicating a 5% increment. This positive shift was attributed to the relatively stable rainfall.

**Root Crops Production from 2014 to 2018 (000'tons)**



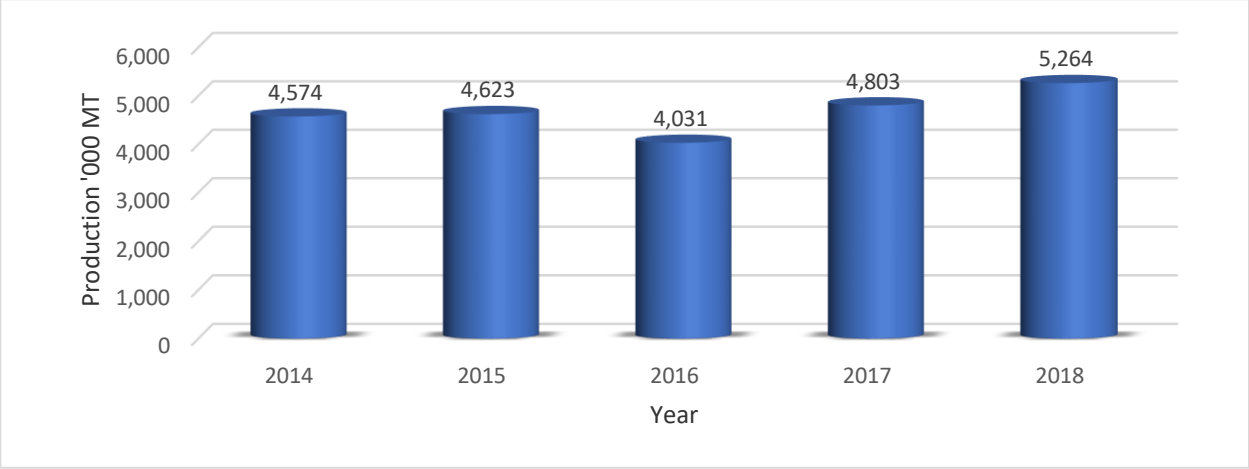

***Root Crops Production from 2014 to 2018 (000'tons)* (*Source: MAAIF and UBOS)***

**Plantain Banana**

The production of plantain banana increased from 4,803,000 tons in 2017 to 5,263,800 tons in 2018 reflecting an increase of 9.6%. This was attributed to the relatively stable weather, increased capacity building on Good Agronomic Practices, increased surveillances, trainings in climate change mitigation and adaptation strategies and use of clean quality disease free planting materials especially tissue culture banana planting materials.

At the 5-year average rural price for Matooke at UGX 800/kg the matooke consumed on farm or traded domestically was valued at about US$1.01 billion. This is around 18% contribution to Uganda's agricultural GDP for 2018. With industrialization, it is expected that this contribution will significantly rise due to the many potential industrial value chains that are possible.

**Production of Plantain Banana 2014-2018 (000'tons)**




*Source: MAAIF and UBOS*

Government is putting a lot of emphasis on adding value on the priority and strategic priorities.

The Ministry through collaboration with UNIDO provided state of the art equipment to enable quality banana juice and wine processing.

***The Director of Extension Services Monitoring Performance of A banana juice processing facility at Forest Fruit Foods Factory, Bushenyi rehabilitated and furnished with machinery by MAAIF through GEF/UNIDO support***

***One of the wine filling machines and storage tank to a banana wine processing facility at Silgard in Mbarara District. Constructed and supplied by MAAIF/UNIDO***

**Tea and Cocoa Production from 2018 to 2019**

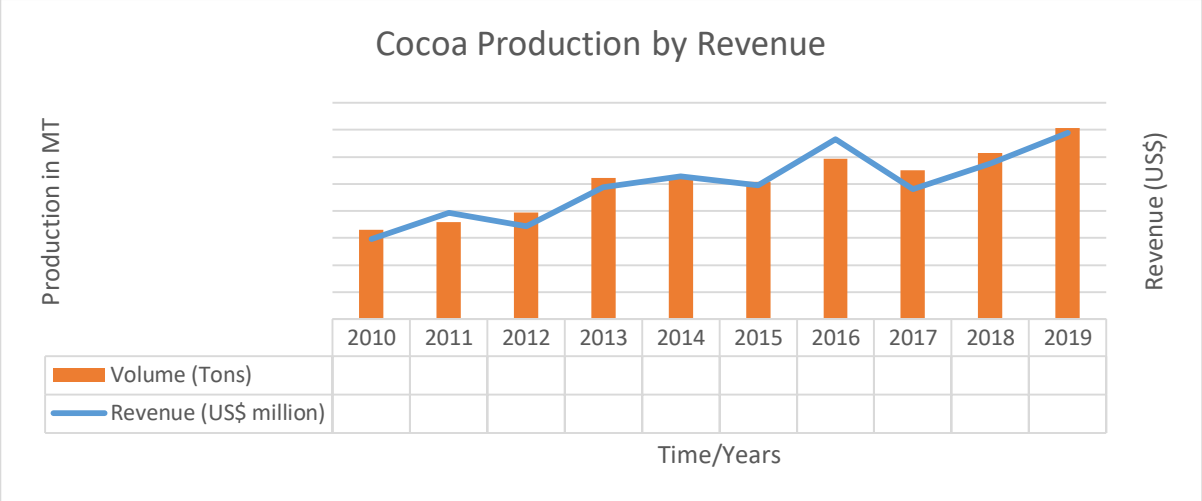
***Production in MT.***

| Production (MT) | 2018/17 | 2017/18 | 2018/19 | 2019/2020 |
|---|---|---|---|---|
| Tea | 69,000 | 74,201 | 78,030 | 70,338 (provisional) |
| Cocoa | 25,712 | 28,945 | 33,513 | 35,318 |

*Source: MAAIF*

The production of tea has been steadily increasing as shown in the table above from 69,000 MT in 2018/17 to 78,030 MT in 2018/19. This increase in production volumes is attributed to Governments interventions in continuous supply of tea seedlings to farmers amidst climatic change effects. There has been a general increase in cocoa production trend of about 16,000MT (54%) over the past 10 years, from 14,000MT in 2009 to 35,000MT in 2019. This increase in production volumes is attributed to the Government strategic intervention of supplying quality cocoa seedlings to farmers in both traditional Cocoa producing Districts as well as new cocoa producing Districts.

**Cocoa Production and Revenue Statistical Trends from 2010 to 2019**




***Cocoa production trends (*Source: MAAIF)**

**Cashew nut**

In FY 2019/2020, Season-2020A, a total of 142,072 cashew seedlings covering 1,753 acres were procured and distributed to farmers in 26 districts including; Nakasongola, Luwero, Kumi, Adjumani, Arua, Soroti, Serere, Pallisa, Kaberamaido, Bukedea, Amuria, Otuke, Alebtong, Lira, Dokolo, Apac, Kwania, Napak, Nakapiripirit, Abim, Kiryandongo, Kamuli, Bulambuli, Omoro, Nwoya and Amuru.

**Fruits and Vegetables**

1. Citrus and mango fruit processing at Soroti Fruit Factory and Nwoya fruit farm supported
2. Promoted Hass production of Hass Avocado in Mayuge and Ssembabule districts
3. Promoted nucleus model farming in Buikwe for capsicum
4. Promoted Mangoes, Citrus, Pineapples, Apples in the country.

**Monitoring the performance of an Apple farm in Kabale district.**

**Supplying of critical farm inputs**

The Department through the ACDP project supplied quality inputs to farmers in the 57 project districts including:

1. 345,089 kilograms of Bean seed,
2. 166,718 kilograms of Maize seed,
3. 17,215 kilograms of Rice seed,
4. 7,171 bags of cassava cuttings,
5. 55,561 pieces of Tauplins,
6. 18,326 pieces of Machetes /Pangas,
7. 43,266 pieces of air tight bags (Hematic bags),
8. 102,372 litres of Herbicides, and
9. 22,752 litres of Insecticides, 162 litres of Fungicides, 3,224 litres of Fumigants.

**Mother and demonstration gardens and nurseries for priority and strategic crops established and supervised**

Planned

1. To monitor performance of 100 banana mother gardens established using tissue culture plantlets, 1 acre each in 2 regions in Central and Western Uganda,
2. To establish 50 cassava mother gardens with tissue culture plantlets, 1 acre each in 2 regions in Central and Northern Uganda,

**Achievement**

1. Seventy (70) vegetable demonstration gardens of 0.1 acre for tomatoes, Cabbage, Green pepper, water melon, Eggplant and Onions were established in all participating sub-counties in eight districts of Gulu, Kitgum, Pader, Lamwo, Agago, Nwoya, Amuru, Omoro.
2. Conducted field supervision and technical backstopping of thirty (30) farmer groups in Gulu, Kitgum and Pader districts.

3. 80 Banana mother gardens of one acre each established using Tissue culture plantlets in Buhweju, Bushenyi, Isingiro, Rubirizi, Mitooma, Sheema, Ntugamo and Mbarara Districts supervised.

*Monitoring Performance of the established mother gardens in 8 districts of south western Uganda*

**FOOD AND NUTRITION SECURITY**

Planned to conduct Surveillance of 30 districts for Food and Nutrition security, 24 Districts were assessed. Northern and Eastern regions of Uganda have limited food reserves and are likely to be food insecure due to the delayed onset rains. Farmers were advised to store enough food reserves and plant early maturing crops and Vegetables.

1. Developed a unified protocol for enhancing the quality of planting materials, management of demonstration plots, seed processing and storage at primary schools and community levels. Dissemination for the Protocol completed in Yumbe, Iganga, Arua and Bugiri districts.
2. 146,096 farmers have access to multiplied or produced micronutrient rich seeds through the parent groups, schools and lead farmers.
3. 146,096 farmers have adopted new agriculture technologies being promoted (CSA and GAP).
4. A minimum of 350 pupils of school going children are receiving regular school-based health services and nutrition education sessions through schools, giving a total of 450,000 pupils.
5. 1,500 schools have planted trees for environmental protection purposes.
6. Nutrition/cooking startup packages (sauce pans, plates, forks etc) were procured to support Nutrition education and cooking demonstrations at school and community level. A total of 10,286 Nutrition forums have been conducted at community level.
7. Procured 4500 drip irrigation kits for school and community level to promote year round production
8. Constructed 3,000 energy saving stoves at primary school and community level

**Nutrient-rich Crop Demonstration Gardens at School and Community Level**

**Monthly nutrition forums at community level.**

**Demonstration gardens at a lead farmer home**

**Kabarole district**

**CAPACITY BUILDING, TRAINING, TECHNICAL BACKSTOPPING AND TECHNICAL WORKING GROUPS/PLATFORMS.**

**a) Capacity building/trainings conducted**.

**Key achievements**

1. Planned to train/sensitize 150 banana value chain actors (Wine beneficiaries) on Good Manufacturing Practices (GMPs). 120 banana wine beneficiaries from 04 districts; Isingiro, Bushenyi, Sheema, and Mbarara, Ntungamo, were trained.
2. 1800 DLG (ToTs) including Science Teachers, Extension workers, and Community Based Facilitators (CBFs) trained on SOPs for Establishment of School Demonstration gardens in Districts of Bugiri, Namutumba, Kiryandongo, Kabarole, Nebbi, Arua, Maracha, Yumbe, Kabale, Kasese, Isingiro, Iganga, Ntungamo and Bushenyi.
3. Trained 60 DLG (ToTs) staff on food and Nutrition programming and integration of Nutrition into Agriculture development.
4. Planned to train 20 farmer groups in market oriented vegetable production: Trained 22 farmer groups for the fourth batch farmers in five districts of Acholi sub-region (Nwoya, Omoro, Amuru, Agago and Lamwo).
5. 1,946 farmers and district staff trained/sensitized in Aflatoxin mitigation and prevention in 57 districts.

**b) Technical working groups/Platforms**

**Key achievements**

1. A National Bio-fortification Technical working group was formed and launched.
2. 01 National Stakeholder meeting bringing together 48 Cocoa value chain actors to develop an effective coordination mechanisms and election of office bearers for Cocoa platform conducted
3. Established cocoa stake-holders platform, elected office bearers and facilitated 02 platform meetings.
4. 05 Rice platform meetings to review and consult on the Draft National Rice Development Strategy conducted.

**Key Challenges to the Crops Sub-Sector**

1. The production and productivity of most crops has remained low due to climate change effects, erratic weather patterns, limited use of improved seeds, low use of fertilizers and poor agronomic practices.
2. Poor Post-harvest handling techniques utilized.
3. Inadequate technical knowledge on Cashew nut Production.
4. Inadequate finances to support implementation of Cashew nut Value Chain Development.
5. High incidence of pest and diseases especially (Bacterial wilt, Late blight)
6. The COVID 19 lockdown which reduced demand for vegetables and movement of farmers resulting into reduction of prices and losses.
7. There is little or no value addition done on fruits and vegetables by farmers.
8. Price fluctuations due to Bumper harvest of commodities.

**Recommendations to Address the Challenges**

The Ministry will:

1. Skill District Local Government Staff as Trainers of Trainers (ToTs) in the crop commodities that are predominant in their areas of jurisdictions.
2. More emphasis should be put on Fruit and vegetables value addition and more especially on avocado
3. Farmers should work with research organizations to obtain clean root stock and scion
4. Government should avail low cost irrigation systems to hass avocado farmers.
5. Intensify food and nutrition surveillances to detect areas at high risks of food and nutrition shortages/insecurity and take appropriate actions.
6. Continue developing and disseminating guidelines, and providing trainings and equipment on post-harvest handling of commodities.
7. Upscale the promotion of new crop production technologies to increase production and productivity on farms.
8. Increase publicity on Aflatoxins prevention, mitigation and control using various methods such as Radios, (Talk shows, news clips) Televisions, and Newspapers in order to boost public awareness on Aflatoxins and Its impact on Agriculture, Health and Trade.
   i. Build Capacity of Farmers and other Value Chain actors on Cashew nut production
   ii. Increase finances to support promotion of Cashew nut value chain development in Uganda.

### 3.1.4.1 *Oil Palm and Oil Seeds*

#### *3.1.4.1.1 Performance overview*

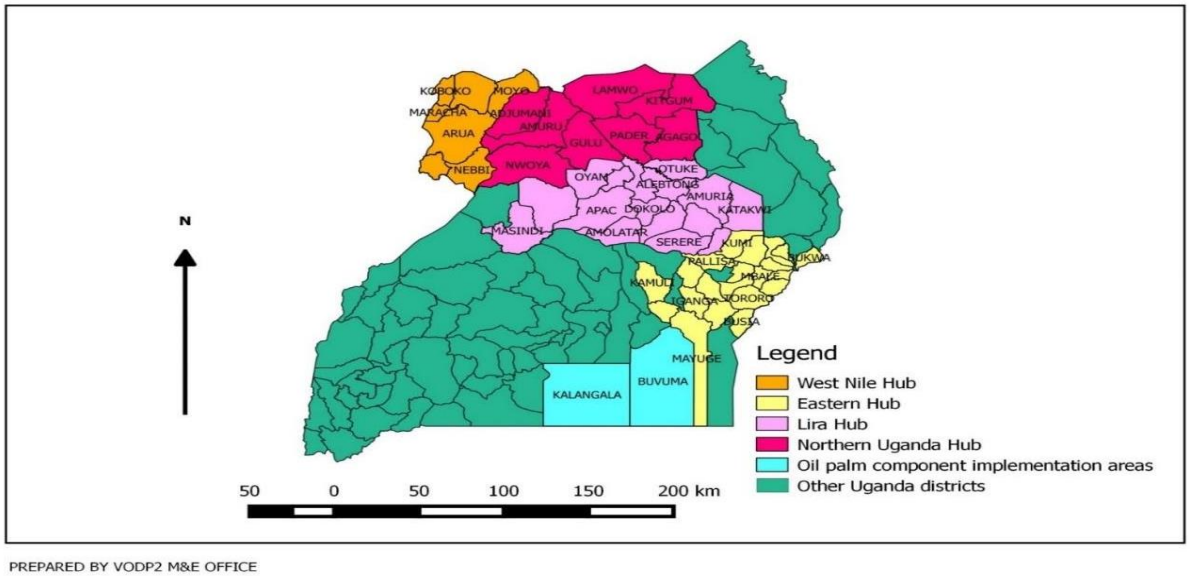
**A: VEGETABLE OIL DEVELOPMENT PROJECT PHASE 2 - VOPD2**

| | |
|---|---|
| Reporting Date: | September 2020 |
| Project Name: | Vegetable Oil Development Project Phase 2 |
| Effective Date: | October 2010 |
| First Disbursement Date | 3rd June, 2011 |
| Project duration: | Eight (8) years |
| Loan Amount: | USD 52M |
| Project End: | 30th August, 2020 |
| Project areas: | Oil palm- Kalangala and Buvuma Districts.<br>Oil seeds- West Nile, Gulu, Eastern and Lira Hubs. |

**Table 1: The 52 Districts in the Oil Seeds Project Hubs**

| Hub | Districts |
|---|---|
| West Nile | Arua, Zombo, Nebbi, Yumbe, Moyo, Koboko and Maracha. |
| Gulu | Gulu, Amuru, Kitgum, Pader, Adjumani, Lamwo, Nwoya and Agago |
| Lira | Lira, Apac, Masindi, Serere, Kaberamaido, Oyam, Amuria, Soroti, Kiryandongo, Amolatar, Alebtong, Otuke, Ngora, Katakwi, Dokolo and Kole |
| Eastern | Mbale, Bukedea, Kumi, Manafwa, Pallisa, Sironko, Bulambuli, Bukwo, Kapchorwa, Kween Bugiri, Tororo, Busia, Jinja, Iganga, Mayuge, Budaka, Butaleja, Namutumba, Kaliro and Kamuli |

**MAP OF UGANDA SHOWING THE PROJECT AREA**




PREPARED BY VODP2 M&E OFFICE

Project Goal: To contribute to sustainable poverty reduction in the project area.

Project Development Objective (PDO): To increase the domestic production of vegetable oil and its 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.

**Project Funding**

| Source | Amount (USD millions) | Funding area |
|---|---|---|
| IFAD | 52 | • Oil palm: Smallholder plantation establishment<br>• Oil seeds: Extension and value chain development activities |
| GOU | 14.6 | Land in Buvuma and ferry barge services |
| Total | 66.6 | |

**Physical Performance - Oil Palm Development**

| Component | Result Area | Achievement/Milestones |
|---|---|---|
| **Oil Palm – Kalangala District** | **Nucleus estate and Smallholder estate established in Kalangala** | **Total planted -11,348 hectares**<br>**Nucleus estate - 6,500**<br>**Smallholders - 4,848** |
| | **Smallholders registered to benefit from oil palm investment** | **Total smallholders -2,063**<br><br>**Female - 805**<br>**Male - 1,221**<br>**Institutions - 37** |
| | **Smallholders incomes**<br><br>**Production loan to smallholder farmer**<br><br>**Dividends paid the KOPGT** | **UGX 4.5 Million per ha per year**<br><br>**Total loan recovered is UGX. 34.008 Billion out of the UGX 57 Billion disbursed.**<br><br>**UGX 10.75 Billion** |
| | **Smallholder oil palm fresh fruit bunch Production.**<br><br>**Crude palm oil produced (MT)** | **The cumulative Fresh Fruit Bunch (FFB) harvest since 2010, is 225,220 MT, worth UGX 110,520 Billion**<br><br>**Crude Palm Oil production in 2019 reached 40,005 MT, up from 4,692 MT in 2010, bringing the cumulative production to 218,735 MT.** |
| | **Mills** | **Total – 2 OPUL mills in Kalangala** |

| | | |
|---|---|---|
| | Constructed | |
| | Farm and access roads constructed | Total Kilometres - 651.2 kms<br>Farm roads - 544.1<br>Access roads - 107.1 |
| | Fertilizer stores in Kalangala | Total fertilizer stores - 3 stores<br>Bugala - 1 store<br>Bunyama - 1 store<br>Bubembe - 1 store |
| Oil palm – Buvuma District | Land procured for nucleus estate | 7,783 Hectares of land acquired. 5,410 Ha surveyed and demarcated, 431 Ha mapped, blocked and bush-cleared, 902.17 Ha additional land identified for purchase; |
| | Nucleus estate established | Oil Palm nursery established with 193,500 oil palm seedlings potted. |
| | Construction of office block at Buvuma | 1 office block constructed |

**MATRIX SHOWING THE IMPACT OF OIL PALM DEVELOPMENT IN KALANGALA DISTRICT**

| | Oil palm development on Kalangala Island | Figures before oil palm development on the Island | Figures after oil palm development on the Island (2019) |
|---|---|---|---|
| 1. | Annual household income | Unpredictable income from fishing | Average of UGX 9.1 million per Household per year |
| 2. | Contribution of oil palm to the National Coffers | | |
| a. | Oil palm taxes (UGX Bn since 2010) | 0 | OPUL- 99.45 Billion<br>BUL - 1,186.99 Billion |
| b. | Employment | 0 | 4,800 on farms and mills |
| c. | Income from FFB sales | 0 | Gross revenue is averaging 1.8 Billion from oil palm harvests each month. |
| 3. | Infrastructure | | |
| | Roads | 66km | 651 kms |
| | Ferries | 1 small | 3 modern |
| | Hospitals | 12 | 14 |
| | Schools | 6 | 6 |
| | Water | Streams/ boreholes | Piped water |
| | Electricity | 0 Watt | 1.6 MW |

| | | | |
|---|---|---|---|
| | Financial Institutions | 0 | 2 Commercial Banks |
| 4. | Tourism | | |
| | Hotels | 1 | 15 |
| 5. | Education | | |
| | Proportion who had never attended any school | 60 | 20 |
| | Proportion who had attained primary level education | 18 | 54 |
| | Proportion who had attained secondary education | 1 | 22 |
| 6. | Environment; Forest cover Measures to protect buffer zone and grassland areas now covered by oil palm | | |
| | Number of forest reserves | 13 | 13 |
| | Area covered by forest reserves (Ha) | 6,462 Ha | 6,462 |
| 7 | Nature of housing | | |
| | Proportion of households using iron sheets for roofing | 40% | 95% |
| | Proportion of households using earth/ sand for floors | 86% | 55% |
| | Construction material for external wall | Mud and poles (44%) | Burnt Bricks with cement (39%) |
| 10 | Main source of household lighting | Kerosene (84%) | Electricity (57%) |
| 11 | Two or more meals a day | 16% | 79% |
| 12. | Vegetable oil production and trade statistics | | |
| | Production of crude palm oil produced (MT) | 0 | 40,005MT |
| | Imports of vegetable oils (USD '000) | 103,225 (2007) | 221,471 |
| | Exports of vegetable oils (USD '000) | 62,850 (2007) | 62,090 |
| | Re-exports of vegetable oils (USD '000) | 93 (2007) | 27,719 |


**Schools, Water Transport and Electricity in Kalangala district**

**Communities around the Nucleus Estate enjoy free water supply**

**Smallholder Plantation Njoga village, with farm roads, Kalangala district**

**Smallholder in the project area have been connected to Electricity grid, Kalangala district**

**Tractors to ease collection & transportation Fresh Fruit bunches from the smallholders' gardens.**

**Bicycles for household mentors to use in training Smallholders in household planning, finance literacy, HIV/AIDS and nutrition**

**KOPGT Extension Services to Small holder farmers, Bbeta East Block, Kalangala district.**

**KOPGT Extension Services Field Officer inspecting Fresh Fruits harvested by Smallholder farmers, Bbeta East Block, Kalangala district**

**KOPGT truck delivering FFBs at the 2nd Oil Mill in Bukuzindu village Bbeta parish Kalangala district**


**First Oil Mill of 40 tons per hour capacity, Bwendero, Kalangala district**

**Physical Performance - Oil seeds component**

| | | |
|---|---|---|
| **Oil Seeds Component** | **Mill capacity utilization** | **53 mills with an average mill utilization capacity of 65% across the project hubs certificated by Uganda National Bureau of Standards (UNBS).** |
| | **Sunflower Production** | **Production per hectare increased from 2,968 MT in 2015 to 103,547 MT in 2019 in the project areas** |
| | **Soy bean production** | **Production per hectare increased from 3,408 MT in 2015 to 131,220 MT in 2019 in the project area** |
| | **Sunflower area under production** | **Area under production for Sunflower increased from 2,204 hectares in the projects baseline year to 60,710 hectares in 2019** |
| | **Soy bean area under production** | **Area under production for Soy bean increased from 4,632 hectares in the projects baseline year to 72,369 hectares in 2019** |
| | **Income per Sunflower hectare per year** | **Income increased from UGX 188,225 in 2015 to UGX 1,141,210.** |
| | **Income per Soy bean hectare per year** | **Income increased from UGX 203,950 in 2015 to UGX 1,599,700** |
| | **Extension services to farmer organizations** | **5,311 farmer groups with 60% female members. The project mobilized 167 Higher Level Farmer Organizations (HLFOs) and of these 106 were registered as Area Cooperative Enterprises (ACEs). 30% of Farmer Groups (1,646) have started functioning as Village Savings and Lending Associations (VSLAs). The project engaged Uganda Cooperative Alliance (UCA) to strengthen capacity and improve governance structures of VSLAs, RPOs and HLFOs.** |
| | **Local Seeds Businesses (LSBs) established** | **315 LSBs established – 1351 MT Foundation seed purchased and 13,655 MT Quality Declared Seed (QDS)** |
| | **Percentage of farmers per hub using** | **Lira Hub- 100%<br>Eastern Hub-45%** |

| | | |
|---|---|---|
| | **Sunflower hybrid seed** | **Gulu Hub-95%**<br>**West Nile-95%** |
| | **Percentage of farmers per hub using Soya bean hybrid seed** | **Lira Hub- 80%**<br>**Eastern Hub-80%**<br>**Gulu Hub-75%**<br>**West Nile-95%** |
| | **Production credit received by oil seeds growers** | **UGX 3.4 billion to 3,959 oil seeds farmers (37% female) by 10 financial institutions.** |



**Kaigwa Moses and a member of his group marketing soy bean Quality Declared seed at Bugobi Market.**

B: NATIONAL OIL PALM PROJECT NOPP

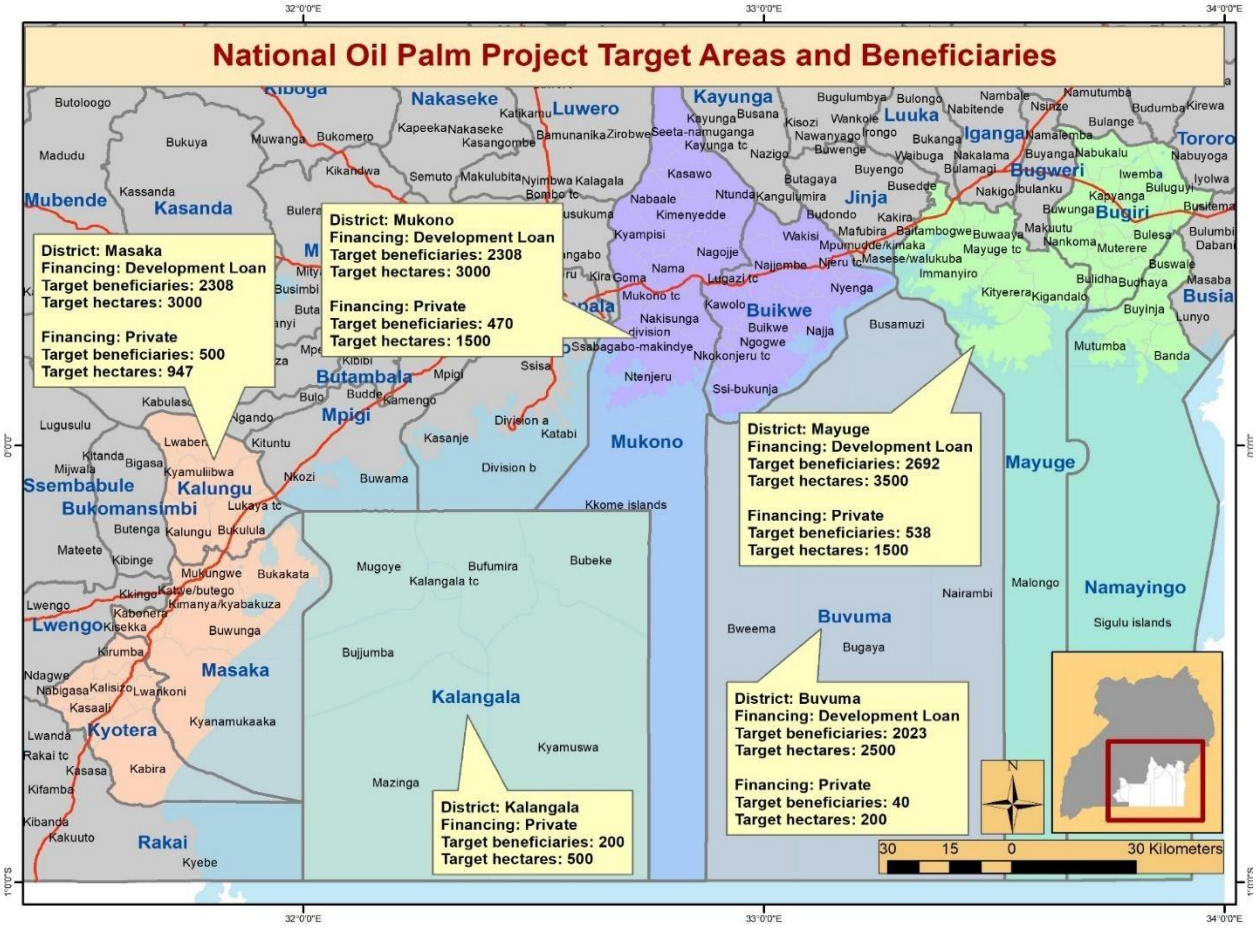
Reporting Date: September 2020
Project Name: National Oil Palm Project (NOPP)
Effective Date: November 29, 2018
First Disbursement Date: September 13, 2019
Project duration: Ten (10) years
Loan Amount: USD 75.82 Million
Project areas: Project Area: Buvuma hub, Mayuge hub (Mayuge, Namayingo, Bugiri), Masaka hub (Masaka, Kalungu, Kyotera) Mukono hub (Mukono, Buikwe & Kalangala); areas for research trials in the different agro-ecological zones.
Project Goal: Inclusive rural transformation through Oil Palm investment.

Project Development Objective (PDO): To sustainably increase rural incomes through opportunities generated by the establishment of an efficient oil palm industry that complies with modern environmental and social standards.

Specific Objectives:

1. To scale up investment in smallholder Oil Palm development.

2. To diversify and enhance resilience of rural communities among Oil Palm Growers.
3. To establish a regulatory and institutional framework for the Oil Palm subsector




## Physical Performance

| Component | Result Area | Achievement/Milestone |
|---|---|---|
| **Smallholder plantation Development** | **Buvuma Hub Establishment** | **Nucleus estate: 5,410 Ha surveyed and demarcated, 431 Ha mapped, blocked and bush-cleared, 902.17 Ha additional land identified for purchase.**<br><br>**Oil Palm nursery established with 193,500 oil palm seedlings potted, for approx. 1000 Ha.**<br><br>**Out growers: 1,456 potential farmers have been identified and registered – mapping and profiling ongoing; they have pledged 2,819.5 Ha against the target of 2,500 Ha; 264 farmers' plots surveyed, equivalent to 356.8 hectares.**<br><br>**Detailed designs of two landing platforms at Kiyindi and Buvuma completed.** |

| | | |
|---|---|---|
| | | Construction of ferry for Buvuma is ongoing, and is 48% complete. |
| | Mayuge Hub Establishment | Out growers 6,221 potential Smallholder OPGs identified and registered, and over 5,000 ha pledged by potential Smallholder OPGs.<br><br>Drafted Oil Palm Development Targeting Strategy. |
| Livelihood diversification and resilience | Kalangala Hub | 150 Households undergoing household mentoring by 30 mentors (12 Women).<br><br>Technical support to KOPGT; now self-sufficient in terms of costs |
| Oil Palm Sector Development Framework | Policy development<br><br>Research | National Oil Palm Policy development process initiated.<br><br>Research by NARO: Fusarium wilt disease surveillance conducted and disease occurrence noted to be declining; DNA extraction protocol optimised to facilitate molecular characterisation of the fusarium wilt pathogen; Oil Palm physiological disorders surveyed for in the adaptive trials in Kagadi, Bugiri and Buvuma districts and in the nucleus estate in Kalangala district - Bunch rot incidence was highest in Kagadi district; Growth and yield adaptive trials in Amuru, Gulu, Omoro and Wakiso (Namulonge) districts |

### 3.1.5 *Crop Protection*

*Introduction*

1. **Policies, laws, guidelines, plans and strategies**
   The National seed policy 2018 was approved by Cabinet and launched by Hon, Minister for MAAIF and now being popularized in the 6 regions of Uganda.
2. National Seed Implementation strategy 2018 finalized and approved by cabinet.
3. The National Sanitary and Phytosanitary (SPS) Draft Policy 2018 was tabled to TPM and Regulatory Impact Assessment (RIA) has been conducted and submitted to TPM.
4. Developed a popular version of the National Seed Policy.
5. Disseminated a popular version of the National Seed Policy across the country to key stake holders such as the DAOs and district farmer leaders.
6. Regulations on Agricultural Chemicals (Control) Act 2006; with three sections (Regulation on pesticides, Regulations on fertilizers, Regulations on application equipment) were reviewed finalized and currently at Solicitor General awaiting to be approved and signed by Honourable Minister for MAAIF, gazzetted and disseminated.
7. A training manual on safe use of agricultural chemicals were finalised, approved by the Agricultural Chemicals Board (ACB) and now used for training of agrochemicals dealers and backstopping of agricultural extension staff.

8. The Plant Protection and Health Import and Export Regulations February 2020 were finalized and gazzetted on February 2020.
9. With the launch of the online e- certification procedure for issuance of Phytosanitary Certificates, MAAIF DCIC reduced the interceptions due to documentation by 80% in the period January 2020 to June 2020. Hence all exports to be certified through the portal to ease statistical data capture and inform decision making.
10. Registration guideline for exporters of fresh fruits and vegetables finalized and disseminated on the Ministry of Agriculture Animal Industry and Fisheries website.
11. Submitted export certification procedure for Capsicum annum (Hot Pepper) to the People's Republic of China.
12. Submitted the export certification procedure of Ginger to the Republic of Egypt.
13. Submitted approval and registration of export of Capsicum annum to the European Union.
14. Developed the Sanitary and Phytosanitary Communication Strategy currently at MAAIF Technical Committee review level before forwarding to the MAAIF Top Policy.

**2. Quality assurance (seeds; agro-chemicals; plants and plant products inspected and certified)**.

1. Conducted 154,000 inspections through pack house to comply with fresh fruits and vegetables Sanitary and Phytosanitary export standards.
2. Certified the following for export: 4,267,560 metric tonnes of cocoa; 233,918,988 metric tonnes of Coffee; 2,232,000 metric tonnes of Tobacco; 31,032,568 metric tonnes of tea; 65,000 metric tonnes of flowers; 45,052 metric tonnes of fruits and vegetables
3. Conducted 1500 field inspections of horticultural crops for Sanitary and Phytosanitary compliance for export market.
4. The Department (Competent Authority on Phytosanitary Measures) underwent a European Union DG SANTE Food and Health Audit in October 2019 and marginally passed with recommendations.
5. Registered exporting companies for fresh fruits and vegetables, doubled from 60 in 2019 to 122 by June 2020; this shows that despite COVID 19 restrictions and challenges, the sector continues to grow.
6. Coordinated partnerships on Sanitary and Phytosanitary Measures as follows:
7. Launched the Sanitary and Phytosanitary Platform together with the Agribusiness Alliance.
8. Signed a Memorandum of Understanding with COLEACP a European Organisation with a mission to support African and Caribbean Pacific countries to trade safely in fresh fruits and vegetables.
9. Signed a Memorandum of Understanding with Uganda Flowers Exporters Association in which Government has committed to contribute to a tune of 500,000 to support Phytosanitary compliance for the Rose flower exports (Cut flowers).
10. Signed a Memorandum of understanding with the Chemiphar Uganda to kick start quality assurance program for agro chemicals and agricultural exports.
11. The Task Force of Phytosanitary matters conducted 9 workshops for private sector to enhance SPS compliance for horticultural exports and reduce interceptions.
12. Conducted 13 meetings for the Task Force on phytosanitary matters.
13. Inspected and certified 37,551.6 metric tonnes seed stock at ware houses of 20 seed companies.

14. Inspected and certified 2,975.5 hectares of field seed crops.
15. Conducted country wide inspection enforcements and impounded 10 metric tonnes of maize for lack of certification labels, low seed germination and viability.
16. Analysed 1,626 samples of seed to ascertain seed quality; as result a total of 21,207 metric tonnes for maize, beans, vegetables, soya beans, sorghum, sunflower and ground nuts were certified.
17. Conducted Distinctness, Uniformity, and Stability (DUS) trials for 54 candidate varieties at Ngetta, Namalere and Serere. 10 new varieties were released National Variety Release Committee (NVRC). The 6 of the varieties were from the private companies while 4 varieties were for the National Programme (NARO).
18. Variety Release Committee passed and released 6 maize seed varieties and hybrid rice varieties (the first hybrid) 7 maize varieties were deferred.
19. Among the 54 evaluated varieties, 20 were for the Irish Potato, 16 of which were introduced from the Netherlands, these have not been released.
20. The following varieties are still being evaluated: 5 maize varieties, 5 rice varieties and 5 sorghum varieties.
21. There are 9 candidate sunflower varieties whose evaluation were completed awaiting consideration by NVRC for release as new sunflower varieties.
22. Agricultural Chemicals Board (ACB) approved 66 agrochemical products for registration.
23. Registered 100 new dealers and 100 new premises
24. ACB approved 180 agrochemical dealers country wide for registration.
25. ACB approved 253 premises for dealership in agrochemicals for registration.
26. ACB renewed 167 agrochemicals, 102 dealers and 128 premises.
27. Inspected 524 agro input dealers and their premises for registration in the entire country.
28. Conducted country wide enforcement inspections and impounded 20,000l/ kg and of suspected counterfeit fertilizers and pesticides. The challenge remains largely with fake foliar fertilizers which are yarned for by unsuspecting farmers due to extremely low prices offered ; Conducted 8 trainings for a total of 600 dealers; 45% women and 55% men on safe use of agrochemicals in Masaka, Bugiri, Kasandha, Gomba, Mbarara, Masindi, Mukono, Wakiso (kabanyoro) and Kabarole districts to ensure quality of technical advice given to farmers on pesticides was improved to reduce misuse; risk associated with pesticides to human life, livestock and environment and how to guard against them.
29. Conducted 2 training for 80 agronomists (40% women and 60% men) of exporters of fresh fruits and vegetables on good agricultural practices and procedures to enable them meet
30. standards for compliance to export to European Union countries.
31. We have harmonized regional guidelines for evaluating Biopesticide which is a step towards fast tracking registration of safer products and reducing the use of hazardous products.
32. Conducted 5 sensitization workshops for stakeholders (extension workers, input-dealers, farmer's associations, and political leaderships) in 30 districts on counterfeit and banned products; a total of 800 persons, 47% women and 53% men were sensitised.
33. Conducted consultative review workshop involving MAAIF, private sector, development partners, government agencies and other ministries in finalising the of the Agricultural chemicals regulations. A total of 45 participants attended.

34. Trained 140 extension officers and DAOs from 50 districts on seed inspection and quality assurance.
35. Represented MAAIF by 3 DCIC Officers in meetings of EAC that completed development of harmonised regional guide lines on pesticides testing; has been adopted by Council of Ministers from the region and now ready for domestication at national level.
36. 25 Phytosanitary Inspectors trained on comprehension of COVID-19 by COLEACP, to facilitate improvement of export procedures by reducing incidence of contamination of horticultural produce.
37. 1 staff participated in an African Union preparation meeting in Cameroon for the 15th Commission on Phytosanitary Measures between 1st and 6th March 2020.
38. Department supported 1 inspector and 2 private sector players in fresh fruits and vegetables to attend the first East African Community regional workshop for the EAC Horticulture Association in December 2019.
39. 3 Staff participated in 3 regional meetings at East African Community Secretariat to harmonise Pest Risk Analysis and SPS measures to facilitate regional trade.
40. 21 inspectors inducted in a training in Sanitary and Phytosanitary measures.
41. 250 exporters and Agronomists trained in electronic application and registration for Fresh Fruits and Vegetables export.

**Key Challenges**

1. Inadequate staffing for the three divisions of the department (currently there a total of 68 Inspectors against the required 168 Inspectors) to effectively perform regulation and certification seed, agricultural and exports and imports of plants and plant products.
2. Absence of revolving funds to be used to timely respond to agro-input regulatory emergences like it's done in the region. We cannot tie regulation to quarterly releases if we are to be effective.
3. Production systems for horticultural exports are currently operating at 8% instead of 80% as a requirement to meet the annual of 500 million USD; currently the annual revenue is 200 million USD.
4. Inadequate laboratory equipment for seed and pesticide laboratories.
5. Interceptions on global markets due quarantine pests like False Codling Moth (FCM) and stringent international market demands on MRLs and presence of HOs, affecting export volumes, and even leading to shrinking of market.
6. Lack of modern equipment for pest and disease diagnosis and analysis of pesticide residues and other contaminants.

**Recommendations to address the Challenges**

The Ministry will

1. Recruit adequate staffing for the three divisions of the department to move from current total of 68 Inspectors to the required 168 Inspectors that were submitted to Ministry of Public service to effectively perform regulation and certification seed, agricultural and exports and imports of plants and plant products.
2. Production systems for horticultural should be improved by increasing export volumes in quantity and quality by streamlining traceability and expanding cold chain systems to be to

increase exports currently operating at 8% to 80% as a requirement to meet the annual of 500 million USD target as opposed to current annual revenue of 200 million USD.

3. Strengthen/support the Joint task force formed to address the challenge of fake agro inputs (MAAIF, UNBS, URA, MTIC, NDA, MOH)
4. Leverage ACDP project to equip the seed and pesticide laboratories with modern equipment
5. Procure modern diagnostic tools to strengthen its Laboratories capacity and train continue to train its human resource.
6. Strengthen Agricultural Police now in place to support the enforcement of Agricultural laws as a priority.
7. Part of the NTR collected by the Department should be ring-fenced and made available if we are to quickly and effectively respond to any emerging regulatory issues.
8. We need to collectively engage and sensitize farmers on issues quality chemicals and also inform them to desist compromising quality in exchange for cheap substandard products.

## **3.2** Fisheries Sub Sector Performance

### **3.2.1** Introduction

#### **3.2.1.1 Mandate of the Directorate**

The Directorate of Fisheries Resources is mandated 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 executed in 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.

#### **3.2.1.2 1.2 Functions of the Directorate**

1. Provide technical guidance for formulation and implementation of policies, plans and strategies in fish production, marketing, inspection and certification.
2. Supporting, supervising and monitoring of fisheries and fishery products;
3. Sustain market oriented fish production from capture fisheries and aquaculture.
4. Fish quality assurance and inspection for quality and safety
5. Fisheries Control and regulation
6. Support and promote aquaculture production and management

#### **3.2.1.3 1.3 Performance in line with Industrialization and Job creation.**

The overall performance of the fisheries subsector covers areas of capture fish production, aquaculture, fisheries licensing, quality assurance and exports. There was increased availability of fish both from capture fisheries and aquaculture. Sustaining enforcement of fisheries laws and regulations, led to a reduction in illegal fishing methods and gears. As a result, there was a progressive increase in fish stocks accompanied with better catches of commercial fish species mainly Nile Perch and Tilapia increased. The availability of raw material (fish) sustained operations of the 12 fish processing factories.

### 3.2.1.4 2.0 Achievements registered

**2.1 Formulation, review and dissemination of Policies.**

1. The National Fisheries & Aquaculture Bill was approved by Cabinet. The bill has now been submitted to the Uganda Printing and Publication Coorperation for gazettement. The bill will provide for a better enabling environment for development for increasing fish production through of capture fisheries, aquaculture and reduction of post-harvest fish losses.
2. Aquaculture rules were submitted to legal drafting, review of fishing rules was finalized and Standard Operating Procedures for fisheries enforcement were finalized.

### 3.2.1.5 2.2 Promotion of sustainable fisheries

**2.2.1 Capture fisheries production**

There was increase in fish catches on various water bodies. Data from Catch Assessment Surveys conducted on Lakes Albert, George, Edward and Kazing Channel show that a total of 6,637 t of fish valued at 57.82 billion UGX was estimated, with Lake George contributing highest to the catch. On Lake Albert, the total annual catch was 33,547 t valued at 761.5 billion UGX. On the other hand, fish production from Lake Victoria was 205,018.6 t while Kyoga produced 36,408.7 t. Overall, there was a notable improvement in fish production and the sizes of fish landed. Nile perch, Tilapia and Mukene fisheries continue to remain species of commercial value on all water bodies.

Generally, the catches of small commercial fish species decreased. The decline is expected as a natural cycle since increased catches of large commercial species are accompanied by a reduction in catches of small commercial species. For these species, a progressive tendency towards value addition was observed with processed and packaged products of mukene including fried, powdered and sundried being available in supermarkets.

**2.2.2 Aquaculture production**

Aquaculture continued to grow with an estimated total production of 130,000MT from 5,000 cages and 25,000 ponds from an estimated 20,000 fish farmers. Overall, the activities undertaken created a favourable environment for increased industrial fish processing and this resulted into increase in employment from which income is earned.

**2.2.3 Aquatic weed control**

The ministry, under the SSFD Project, supported fisheries monitoring, control and surveillance patrols by the UPDF, controlled fishing effort through species specific licensing and encouraged community participation in control of invasive aquatic weeds through procurement and distribution of manual aquatic weed removal equipment (wheel barrows, pangas, life jackets, forked hoes and spades. As a result, navigation and fishing operations were eased. To further the need for integrated approach to aquatic weed control, the ministry working with NARO, continued to maintain trial stations for the biological control of the Kariba weed on Lake Kyoga.

### 3.2.1.6 Monitoring, Control and Surveillance

The Ministry supported enforcement of fisheries laws and regulations with the Fisheries Protection Force. In the year under review there was continued monitoring, control and

surveillance patrols on land and water. Lake Kyoga was closed to fishing to allow recovery of fish stocks but also make reforms in the size of fishing boats. As a result of these interventions, improvement in fish stocks has been reported on all lakes. A change in the slot size of fish marketed has been observed. Most of the fish caught and marketed is of harvestable slot size.

### 3.2.1.7 Fisheries licensing and Non-Tax Revenue

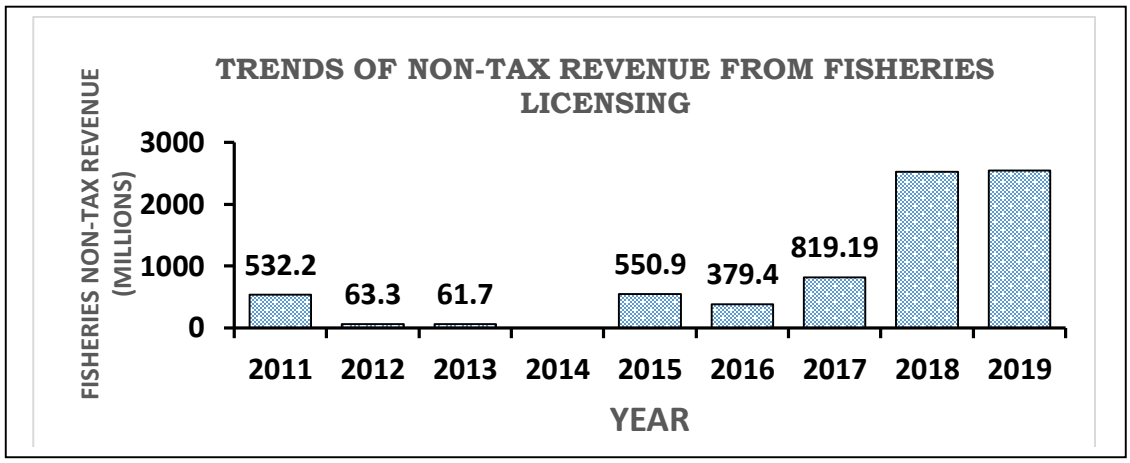
In order to control fishing effort for fish species of commercial value, the Ministry implemented species specific fisheries licensing for fishing vessels on Lake Victoria. Out of the total 23,138 fishing vessels targeted for fish species specific licensing, we licensed 10,523 which is 45% compliance. On lakes George and Edward 100% (614) fishing boats were licensed. However, in comparison to last year compliance to licensing on Lake Victoria registered an 8% decrease.

**Table 2. Status of fisheries NTR generation from categories.**

| NON TAX REVENUE FROM FISHERIES LICENSING FOR PERIOD JANUARY TO DEC, 2019. | | | | | |
|---|---|---|---|---|---|
| **CATEGORY** | **UNIT COST** | **JAN-JUNE** | **JULY-DEC** | **NUMBER ISSUED** | **TOTAL NTR** |
| **Application fees** | 10,000 | 509 | 1,604 | 2,113 | 21,130,000 |
| **Artisanal processors/fish mongers** | 50,000 | 579 | 330 | 909 | 45,450,000 |
| **Boat builders/local gear makers/repairers** | 50,000 | 8 | 3 | 11 | 550,000 |
| **By products and processed fish(dried/smoked/)transporters** | 500,000 | 210 | 66 | 276 | 138,000,000 |
| **Contained vessels by tonnage less than 5 tonnes** | 250,000 | 45 | 64 | 109 | 27,250,000 |
| **Contained vessels by tonnage less than 5 to 10 tonnes** | 500,000 | 7 | 8 | 15 | 7,500,000 |
| **Fish control permit for citizen** | 25,000 | 8,164 | 13,516 | 21,680 | 542,000,000 |
| **Fish control permit for non-citizen** | 100,000 | 0 | 90 | 90 | 9,000,000 |
| **Fish net manufacturing factories/importers** | 1,000,000 | 6 | 1 | 7 | 7,000,000 |
| **Fish processing control fee for processing factories** | 3,000,000 | 36 | 1 | 37 | 111,000,000 |
| **Fish sanitary certificate** | 20,000 | 9,197 | 5,938 | 15,135 | 302,700,000 |
| **Fishing vessels on lake Victoria, albert, Kyoga, Edward, George and Wamala** | 100,000 | 4,330 | 6,616 | 10,946 | 1,094,600,000 |
| **Large scale artisanal processing(fish maws)** | 500,000 | 34 | 8 | 42 | 21,000,000 |
| **License for vessels used or owned by non-citizens** | 2,000,000 | 11 | 28 | 39 | 78,000,000 |
| **Fishing vessels on lake nakivale and other minor lakes** | 50,000 | 41 | 1 | 42 | 2,100,000 |
| **Recreational fishing permit** | 150,000 | 4 | 3 | 7 | 1,050,000 |
| **Special license** | 25,000 | 204 | 105 | 309 | 7,725,000 |
| **Trucks carrying fish by tonnage less than 5 tonnes** | 250,000 | 217 | 47 | 264 | 66,000,000 |
| **Trucks carrying fish by tonnage 5 to 10 tonnes** | 500,000 | 93 | 16 | 109 | 54,500,000 |
| **Trucks carrying fish by tonnage over 10 tonnes** | 750,000 | 16 | 1 | 17 | 12,750,000 |

| NON TAX REVENUE FROM FISHERIES LICENSING FOR PERIOD JANUARY TO DEC, 2019. | | | | | |
|---|---|---|---|---|---|
| CATEGORY | UNIT COST | JAN-JUNE | JULY-DEC | NUMBER ISSUED | TOTAL NTR |
| TOTALS | | | | 52,157 | 2,549,305,000 |

For the year 2019, non-tax revenue realized from fisheries was 2.54 billion from all categories of licenses, permits and Certificates issued. This NTR is 2% higher than that realized in the previous year 2018. The small improvement resulted from uneven performance across districts especially on Lake Victoria. In some districts, enforcement was relaxed.




The fall in NTR realized from fishers on Lake Victoria but it was compensated by NTR from licensing 100% of the fishing vessels on lake Edward and George. The detailed NTR from each license category is shown in Table 2 on the page before this.

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Over the years, a progress increase in compliance to licensing has resulted into a corresponding increase in NTR from fisheries licensing as indicated in Figure 2 also on the page before this.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. Overall 45% of the allowed boats were licensed.

**Table 3. Compliance to fishing vessel licensing by district on Lake Victoria 2019**

| DISTRICT | MUKENE | NILE PERCH | TILAPIA | TOTAL TARGET | TOTAL ACHIEVED | PERCENT(%) |
|---|---|---|---|---|---|---|
| **Bugiri** | | | | 241 | - | |
| **Buikwe** | 400 | 205 | 12 | 1,533 | 617 | **40.2** |
| **Busia** | | 2 | | 130 | 2 | **1.5** |
| **Buvuma** | 302 | 1,210 | 22 | 5,193 | 1,534 | **29.5** |
| **Jinja** | 3 | 86 | 57 | 218 | 146 | **67.0** |
| **Kalangala** | 189 | 2,048 | 75 | 2,970 | 2,312 | **77.8** |
| **Kalungu** | | 3 | 1 | 99 | 4 | **4.0** |
| **Kampala** | | 29 | | 121 | 29 | **24.0** |
| **Kyotera** | 70 | 509 | 6 | 412 | 585 | **142.0** |
| **Masaka** | 78 | 528 | 34 | 647 | 640 | **98.9** |
| **Mayuge** | 247 | 549 | 32 | 2,903 | 828 | **28.5** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Mpigi** | 109 | 243 | 84 | 782 | 436 | **55.8** |
| **Mukono** | 188 | 481 | 183 | 3,343 | 852 | **25.5** |
| **Namayingo** | 171 | 1,198 | 1 | 2,587 | 1,370 | **53.0** |
| **Wakiso** | 66 | 730 | 14 | 1,959 | 810 | **41.3** |
| **TOTALS** | **1,865** | **7,906** | **750** | **23,138** | **10,523** | **45.5** |

### 2.2.6 Fish Trade and Marketing

Strengthening of inspection and certification services of fish and fishery products led to 131% increase in Fish sanitary certificates issued from 6,545 in 2018 to 15,135 in 2019. Accordingly, NTR from fish sanitary certificates increased from 130,900,000 to 302,700,000 UGX. The total exports of fish and fishery products rose from…..in 2018 to …..in 2019 valued at…….compared to ……in 2018. During the period under review, fish maw processing facilities were inspected and various consignments of fish maws were certified for export. In this regard, a total of …….tonnes of fish maws worth ……. billion were exported and an extra ……UGX was fetched as a levy on fish maw exports.

## 3.0 Challenges

1. Increased costs of fishing and loss of livelihoods resulting from flooding and infestation of water bodies by invasive aquatic weeds especially Kariba weed and water hyacinth. These have led to loss of fishing gear, destruction of fish handling and processing infrastructure and households.
2. 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.
3. Aquaculture is constrained by limited investment in fish farming; high cost; limited access to high quality fish seed and feed; and inadequate extension services.
4. 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.
5. Limited response and financing for the control of the Kariba Weed spread on Lake Kyoga, Albert and now in ponds riparian to Lake Victoria.
6. Lack of financing to fish landing site infrastructure developments
7. Overwhelming demand beyond budgetary allocations for inputs by fish farmers and fishing communities.
8. Inadequate transport vehicles for field activities
9. Loss of livelihoods in fishing communities as a result of strong enforcement operations

## 4.0 Actions being taken

The Directorate undertook an assessment of impacts of flooding and aquatic weeds on the fisheries and aquaculture. Following the assessment, we have requested Cabinet to approve emergency funding for addressing the negative impacts of flooding and aquatic weeds. This funding will address various management and development issues in relation to control of invasive aquatic weeds, sustain enforcement, manage fish post-harvest losses and aquaculture management.

## 3.3 Livestock Sub Sector Performance

### 3.3.1 Department of Animal Health

| Output | Indicator | Target in Ministerial policy statement | Achievement | Result/Remarks |
|---|---|---|---|---|
| Promotion of animals and animal products | No. of animal and animal product importers and exporters registered | 10 | 32 new exporters registered<br><br>The department made guidelines on importation of hides and skins, where only hides and skins meant for further processing are allowed into the country. | • There was an increment in Animal and animal product Exports from UGX 672.9 billion the previous year to 729.7, generating a non-tax revenue of 0.32 billion, despite the COVID-19 lockdown. This was due to increase in export of processed milk products. The value of imports also increased from UGX 142.6 billion to 165 billion in year under reporting. The poultry industry dominated the Import portfolio with day old chicks and concentrates taking over 60% of the imports, while milk and milk products made 85% of the export value.<br>• Registration via the electronic single window increases the ease of doing business in animal trade.<br>• Gelatin exports (made from hides and skins) increased from UGX 12 billion in FY 18/19 to 19 billion in FY19/20 |
| | | | 3 Multilateral meetings held between Uganda and other trading partners to seek for markets for animals and animal products | Two foreign markets have been accessed; Algerian market for milk powder, Equatorial Guinea market for animal feeds; UAE market for Goats meat. |
| | | | 1,600 boxes of hybrid silkworm eggs were distributed to 30 farmer groups in South Western, Eastern and Central Uganda | Distribution silk worm eggs to silverwork farmers to promote adoption of silk worm farming for production of high-quality silk for the textile industry |
| | Percentage change in rejection of | 10% | 5%<br>• Rejection of all animal feed | |

| Output | Indicator | Target in Ministerial policy statement | Achievement | Result/Remarks |
|---|---|---|---|---|
| | animal and animal products due to poor quality and safety | | imports containing antibiotics as ingredients.<br>• Rejection of importation of pig intestines.<br>• Rejection of importation of any consignment from countries with notifiable diseases | • To slow down /contain anti-microbial resistance development in animals |
| Vector and disease control in priority animal commodities | No. of animals treated by disease | **2,100,000** | **3,011,000** doses of vaccines procured against a susceptible **14.9** million cattle population. Of these 700,000 doses for FMD were distributed to 56 Districts that is: Abim, Bududa, Busia, Gomba, Isingiro, Kaabong, Kalungu, Kamuli, Katakwi, Kayunga, Kazo Kiboga, Kiruhura, Kiryandongo, Kotido, Kyankwanzi, Kyotera, Lamwo, Lwengo, Lyantonde, Manafwa, Masindi, Mayuge, Mbale, Moroto, Mubende, Nakapiripirit, Nakaseke, Nakasongola, Namisindwa, Napak, | • 700, 000 heads of cattle vaccinated against FMD; This is meant to create immunity against FMD for improved productivity;<br>• Reduce incidences and prevalence of dog mediated rabies in humans and the related costs.<br>• 500,000 cattle vaccinated against CBPP countrywide<br>• 500,000 goats and sheep vaccinated against PPR; incidences reduced due to creation of immunity against the disease<br>• 250 dogs and cats vaccinated against rabies; 200 cattle vaccinated against Anthrax during the world Veterinary day 27th April 2018 at Arua District. |

| Output | Indicator | Target in Ministerial policy statement | Achievement | Result/Remarks |
|---|---|---|---|---|
| | | | Ntoroko, Ntungamo, Pallisa, Rakai, Serere, Soroti, Wakiso, Bukwo, Sironko and Sembabule<br><br>500,000 CBPP, 500,000 PPR 500,000 doses for Rabies, and 30,000 doses of Anthrax. (Anthrax vaccine was procured by FAO) | |
| | Percentage change in animal disease and vector outbreaks | 12% | 16%<br>• FMD outbreak investigations undertaken in 53 districts<br><br>• Outbreak investigations undertaken for Anthrax in Rubirizi, Kasese PPR in Moroto, ASF & CCHF in Palisa, Nakaseke, Moyo and Kabarole;<br>• 28 DLG staff trained in e-disease reporting in Mityana, Mubende, Kyenjojo,Kabarole, kagadi, Bushenyi, Mbarara and Rukungiri<br><br>•A monitoring system for Quantifying and | • Lifted FMD Quarantine restrictions in 18 districts to aid trade in animal and animal products.<br>These were, Nakasongora, Kiboga , Nakaseke, Kayunga, Kamuli, Butebu, Mayuge, Busia, Katakwi, Sembabule, Nakapirit, Bududa, Gomba, Abim, Kaabong, Masindi, Kalungi, Lyatonde;<br>31 Districts are still under quarantine and measures have been put in place to contain the disease;<br><br>• Increase disease reporting in remote areas for quicker decision making. |

| Output | Indicator | Target in Ministerial policy statement | Achievement | Result/Remarks |
|---|---|---|---|---|
| | | | Mapping antimicrobials used in Livestock farming systems in Uganda was launched with support from Makerere University Research Innovation fund and in collaboration with stakeholders.<br><br>• 25 DLG staff trained in Laboratory diagnosis at Arua Regional Laboratory.<br><br>• Investigated acaricide use at farms; 67 dip wash samples were tested; 11 **(16.42%)** samples tested within the recommended range of concentration, 35 **(52.24%)** tested below the recommended range of concentration, 21 **(31.34%)** tested above the recommended range of concentration | • Establish a data base for antimicrobial use from importation or manufacturing to farm.<br><br>Increase the use of the more accurate diagnostic services to reduce unnecessary expenditure on disease treatments.<br><br>Farmers were guided on the proper mixing of acaricides, regular toping of dip tanks /spray races; to ensure that the right concentration suitable for killing ticks is maintained; |

| Output | Indicator | Target in Ministerial policy statement | Achievement | Result/Remarks |
|---|---|---|---|---|
| | Number of cattle dips constructed | 50 | Not achieved | No funds provided |
| Certification & inspection of animals & animal products at stock routes and ports of entry & exit. | Number of cattle trader's license procured and issued | | • 6,340 inter-district and 1,520 international veterinary certificates procured<br>• Animal movement control enforced along major stock routes throughout the Country; Kamwenge-Fortportal-Kasese route; Karuma- Gulu; Karuma-Nakasongola-Kiryandongo-Kampala; Soroti-Mbale; Hoima-Wakiso-Kampala; Mbarara-Bushyenyi-Kasese routes<br>• 9 borders supervised; Entebbe international Airport, Malaba, Busia, Katuna, Elegu, Portbell, Post office and Ware houses around Kampala, | • Increased compliance to animal and animal products movement regulations and standards<br>• Compliance to observance of animal welfare during transport of live animals increased; The Quality of meat and meat products from improved<br>• Internal and external animal and animal products movements regulated;<br>• 314,993 animals were certified to move within the Country from 41 districts; These were worth UGX 206.7 billion, fetching a revenue of UGX 1.87 billion for the Local Governments. 35.5% of these animals are destined to Kampala for slaughter, while 11.35% are destined to Kasese.<br>• Increased compliance to Sanitary and phytosanitary measures for exports and imports; 12 consignments were rejected and confiscated at ports of entry. |

| Output | Indicator | Target in Ministerial policy statement | Achievement | Result/Remarks |
|---|---|---|---|---|
| | | | Pakwach Inland port and Mutukula. | |
| Livestock marketing facility construction and inspection | Number of facilities inspected | 50 | • 27 that is;<br>✓ 3 Poultry Hatcheries; SR Afrochicks, Yokuku, Ugachick poultry breeders and Biyinzika<br>✓ 10 abattoirs; Biyinzika, Ugachick, Egypt Uganda Food security abattoir, Lira, Gulu, Apac and Ishaka Municipal abattoirs, Nyakabirizi, Muhanga and Bukiinda slaughter slabs.<br>✓ 14 livestock markets; Umoja livestock market in Lira, Akashanda livestock market-Bushenyi, Kagango livestock market-Sheema, Kamwezi/ | • Maintenance of standards to allow international trade. (Closure of livestock markets due during the COVID-19 lockdown measures affected most of the inspection activities) |

| Output | Indicator | Target in Ministerial policy statement | Achievement | Result/Remarks |
|---|---|---|---|---|
| | | | Kibanda livestock market, Ntaraga livestock market – Rukiga, Rushebeya livestock market- Rukiga, Rugoma livestock market – Rukiga, Rwamatunguru livestock market –Rukiga, Arapai livestock market – Soroti, Ochorimongin livestock market – Katakwi, Ochapa livestock market – Serere, Otuboi livestock market – Kalaki, Kanawat livestock market – Kotido, Ochero livestock market - Kaberamaido | |
| Strategies, policies, plans and Guidelines | No. of sector policies, laws and regulations formulated | 4 policies and 4 legislations (Ministry target) | • Principles for the Veterinary Practitioners Bill approved by Cabinet.<br>• Bill is under drafting by first parliamentary council | • Regulate veterinary and para-veterinary professionals in the country and minimize the use of "quacks"<br>• To guide strategic investment in the Animal Health and increase access to markets of animal and animal products. |

| Output | Indicator | Target in Ministerial policy statement | Achievement | Result/Remarks |
|---|---|---|---|---|
| | | | • PPR control strategy finalized<br>• National Surveillance Plan for AMU/C finalized<br>• Risk based surveillance plan for FMD under review<br>• National Veterinary Laboratory policy draft finalized<br>• National Veterinary Medicines and Devices Policy and its Regulatory Impact Assessment finalized<br>• Regulatory Impact Assessment report for the Animal Diseases Act validated support from the MOBIP project. | • Having these strategies in place has attracted funding from FAO and ILIRI<br>• To align the Country PPR control activities to the global plan; this will attract more funding towards the control and eradication of PPR by 2030<br>• This is for establishing an efficient and effective national veterinary laboratory system that can easily predict, prevent detect and respond to animal diseases and enhance trade in animals and animal products for the local and foreign markets<br>• This is to establish a strong regulatory framework to ensure quality, effective and safe veterinary medicines are availed on the market and their use appropriately monitored. Effective and quality drugs will enable the control of pests and diseases which will lead to increased production and productivity of the animal sector, increase incomes and improve livelihoods of farmers and all actors along the value chain thus; making animal farming a sustainably profitable venture which is part of the mission of MAAIF.<br>• The RIA is to guide the review/update of the Animal Diseases Act. The new law will strengthen disease control activities |

In the long term, the Directorate has stepped up financial mobilization through development of project proposals highlighting interventions to address issues in fisheries and aquaculture. A small scale project on Enhancing the Contribution of Small-Scale Fisheries to Food Security and Sustainable Livelihood through Better Policies, Strategies and Initiatives" is being implemented in collaboration with FAO to ensure that value addition issues of small pelagic species are addressed. To enable alternatives to capture fisheries, aquaculture is being promoted through development of infrastructure and strengthening aquaculture regulation under the Promoting Environmentally sustainable Aquaculture Project funded by the EU.

**Key issues identified**

1. Lockdown measures due to the COVID-19 pandemic affected execution of the Departmental activities.
2. Limited compliance in reporting by districts.
3. Continued occurrence of informal cross border trade in livestock and livestock products from Uganda to DRC, South Sudan and Tanzania
4. Lack of disease control infrastructure (holding grounds, quarantine stations etc) for suspected animals in most areas in Uganda
5. The failure to do field studies on key livestock diseases like Foot and Mouth Disease, Rift valley Fever, PPR, CBPP, CCPP, Brucellosis, ASF, Tick borne diseases coupled with the delayed vaccine procurement, limited funds for surveillance and delayed/ no purchase of laboratory consumables affects timely vaccination and response to disease outbreaks, which increased the number of outbreaks.
6. Trade restrictions on animal and animal products within the EAC and other countries eg restriction Milk products exports for Pearl Dairy Farms limited in the EAC, restriction of exportation of animal and wildlife products to Russia due to occurrence of FMD.

## Priorities for FY 2020/2021 in line with Agro-industrialization program

| Agro-industrialization program objective | Program Intervention | Interventions at Departmental level |
|---|---|---|
| Increase agricultural Production and Productivity | Strengthen the agricultural Inputs markets and distribution systems to adhere to quality standards and grades | • Certification of animal and animal products related imports like livestock farm machinery, day old chicks, hatching eggs, animal feeds, feed ingredients, vaccines<br>• Develop standards and grades for veterinary devices and equipment like syringes, spray races, foot pumps |
| | Strengthen systems for management of pests, vectors and diseases | • Develop and equip infrastructure and facilities for disease diagnosis and control such as; |

| Agro-industrialization program objective | Program Intervention | Interventions at Departmental level |
|---|---|---|
| | | ❖ laboratories (8 regional labs and NADDEC)<br>❖ cold chain facilities (Wandegeya, NADDEC, district vaccine carriers, regional laboratories), consumables<br>❖ holding grounds, incinerators |
| Increase agricultural Production and Productivity | Strengthen systems for management of pests, vectors and diseases | • Undertake animal disease surveillance and outbreak investigation including wildlife and fish diseases<br>• Develop human capacity for management of pests, vectors and diseases<br>❖ Trainings for staff and DLG<br>❖ Collaboration with institutions of learning to develop training curriculum<br>❖ Further studies for staff<br>❖ Zonal, port and border post staff logistical support<br>• Procure and distribution of vaccines for state-controlled diseases-FMD, PPR, CBPP & Rabies ; Increase vaccination coverage for FMD, PPR, CBPP & Rabies to at least 75%<br>• Support the veterinary drugs and vaccines manufacture and distribution through PPPs |
| Increase Agricultural Production and Productivity | Strengthen agricultural research and technology development | • Establish and operationalize collaborative mechanisms with national, regional and international research organizations on animal disease and vector control matters |

| Agro-industrialization program objective | Program Intervention | Interventions at Departmental level |
|---|---|---|
| | | ❖ NADDEC facilities for vaccine development<br>❖ Tick accaricide resistance research with CoVAB and NALIRI |
| Increase market access and competitiveness of agricultural products in domestic and international markets | Strengthen enforcement and adherence to product quality requirements | • Inspection and Certification of animal and animal products for export<br>• Train farmers and processors on sanitary measures to meet the national and international market requirements<br>• Inspection of animal product processing facilities<br>• Renovate, build and equip certification laboratory facilities in strategic locations<br>• Promoting appropriate use of Veterinary drugs |
| Increase market access and competitiveness of agricultural products in domestic and international markets | Improve agricultural market infrastructure in rural and urban areas at district and community levels | • Providing specifications for livestock markets in liaison with DAP<br>• Establishment of livestock market infrastructure |
| | Strengthen enforcement and adherence to product quality requirements | • Inspection and Certification of animal and animal products for export<br>• Train farmers and processors on sanitary measures for export markets<br>• Inspection of animal product processing facilities<br>• Negotiation and making International trade agreements |
| | Improve transportation and logistics facilities for effective product marketing and distribution | • Develop specifications for trucks and guidelines for live animal transportation |
| Strengthen institutional coordination for improved service delivery | Strengthen coordination of public institutions in design and implementation of policies, laws and guidelines | • Develop and implement guidelines and strategies<br>❖ National AMR Action Plan, Guidelines for Live |

| Agro-industrialization program objective | Program Intervention | Interventions at Departmental level |
|---|---|---|
| | | animal movement, quarantine enforcement<br>• Review and update polices and laws to strengthen coordination and collaborations<br>❖ National Veterinary medicines and devices policy, Policy for delivery of veterinary services, National Laboratory policy, Animal Disease Act |

### 3.3.2 Department of Animal Production

1. Drafted the hides and skins policy to create an enabling environment for effective regulation of the industry.
2. Finalised the development of guidelines for inspection of slaughter facilities and meat, to improve the quality and safety of meat produced for human consumption.
3. Developed protocols for establishing slaughter facilities for both public and private investments and, these are yet to be published.
4. A Residue Monitoring Plan (RMP) to guide systematic collection and analysis of meat samples to detect food safety hazards including veterinary drugs, pesticides and other chemical residues has been developed.
5. Four teams led by VPH staff carried out a scoping exercise whereby beef samples were collected from key slaughter facilities in 28 Districts to measure the level of food safety hazards and, currently analysis is ongoing at the UNBS laboratory.
6. 105 women groups were identified. The groups are currently undergoing training at UIRI, Nakawa in beef and other animal by-products value addition.
7. Mobilization and formation of value chain innovation platform started in eastern and central regions and, this is to continue in other parts of the country to promote production of good quality hides and skins for markets.
8. Inspection and approval of slaughter, meat and other by product processing facilities was done for HMH Rainbow Ltd's slaughter facility, Ms Majid Futtaim Retail's meat processing facility and Tianran Biotech (U)ltd Jinja,
9. Capacity building of veterinary staff on meat hygiene and, slaughter facility inspections were conducted in Kween, Busia, Mbale and Soroti during the last quarter of 2019/20.
10. 50 meat inspection kits were procured to aid in inspection and certification of meat. The kits are yet to be distributed to selected Districts in the country.
11. To promote legal trade of cattle/Livestock, 4000 cattle trader's licenses were procured and delivered to MAAIF stores.

12. Registration and licencing of both hides & skins and cattle traders have been done and the register updated.
13. Regulatory Impact Assessment for the Meat Development Bill developed
14. Developed draft regulations for the Animal Breeding Act to provide for certification and registration of artificial inseminators, embryo transfer technicians, animal breeders and hatchery operators finalized.
15. Stakeholder consultations on the draft National dairy development policy undertaken
16. Technical inspection and support provided to poultry hatchery operators in central, western and eastern regions of the country.
17. Cabinet Memo to support the piloting of the proof of concept for the Livestock identification and Traceability system presented to Cabinet.
18. Draft Meat investment Plan developed.
19. First meeting for mobilisation of farmers for beef cattle multiplication and fattening held.
20. First meeting for formation of the goat value chain stakeholder platform held.
21. Inspection, certification and technical backstopping of seven dairy, meat and piggery production establishments undertaken.
22. Regulatory Impact Assessment for the Meat Development Bill developed.
23. Developed draft regulations for the Animal Breeding Act to provide for certification. and registration of artificial inseminators, embryo transfer technicians, animal breeders and hatchery operators finalized.
24. Stakeholder consultations on the draft National dairy development policy undertaken
25. Technical inspection and support provided to poultry hatchery operators in central, western and eastern regions of the country.
26. The ministry and its agencies (NAGRC &DB, NARO, DDA and NAADS) supplied 20,000 Kgs of improved pasture and fodder seed to farmers, stock farms and research institutes across the country
27. Increased the national cover of improved pastures by 2,500 hectares (estimated to yield 30 tons DM/Ha/Year up from 5-15 tons DM/Ha/Year).
28. Established 48 Pasture and Fodder Production Out grower schemes to enhance quality seed supply, fodder production and conservation while increasing employment opportunities along the value chains.
29. Promoted mechanization of animal feed, pasture and fodder production through provision of pasture and fodder establishment, harvesting and storage equipment (48 Tractors, 18 grass harvesters,38 Forage choppers, 18 Hay bailers). This equipment has increased the forage production and conservation capacity by 200 tons of DM per day
30. Promoted increased access to quality animal feeds through the provision of animal processing feed equipment (24 animal feed processing units) and 4 storage facilities
31. Supported 3 vocational training centers on animal feed production, management and trade in collaboration with partners (SNV).
32. Increased animal feed exports to regional markets and reduced imports of animal feeds into the country hence generating foreign exchange earnings
33. Increased water for livestock storage capacity by 7.44 – 11.04 million $m^3$ to be provided by 337 surface water reservoirs (333 valley tanks, 3 valley dams) and 90 boreholes which Procure and install 10 sets of Automatic weather stations Established 337 Water User Committees and Associations to ensure sustainable management of new water for production facilities.

34. Strengthened 286 Water User Committees and Associations to ensure sustainable management of existing water for production facilities.
35. Inspected and certified of 3 animal feed processing establishments to ensure quality animal feeds on the market.
36. Completed 8 markets, 8 slaughters sheds, 2 quarantine stations, 4 holding grounds and 2 border check points; completed construction of 64 crushes; Construction of 8 valley tanks and 1 valley dam are 90% complete; construction of 3 valley dams is 15% started; support extended to 12 conflict mitigation platforms, procured and distributed 10 sets of forage harvesting equipment to 10 youth groups in 8 Karamoja districts, 4 Teso Districts and Kween (in Sebei region). Also procured and installed 10 sets of automatic weather stations
37. Construction and equipping of 2 holding grounds in Nshaara and Ruhengyere for beef production is 10% complete.
38. Purchased 2,700 slaughter grade animals and assorted drugs to restock government farm at Kyankwanzi.
39. Supported 4 disease surveillance exercises on trade sensitive diseases.

**Challenges**

1. Lack of reasonable funding coupled with understaffing are crippling services in the Department.
2. Lack of facilities to undertake timely diagnostic analytical services on meat and other products samples.
3. Lack of transport facilities for staff in the Division. The few available vehicles are old and constantly breakdown making their repairs/service costly to the Dept.
4. Obsolete policies, laws and regulation that are difficult/meaningless to implement leading to retarded development in livestock sub-sector.
5. Lack bylaws, ordinances, codes to regulate water facility use, operations and maintenance at community and district level.
6. Poor access to machinery and heavy equipment for construction and rehabilitation of facilities.
7. Degradation of water sources to erosion and siltation.
8. Encroachment of Water Resources Buffers (Wetlands and Forests/Woodlots).
9. Inadequate capacity for Water resources management in districts.
10. Unreliable Water Resources Information.

**Project related constraints**

1. Delays in procurement to meet set guidelines.
2. Inadequate Technical staff in the districts to implement the project.
3. Stringent Social safeguard requirements by the World Bank.
4. Land ownership disputes on commencement of works and during works by communities and Uganda Wild Life Authority and slow Land acquisition for infrastructure projects.
5. Resurgence of tsetse infestation in Kaabong and Kotido districts from the Kidepo National Park.
6. Influx of pastoralists and their herds from Kenya in search of water and pasture.
7. Insecurity (cattle rustling) in the border districts Insecurity (cattle rustling) in the border districts.

8. COVID19 close down restrictions.

### 3.3.3 Department of Entomology (UTCC)

Introduction:

**Legal Framework**

Uganda Trypanosomiasis Control Council is a statutory body under Ministry of Agriculture Animal Industry and Fisheries. It was established under the Uganda Trypanosomiasis control act1992, Chapter 211 with a mandate of elimination of livestock and human trypanosomiasis in Uganda.

**Vision**

"A Uganda free from tsetse and trypanosomiasis"

**Mission**

To provide efficient and cost effective integrated measures aimed at eliminating Trypanosomiasis from the hosts.

**Objectives**

1. To ensure the effective and efficient implementation of all aspects of the programme;
2. To formulate policies and determine priorities for tsetse and trypanosomiasis research and control in Uganda in relation to the economic and social policies of the Government;
3. To advise the Government and make to the Government such recommendations as it may consider necessary concerning the financial, human and other resource requirements for the implementation of the programme;
4. To consider and approve, in consultation with the Uganda National Council for Science and Technology established by the Uganda National Council for Science and Technology Act, any research projects arising out of the programme and to assign them to any institution within or outside the council;
5. To ensure the proper application of the results and the due implementation of the recommendations of any research activities in the programme;
6. To advise the Minister on the management and coordination of the programme at all levels, including the setting up of new research institutions; and
7. To establish units and technical services in relation to the programme.

Country Tsetse and Trypanosomiasis Status

Vector

Generally, the tsetse density in the country is low with flies trapped per day in most areas standing at less than 1. There are areas however like in and around national parks and also around water bodies that register high tsetse densities. Knowing the densities alone is not informative enough to inform the national control program. We are now embarking on determine the rate of infection in tsetse flies so as to be able to assess the risk to both livestock and human.

Disease in livestock

Tsetse fly and Trypanosomiasis continue to ravage the production and productivity of both human and livestock especially cattle in Uganda. The production parameters affected in livestock are milk production, fertility, growth rate, traction power and death while in human; it's usually loss of production time and the devastating effects of the drugs used to treat human Trypanosomiasis. The general prevalence stands at **5%,** however there are areas that register a prevalence of **above 50%** especially in conservation areas and in the cattle corridor.

Diseases in human

Uganda is the only country with both acute and chronic type of human African Trypanosomiasis. The acute type is zoonotic in nature. Epidemiologically important in maintenance of zoonotic HAT are domestic animals, notably cattle, which act as reservoirs of *T. b. rhodesiense*. The chronic form of the disease caused by *T. b. gambiense*, whose main reservoir is yet unknown, exists west of the Nile extending to most parts of South–Sudan and Congo. The acute cases have reduced from **473** in 2005 to currently **1** case in 2019. The chronic type of sleeping sickness also has a similar trend reducing from **311** cases in 2005 to **2 cases** in 2019.

3.0 Key planned interventions for 2019/20

1. Establish a Uganda tsetse and trypanosomiasis resource Centre (UTTRC) to handle awareness, advocacy, surveillance, capacity building and integrating the issues of art and culture in the control of Trypanosomiasis. The Centre will enhance surveillance, research and technology development.
2. Promoting and scaling up live bait technology in high risk districts.
3. Training and equipping community based spray persons to handle the spraying of animals in the high risk districts.
4. Scale up surveillance and treatment of positive cases for both humans and animals.
5. Creating dialogue, networks and building partnerships with development partners working in area of tsetse and Trypanosomiasis control.
6. Develop control strategies for national parks and game reserves.
7. Strengthen capacity of staff (Headquarters and Local Government) engaged in T&T control

### ***3.3.3.1*** *Achievements in the FY 2019/20*

#### *3.3.3.1.1Create enabling environment for tsetse and trypanosomiasis control*

The council and its technical committee organized and held **12 meetings** during the financial year to guide on Tsetse and Trypanosomsisis control in the country. Deliberations were made on re-positioning of COCTU to handle the tsetse and trypanosomiasis challenge. The council guided that COCTU should strive to get a vote to allow it handle its mandate better. They advised further sensitization and continued surveillance to reduce the risk. The council is still fast tracking the process of creating an understanding with Uganda Wildlife Authority on issues of T&T control in conservation areas.

#### *3.3.3.1.2 Reduce the tsetse vector and man- tsetse-animal contacts*

**Promotion of catalytic spraying in high risk areas;** Eight hundred sixteen thousand, two hundred eighteen **(816,218**) heads of cattle were sprayed with deltamethrin based acaricide as a catalyst to stimulate the communities to spray their animals in ***Bunyoro, Lango, Amudat, Kasese,***

***Rubirizi, along river Katonga, Buganda and Busoga regions. As a result,*** **1,567,413** heads of cattle were sprayed by the youth, paid for by the communities. This activity makes a cow to kill a tsetse fly rather than a tsetse fly killing a cow.

#### *3.3.3.1.3* Mass cattle treatment with trypanocidals;

Cattle are treated kill the parasites so as to improve production and reduce human infection risk. Five hundred sixty-seven thousand, nine hundred eleven (**567,911)** heads of cattle were treated with diminazene acaturate to cleanse the herds of the trypanosome parasite in ***Bunyoro, Lango, Amudat, Kasese, Rubirizi, along river Katonga, Buganda and Busoga regions.*** This is done to protect the people and also improve herd production and productivity.

#### *3.3.3.1.4 Trypanosomiasis surveillance*

Trypanosomiasis surveillance to determine prevalence was carried out in ***Bunyoro, Lango, Amudat, Kasese, Rubirizi, Isingiro, along river Katonga, Buganda and Busoga regions***. The average AAT prevalence in the areas mentioned is **17%**. This is on a higher side and can potentially affect the production and productivity of cattle in terms of reduced growth rate, calf mortality, reduced milk production and infertility. The cattle screening was done using ITS-PCR as well as the rapid diagnostic tools.

***Cattle treatment in Buyende district – Busoga Sub region to clear trypanosome parasites from the host***


***A field trial of Mini – mobile PCR machine to reduce the time between sample collection and result dissemination to the farmers.***

#### *3.3.3.1.4 Establish tsetse and trypanosomiasis resource center*

Uganda Tsetse and Trypanosomiasis Resource Centre (UTTRC) constructed started and its going to be implemented in phases. The center will domesticate the tsetse and trypanosomiasis knowledge. It will also handle partnerships & collaborations, awareness, advocacy, surveillance, capacity building and integrating the issues of art and culture in the control of Trypanosomiasis. The first phase of constructing a training hall was completed and it's in use training youth in various aspects of trypanosomiasis control.

### ***3.3.3.2** Challenges*

1. COCTU funding is inadequate to allow it execute its mandate of coordinating the human and animal Trypanosomiasis control activities in Uganda.
2. Lack of facilities to undertake quick diagnostic analysis services on samples collected

### **3.3.3.3** *Recommendations to address the challenges*

**1.** COCTU is supplementing the Government funding with International partnerships. It also continues to lobby for more funding from GOU**.**

**2.** COCTU secured 4 acres of land in Jinja and plans to start on the resource centre establishment to address some of the surveillance and T&T research challenges.

3. As the disease prevalence goes down, surveillance becomes very vital and critical. This calls for deeper understanding and strengthening of the rapid and mobile diagnostics tools so as to have real-time responses.

**4.** We also need to look into possibilities of domesticating the knowledge and tools by establishing a resource center, fully furnished with machines and equipment for surveillance

## **3.4 Agricultural Extension Services**

### 3.4.1 Introduction

Government in October 2018 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 Department of Agricultural Extension and Skills Management is one of the two departments of the Directorate of Agricultural Extension Services.

1. **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**).**
2. **Department of Agricultural Investment and Enterprise Development (**With two divisions; Division of Agribusiness Services and Division of Primary Processing and Value Addition**).**

**The Mission** of the policy is to 'promote application of appropriate information, knowledge and technological innovations for commercialization of agriculture'. While it draws its **mandate** from the **National Agricultural Extension Policy 2018.** The Policy goal is strengthen and establish a sustainable farmer-centered agricultural extension system for increased productivity and household incomes with four main objectives.

### 3.4.2 To realize the Mission the Department pursues the following objectives

1. Establish a well-coordinated and harmonized pluralistic agricultural extension delivery system
2. Build institutional capacity for effective extension service delivery
3. Develop mechanisms for packaging and disseminating appropriate technologies to farmers and other beneficiaries
4. Empower farmers and other vulnerable groups to participate and demand for services.

### 3.4.3 The department has several functions and these include;

1. Policy formulation and reviews on matters related to agricultural extension
2. Strengthen coordination of local government production departments, NGOs and private sector in provision of agricultural extension services
3. Provide technical advice on agricultural extension and advisory services
4. Setting standards for service delivery in local governments and private sector
5. Quality assurance of agricultural extension services
6. Provide information and communication services to MAAIF and local governments
7. Strengthen inter-institutional linkages between research, educational and farmer institutions
    a) Support farmer institutional development through capacity building programs
    b) Support skilling and manpower development in the agricultural sector

### 3.4.4 Key Achievements for the Department of Agricultural Extension and Skills Management (DAESM) for the FY 2019/20

**1.0 Policies, Strategies, Guidelines and Laws**

During the FY 2019/2020, the draft Cabinet paper on the principals of the National Agricultural Extension Bill 2017 was completed and presented to MAAIF Top Policy Management. Most policy documents were disseminated online and these included the: National Seed Policy and Strategy, 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 were disseminated. These included among others; 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. In addition, the Department represented MAAIF in a joint venture with MoGLSD, MTIC, MEACA, UBITEB come up with a Jobs and Livelihood Integrated Response Plan (JLIRP) to be used as a basis for offering support falling under the mandate of these listed Ministries by the supporting partners to the different refugee hosting districts. The plan is now in its final stages of development and will soon be submitted for approval and operationalization.

**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 DAESM continued to work with Development Partners and Non-State Actors in FY 2019/2020. This relationship showed marked improvements;

1. MAAIF was one of the Organizers and funders for the 3rd National Agricultural Extension Symposium. This Symposium brought together many actors both Public and Private. The Launch of the 7 day activities was done at MAAIF Premises and e-Registration of the of the Agricultural Extension Service Providers was also launched by the Hon. Minister for Agriculture, Animal Industry and Fisheries, Hon. Vincent Bamulangaki Ssempijja. This was followed by a series of virtual meetings, which were attended by and concluded by another meeting at Hotel Africana.
2. Technical Support was given to all the 135 District Local Governments and their Municipalities. To achieve this, we used the approach of having DAESM staff attachments to Districts Clustered under the 9 ZARDIs, the Department also participated in the Joint inter-ministerial Inspection of Local Governments. 121 Districts were able to submit their reports on the Agricultural Extension activities carried out in the districts, especially with support of the Agricultural Extension Fund.
3. Recruitment of Agricultural Extension staff. The Recruitment status for Agricultural Extension Officers currently stands at 4,100 (641 female and 3,459 male) compared to the approved number of 5,000 Extension Officers. The ideal number would be 12,000 Extension Officers. Table 1 below shows the staffing and the gaps for the extension workers in the DLGs.

**Table 1: DLG Staff levels as at 30.06.2019 and gaps to be filled.**

| No. | Local Government | Expected Total Number of Staff | Available Staff | Recruitment Gap |
|---|---|---|---|---|
| 1 | 135 DLG | 1,755 | 853 | 902 |
| 2 | 1,698 LLG | 4,050 | 3,247 | 803 |
| **Totals** | | **5,805** | **4,100** | **1,705** |

**Table 2: Motor vehicle and Motor cycles required in Local Governments**

| Item | Total Required | Number of Vehicles Provided | Gaps |
|---|---|---|---|
| Vehicles | 137[1] | 128 | 9 |
| Motorcycles | 2,966[2] | 1,061 | 1,905 |

The Ministry adopted and scaled up Village Agent Model (VAM) in order to enhance value chain development in the agricultural sector. In view of the existing gap between the extensions: farmer ratio. The model has brought on board the private sector working closely with farmers at the grass roots (village). A total of 6,528 village agents, traders and extension staff were trained across the country.

**Table 3: The trained Traders, Village Agents and Extension workers**

| Region | Traders | Village Agents | Extension Workers | Total |
|---|---|---|---|---|
| West | 389 | 782 | 402 | 1,573 |
| North | 491 | 1,009 | 489 | 1,989 |
| East | 589 | 1,148 | 494 | 2,231 |
| Central | 197 | 351 | 187 | 735 |
| **Total** | **1,666** | **3,290** | **1,572** | **6,528** |

1. Enhanced institutional capacity to facilitate scaling up of rural-based agricultural commercialization and agribusiness development among actors in the targeted value chains (maize, rice, Soybean and oranges).
2. Pre-season review and planning meeting for all the 135 Districts. The Department carried out an assessment of DLG performance based on reports submitted and the field visits undertaken. The districts were ranked by a team of DAESM staff and the feedback was given in this Pre–season meeting. This was in an effort to improve performance of LG.
3. Benchmarking. Three Officers from DAESM went for benchmarking in Kenya; Kisumu and Busia counties. This activity was very useful because the Officers shared and learnt a lot as far as Agricultural Extension Service delivery is concerned from the officers and farmers from these two counties. Subsequent visit to Rwanda by another Team of Officers was not possible due to COVID 19 outbreak.
4. Collaboration with Feed The Future USAID project on assessment of implementation of the National Agricultural Extension Strategy (NAES 2018) in 9 districts from the following 7 zones: Buginyanya; Kamuli, Sironko, Nabuin, Amuria, Ngetta, Lira, Bulindi; Masindi, Abi; Adjumani, Muzardi; Mubende, Mbazardi; Rakai, Mitooma. More dissemination and awareness training on the strategy to the key implementers is still necessary as more than 50% of respondents to the assessment could not easily interpret the ramifications of the strategy to the sector

### **3.4.5** Agricultural Information and Communication materials developed and disseminated

Agricultural Extension manuals for Extension Officers were developed for Poultry, Coffee, Aquaculture, Post Harvest Handling and access to markets. Dissemination of these materials was done mainly in soft copies.

[1] 137 corresponds to the total number of districts, new ones inclusive

[2] 2,966 corresponds to the current number of recruited extension workers in the LLGs out of the total required number (3,966) for all the LLGs

1. Agricultural Extension training Manuals for (Farmer Institutional Development, maize, beans, rice cassava and coffee) were disseminated to 71 DLGs
2. Agricultural Extension manuals for Extension Officers were developed for Poultry, Coffee, Aquaculture Post Harvest Handling and access to markets

### **3.4.6** Support skilling and manpower development

1. Two Officers in DAESM were supported to successfully undertake PGD courses at UMI in Public Administration & Management and Information Technology. They have now graduated.
2. The department participated in curricula review workshop meetings with Makerere University department of botany and zoology. This meeting helped to refine the curricula to meet the current needs of the agriculture sector.
3. Capacity building of extension staff on soil testing and agronomic practices in 57 districts with resources from the Agriculture Cluster Development Project (ACDP)

**2.5 Setting Standards and Quality Assurance of Agricultural Extension Services**

The Department printed and disseminated 5,000 copies to all the 135 DLG. The Department is also working with DLG to enhance uptake of technologies developed through NARO through establishment of demonstrations gardens and Field days.

**2.6 Cross–cutting issues**

The department built the capacity of Nwoya district administration and technical agriculture staff with resources from UN-Women on Climate Smart Agriculture (CSA). There is an upsurge of large scale investors in Nwoya district and plans for a fruit factory by government in the district is in advanced stages. The need for climate smart adaptation is therefore paramount.

**3.0 Key outstanding challenges experienced during FY 2019/2020**

1. Inadequate staffing and infrastructure capacity limiting effective delivery of extension services at both central and Local Government level
2. Whereas the Directorate has been able to develop extension materials, the lack of financing has affected sensitization and wide dissemination.
3. Un-coordinated movements of teams in Extension service delivery due to uncoordinated parallel programmes being implemented by MAAIF, its agencies like NAADS, OWC, UCDA, NARO and other MDAs
4. The e–diary is an effective means of tracking DLG staff performance however, the directorate is lacking funds to roll out this intervention to other districts other than the pilot ones namely Kalungu and Ntungamo
5. Due to lack of the financial muscle, there is weak supervision and ineffective monitoring.
6. Some of the very important documents being used as reference documents like the National Agricultural Extension Strategy (NAES) 2018 need review because the indicated period of application has expired yet there are no funds for this.
7. The delays to enact the national Agricultural Extension Bill 2017 has weakened the capacity of the directorate to register, accredit and coordinate service providers.

8. COVID 19 has compromised the speed at which extension service delivery was progressing, because of the requirement to meet just a few people at a go and also observe all the MoH provided guidelines as far as the control of the spread of this pandemic is concerned.

**4.0 Proposed appropriate recommendations to address the challenges**

1. There is need for more resources to be allocated to DAESM to support recruitment of staff, infrastructure development at both Central and Local Government Levels; support staff to deliver extension services safely in the new normal, for sensitization, review, multiplication and dissemination of extension materials; and also for supervision and effective monitoring of extension service delivery in the whole country.
2. There is need for effective coordination and harmonization of all Teams of Agricultural Extension Service providers both public and private to avoid collision and confusion of farmers.
3. Expedite the process of enactment of the National Agricultural Extension Bill 2017 to strengthen the capacity of the directorate to register, accredit and coordinate service providers
4. Come up with as many proposals and innovation as possible to improve service delivery in the new normal such as adopting many ICT technologies and techniques as possible. E.g. Intensification of use of telephone calls, SMSs, Spot messages and radio & TV talk shows.

### 3.5 Other MAAIF Departments

## 3.5.1 Agricultural Infrastructure and Water for Agricultural Production

### 3.5.1.1 Introduction

**Selected Achievements – FY2019/2020**

1. Supervised construction of six (6) Irrigations schemes of Doho II (1,178 ha), Mubuku II (480 ha), Wadelai (1,000 ha), Torchi (500 ha), Ngenge (880ha) and Rwengaaju (116ha).
2. Carried out detailed engineering designs for two (2) irrigation schemes of Acomai (1,480ha) and Atari (680ha).
3. Constructed 162Valley tanks and Fish Ponds mainly in the cattle corridor
4. Supervised construction of water for production infrastructure and facilities ( 7 valley tanks each 40,000m3 capacity in sevn districts and one (1) dam of 720,000m3 capacity in Kabong district) under RPLRP.
5. Construction of 7 solar powered irrigation systems at ZARDIs
6. Harvested and cleared over 150 acres of floating island and aquatic weeds on Lake Victoria and Nalubale/Kira Power dams.
7. Bush cleared 25,610 acres of new land for Agricultural Production in 38 districts
8. Ploughed 45,000 acres of land in 80 districts using MAAIF tractors.
9. Offered technical support supervision and capacity building to districts
10. Draft National Agricultural Mechanisation Policy developed
11. Technical capacity built for 200 heavy equipment operators including tractor operators, technicians, mechanics and farmers.

12. Testing and certification for 16 new agricultural machinery and equipment (imported and locally manufactured) done. This equipment included power tillers, ploughs and implements.
13. Profiled of 86 Sustainable Land Management (SLM) practices
14. Identified 12 Soil and Water Conservation technologies which are used by farmers.
15. Land use plans and community resource maps in two sub-counties for each of the districts of Manafwa, Bulambuli and Mbale districts developed and disseminated

#### 3.5.1.2 Improving Access and Use of Agricultural Equipment Through Use of LST for Agriculture Mchanisation Project

**1. PROJECT OBJECTIVES:**

The project aims to improve access and use of Agricultural equipment and machinery for:

a) Plan, Prepare, Develop and Review of the standard technical specifications, drawings and plans for the procurement, acquisition, construction, development and rehabilitation of the farm machinery, infrastructure and energy facilities for farmers access and use to boost production and productivity.
b) Developing, rehabilitation and construction of the water harvesting and storage infrastructure/facilities thus Valley Tanks, Dams, fish Ponds and canals for provision of water for irrigation, livestock and fish and to limited extent human consumption. Also promotion of deep and production wells drilling and development through use of the universal drilling rigs for sustainable supply and availability of water for agriculture production throughout the year.
c) Opening, restoration, upgrading and bush clearing of farm land for agriculture production purposes.
d) Rehabilitation, Improving and opening of farm Access roads for easy of transportation, interconnectivity and market linkage and access.
e) Opening and ploughing of farmland for agricultural use with tractors and implements.
f) Transportation and haulage of the farm construction inputs, water, farm structures and establishment of agricultural mechanization units and networking them to achieve scale economies in the country.
g) Provision of technical support and supervision of the planned and developed Agricultural Infrastructure and facilities through skilling and capacity building through construction and establishment of Regional Technical Service and maintenance centers in the country.

**2. SCOPE OF WORKS**

a) Designing, assessment, verification of the works, Quantification and deployment of the heavy equipment to undertake the development and construction of the farm structures.
b) Setting out and Valley tanks construction/rehabilitation (de-silting);
c) Develop designs for Dam construction/rehabilitation (de-silting);
d) Construction of aquaculture facilities;
e) Construction of irrigation and drainage channels;
f) Construction/rehabilitation of farm access and market roads;
g) Heavy Bush clearing (opening land for agriculture / land preparation) for agriculture use;
h) Land scaping, grading/levelling for agricultural production;

i) Haulage of water for farm use and farm materials for on farm construction and other on-farm agricultural related works/infrastructure.
j) Sensitization and creation of awareness to local communities, farmers, technicians on agricultural mechanization services and activities.
k) Building and developing capacity of farmers and local communities, other Ministries/Agencies on heavy equipment access, use, operation and maintenance.
l) Testing and certification of the equipment models prior to acquisition and use by the farmers or local communities or importation in to the country.
m) Provision of technical support and guidance to all farmers and local communities in relation to plans and agric mechanisation activities.

## 3. PROJECT PERFORMANCE & ACHIEVEMENTS FOR FY 2019/20.

**Outputs** achieved using the acquired and deployed heavy equipment units includes the comprehensive details provided in the Annex attached.

1. **296**Valley tanks/Dams (**5,795,518.9C**ubic meters or **5.8Bn** Ltrs of water) constructed and rehabilitated for provision of water for livestock, aquaculture and irrigation in the **51** districts covering all regions of Eastern, Central, Western, Northern and West Nile regions using the acquired and deployed heavy earth moving equipment and machinery sets. This has greatly increased the number of farmers accessing and using water for agricultural production thus boosting production.
2. **2,760,000m³** of water collected/hauled/transported to refill exhausted, the dry or empty water facilities both under and surface using water Bowsers (Trucks/Tanks) for Aquaculture, livestock and Irrigation during the dry spell periods especially along the cattle corridor or drought affected districts of Kiruhura, Mbarara, Isingiro, Kiboga, Mityana, Wakiso, Luwero, Nakasongola, Nakaseke, Gomba, Mpigi, Masaka, Kumi, Kalungu, Rakai, Mukono and Sheema.
3. Total of **30,310**Acres of farm land was restored, opened and bush cleared for agriculture use through uprooting, felling of the trees, removal of stamps, obstacles, anthills, grading, levelling 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 and Bulambuli districts.
4. **185** farm access roads of total **598**Kms were improved, upgraded and opened using the heavy equipment sets to ease mobility, interconnectivity, and market access or linkage in the districts of Kalangala, Gomba, Sembabule, Kazo, Rwampara, Mayuge, Jinja, Bulambuli,Wakiso,Mpigi, Mukono, Kumi, Mbarara, Kalungu, Kiruhura, Masaka, and Nakasongola.
5. **22,450Acres** 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, 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. **660** Heavy Equipment operators and technicians from the Public and Private Sector, Ministry and Agencies were skilled and trained in heavy equipment operations, use, routine maintenance and safety. This has greatly improved on the effectiveness and efficiency of the operations with minimal breakdowns and accident rate.

7. **1000** district Sites for development and construction of the new valley tanks, dams and aquaculture facilities, farm access roads and bush clearing were assessed, inspected and verified and technical requirements, specifications, drawings and designs developed.
8. Designs and drawings for the construction of the two new regional Agric Cultural Mech technical support and coordination centres in Northern and Eastern Uganda were carried completed.
9. The two agricultural mechanization units of Agwata and Buwama Regional Centres have been constructed and upgraded. This will improve on the water facilities and agricultural mechanization facilities establishment and utilization as well as farmer's access and waiting time improved.
10. Developed and implemented standard technical specifications for the acquisition and supply of the different models for procurement of the new additional assorted heavy equipment and labour saving technologies carried out to deliver them on time.
11. The added and acquired new equipment units includes: (Four assorted Hydraulic Excavators, Three Bull Dozers, Two Workshop Vans, 4DC Pick Ups, 20 Tractors of 60Hp, 2 multipurpose Drilling Rigs units, 4 water bowsers and maintenance parts).

**TABLE 1: KEY CHALLENGES AND STRATEGIES**

| KEY CHALLENGES | RECOMMENDATIONS AND STRATEGIES |
|---|---|
| - Limited and fewer number of the Heavy earth moving Equipment sets for deployment, access, maintenance and utilisation | six more heavy equipment sets be procured and deployed at regional level to ease access and utilisation by all farming communities and deployed in the established centers<br>Sensitisation of the private equipment owners to provide the services at reasonable costs.<br>Patterning with the Local Govt Ministry for the utilisation of the district equipment.<br>Funds be availed to procure more equipment sets for deployment to the regions |
| - Inadequate budgetary allocation for procurement of more **six (06) Sets** of Heavy Equipment for deployment and operations at regional level | Funds be availed and increased for urgent procurement of the **six (06) complete units** of the heavy equipment to be deployed and support the regional centers and Namalere National Agric Mech Referral Center |
| - 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<br>Provide import subsidies on all imported and locally manufactured or fabricated agricultural equipment and accessories |
| - Over whelming and High demand for access and utilisation of the heavy equipment units by all the farmers and local communities country wide. | Increasing the number of the heavy equipment units both in the center and regions.<br>Sensitising and awareness creation to all communities to promote heavy equipment services, utilisation and scheduling.<br>Encourage farmers to form groups or register to ease allocation and deployment of the heavy equipment and related services<br>Deployment schedules and plans to be systematically developed and reviewed for ease of deployments<br>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<br>Ministry plans to revitalise and operationalise the regional centers in the five regions, country wide with Namalere as a referral centre. |

| KEY CHALLENGES | RECOMMENDATIONS AND STRATEGIES |
|---|---|
| | Plans to promote and incorporate draft animal power usage in the North, East and parts of Central region to developed and rolled out<br>Partnering with the private to promote improved access for use and operation of the heavy equipment |
| - High rate of equipment breakdown. | Timely procurements and maintenance of the equipments Framework contracts should be initiated and emergency funds in form of cash advances/ imprest to ease maintenance |
| - Limited knowledge, skills, equipment, space and tools for training and maintenance of Heavy equipment and machinery | Ministry Plans to rehabilitate and equip Namalere referral workshops and **4** regional centers.<br>Ministry to start capacity building and skilling of the farmers/local population on heavy equipment and machinery operations and maintenance both in Namalere and regional centers especially the youth and women<br>Ministry also plans to establish the training college for agricultural engineering, mechanization, water, irrigation and farm land planning in Namalere to equip farmers with skills.<br>Ministry is promoting Research and development on labour saving Technologies to ease access to agric mechanisation services |

## 3.6 MAAIF Agencies

### 3.6.1 National Agriculture Research Organisation (NARO)

#### 1.0 Introduction

The National Agricultural Research Organization (NARO) is an agency under the Ministry of Agriculture Animal Industries and Fisheries (MAAIF) mandated by the National Agricultural Research (NAR) Act 2005 to undertake research in all aspects of Agricultural activities in Uganda including crops, livestock, fisheries, forestry, agro-machinery, natural resources and socio-economics. 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 sixteen (16) semi-autonomous Public Agricultural Research Institutes (PARIs). These include seven (7) National Agricultural Research Institutes (NARIs) with a national research mandate, and nine (9) Zonal Agricultural Research and Development Institutes (ZARDIs) mandated to carry out applied and adaptive research for a specific agro-ecological zone.

The vision and mission statement of NARO emphasize a *competitive society supported by a dynamic agricultural research innovation system* and *innovation for sustainable agricultural transformation*. The goal of the organization is "*to increase total factor productivity and access to agricultural research products and services for inclusive growth*." 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 is aligned to the national agricultural research policy and receives budgetary support from the Government of Uganda and other development partners. This is in accordance to comprehensive annual work plans guided by the budget policy and procedures that are aligned

to the Public Finance and Accountability Act (2015) of Uganda. The undertakings of NARO are based on the NARO Strategic Plan, Medium Term Operational Plan and Annual work plans that contribute to:

1) National Standards Indicators (NSI), the 2nd National Development Plan (NDP II) and agricultural sector outcomes and output targets,
2) National Resistance Movement (NRM) Manifesto commitments 2018-2021,
3) Sustainable Development Goals (SDGs) of ending poverty (SDG1), end hunger and achieve food security (SDG2), gender equality (SDG5) and taking action to combat climate change (SDG13).

### 1.1 NARO Strategic Objectives

The principal strategic objective of NARO focuses on contributing to agricultural transformation hinged on niche markets and industry. Specifically,

1) Develop and promote demand-driven technologies, innovations and management practices that increase niche markets for communities in agricultural sector,
2) Increase research products and services suited for vertical integration into industries,
3) Improve access and sustainable utilisation of improved agricultural technologies and innovations by communities,
4) Increase Total Factor Productivity to accelerate community institutional orientation to agricultural transformation.

NARO has registered significant achievements in the different targeted output areas that include technology generation, and promoting partnerships between research and extension through technology dissemination, promotion and up scaling along various pathways.

## 2.0 NARO Performance Highlights FY 2019-2020

### 2.1 Physical performance

NARO submitted 27 varieties to the release committee, generated 114 technologies, undertook 40 research projects under CGS, and delivered 128 technologies along the technology uptake pathways (Table 1).

**Table 1: Summary of NARO Performance as per the Key Performance Indicators**

| NARO Key Performance Indicators | Planned Targets 2019/20 | Achieved 2019/20 | Remarks |
|---|---|---|---|
| **Generation of agricultural technologies** | | | |
| Number of new varieties/ prototypes submitted to Variety Release Committee for release | 20 | 27 | - Contribution of off-budget support |
| Number of production technologies generated | 70 | 114 | - Contribution of off-budget support |
| Number of research studies under competitive grants scheme (CGS) | 38 | 40 | - Effective planning and targeting of research needs |
| **Research extension interface promoted and strengthened** | | | |

| NARO Key Performance Indicators | Planned Targets 2019/20 | Achieved 2019/20 | Remarks |
|---|---|---|---|
| Number of technological innovation platforms established/supported | 10 | 32 | - Increased interest by beneficiaries in the value chain<br>- Contribution of off-budget support |
| Number of technological innovations delivered to uptake pathways | 40 | 128 | - Contribution of off-budget support |

## 2.2 Financial performance

NARO's annual budget for FY 2019/20 was UGX 79.661 billion from Government of Uganda. The annual budget release was UGX 57.102 billion with 100 percent funds absorption (Table 2). During FY 2019/20, NARO implemented a total of 116 off-budget projects supported by development partners to a tune of UGX 41.173 billion.

**Table 2 shows the NARO Budget Performance for the financial year 2019/20**

| Source | Approved Annual Budget | Annual Budget Release 2019/2020 | Annual Budget Spent 2019/2020 | % Annual Budget Released | % Annual Budget Spent | % Annual Released Spent |
|---|---|---|---|---|---|---|
| GoU Recurrent wage | 22.472 | 22.472 | 22.472 | 100 | 100 | 100 |
| GoU Recurrent Non-Wage | 19.716 | 16.336 | 16.336 | 83 | 83 | 100 |
| Total GOU Recurrent | 42.188 | 38.808 | 38.808 | 92 | 92 | 100 |
| GOU Development | 37.473 | 18.294 | 18.294 | 49 | 49 | 100 |
| Total GOU | 79.661 | 57.102 | 57.102 | 72 | 72 | 100 |

***Source: NARO***

## 3.0 Key achievements

NARO undertakes research under the following vote functions:

i) Generation of agricultural technologies;
ii) Strengthening agricultural research extension interface and;
iii) Strengthening agricultural research capacity.

### 3.1 Generation of Agricultural Technologies

#### 3.1.1 Crops Research Interventions

***New varieties/ prototypes submitted to Variety Release Committee for release***

In the crops sub-sector, a total of 27 candidate varieties were submitted (Table 3) to the National Variety Release Committee (NVRC) of MAAIF. The candidate varieties have superior attributes over the current existing varieties with respect to yield advantage, pest and disease resistance, adaptation to drought prone environments and culinary attributes. All the technologies developed target men, women, youth and children.

Table 2: **Varieties submitted for release during the FY 2019/20**

| PARI | Commodity submitted to VCR for release | Number of varieties submitted for release | Key Attributes of the submitted varieties |
|---|---|---|---|
| NaCRRI | Rice varieties Arize Gold 444, DU363, AGRA-55, PR107, IR1052, ARU1189, MET12: | 7 | • High fibre quality (>30 mm) and strength<br>• High yielding with good aromatic taste<br>• Texture that extends and soft on cooking and non-pasty |
| NaCRRI | Maize varieties (NAROMaize63, 64, EH71, EH73) and | 4 | • Drought tolerance<br>• Earliness (75 – 80 Days After Planting) |
| NaCRRI | Vegetable varieties (tomatoes, eggplants, kales, cabbages and cucumbers) | 12 | • High yielding<br>• High fruit weight<br>• Resistance to diseases |
| KaZARDI | Potatoes | 2 | • Crispy suited for fast foods<br>• Resistant to late blight disease |
| NaSARRI | Sorghum | 2 | • Two hybrids<br>• Early maturity (100-110 days)<br>• Shorter plant height (160-170 cm)<br>• More waxy glume cover |
| **TOTAL** | | **27** | |

***Production technologies generated***

As highlighted in table 3, NARO achieved the targets of all the planned production technologies attributed majorly to off-budget projects contributions.

**Rice**

Seven (7) rice varieties have been submitted to the NVRC. These varieties include; NARO Rice 1 also known as Kafu (Code PR 107), NARO Rice 2 also known as TOCI (Code MET 12), NARO Rice 3 also known as Ayago (Code AGRA 55), and NARO Rice 4, also known as Oraa (Code ARU 1189), NARO Rice 5 also known as Achomai (Code IR 1052). The following varieties were released: Arize Gold 644, and Chiga-1.

**Figure 2 Code name: PR107, other name Kafu**

Special attributes

Plant height: Culm length, very short (52), Flag leaf: large, short, attitude, erect Leaf: collar color- light green; Color ACYN : light gold internodes: Grain: awnless, color straw colored grains, size grains 35grams/1000grains slightly bigger than the preferred SUPA V88Milled grain: white, short. Milling: Milling % (64), Whole grain (84), Quality: Amylose content (21.6), Alkali spreading value (5.9), Gel consistency (63 mm).

Figure 3: NARORICE 2, MET 12, another name TOCI

**Special attributes**

Plant height: Culm length, short (73), Flag leaf: Collar color, large, short, attitude, semi erect leaf: collar color-green; Ligule color: Yellowish green. Color ACYN: light gold internodes. Grain: awned, color straw color with purple tip, size Long big grains lines SUPA V88, Milled grain: white, short, Milling: Milling % (64), Whole grain (83), Quality: Amylose content (20.1), Alkali spreading value (7.1), Gel consistency (65 mm)

Figure 4: NARORICE-3, AGRA 55, other names Ayago

**Special attributes**

Plant height: Culm length, short (76), Flag leaf: large, short, attitude, semi erect Leaf: collar color-green; Ligule color: Yellowish green; Color ACYN: light gold internodes. Grain: awnless, color straw colored grains, size slender like Basmati, grain tip purple

Milled grain: white, short; Milling: Milling % (62), Whole grain (83), Quality: Amylose content (22),

**Figure 5: NARO RICE 4 ARU 1189, ORAA**

**Special attributes**

Plant height: Culm length, very short (54), Flag leaf: large, short, attitude, semi erect. Leaf: collar color-green; Ligule color: Light Purple; Color ACYN: green internodes: basal leaf sheath has purple lines; Purple leaf margins; Grain: awnless, color Golden, medium grains lines KOMBOKA, Lemma: coloration of keel tip (Purple tip). Milled grain: white, short; Milling: Milling % (68), Whole grain (81), Quality: Amylose content (23.1), Alkali spreading value (6.9), Gel consistency (66 mm)

The developed varieties have a yield potential ranging from 4.9- 6.5 tons/ha. Their key attributes include; maturing within 95-135 days with a good aromatic taste, texture that extends and soft on cooking and non-pasty preferred by majority of women. Unlike existing varieties, all the new varieties are aromatic and yield more by 1 ton per hectare. All these varieties are resistant to Rice Yellow Mottle Virus, Rice Blast and Bacterial Leaf Streak. These varieties will be most beneficial to farmers within the low land areas in Uganda. Figures 1- 4 show different rice varieties with their special attributes:

Relatedly, NARORICE-5, Code IR1052 (Achomai), has the following attributes; Early Maturity: 130 Days After Planting, 50% flowering: early (105 Days After Planting, Yield: 6,400 tons/ha, Culm length: 54cm, Plant height: Culm length, very short (54 cm), overall height. Panicle type: Panicle exertion. Flag leaf: large, short, attitude, semi erect Leaf: collar color-green; Ligule color: Yellowish green Color of internodes no ACYN underlying: light gold Grain: awnless, lemma color straw, size long big grains lines SUPA V88, Milled grain: white, short Milling: Milling % (65), Whole grain (85), Quality: Amylose content (21.8), Alkali spreading value (7.2), Gel consistency (65 mm). Taste: Highly Aromatic. Texture: extends, soft on cooking, non-pasty. Resistance to: RYMV, Rice blast and BLS

**Maize**

Four (4) Drought Tolerant Maize Varieties with yield potential averaging 8.5 tonnes per hectare have been submitted for release. These are; ADV2309W, ADV2310W, UH5961, and UH 5962. The varieties were developed to respond to biotic and abiotic stress, increase in the seed sector competitiveness for both regional and domestic market demand for exclusive variety promotion in addition to enhancing on-farm grains.

ADV2309W

ADV2310W

**Figure 6:ADV 2309W and ADV2310W Varieties**

The ADV239W and ADV2310W (Figure 5) are tolerant to foliar disease of Grey Leaf Spot (GLS), Maize Lethal Necrosis Disease (MSN), Turcicum and common rust disease. The special attributes for ADV2309W and ADV2310W include 110-130 days to maturity and yield 6-8 t/ha, while the UH5961 and UH5962 (Figure 6) are bred for mid-altitude DT with maturity period of 120-130 days and yields of 7-8t/ha. In maize farming, women and youth are more involved in weeding and harvesting. These early maturing varieties will require less weeding time hence giving women and youth more time to household activities.

CKH135960 (UH5961)-Naro maize 61

CKH135975 (UH5962)-Naro Maize 62

**Figure 7: UH5961 and UH5962 Varieties**

**Sorghum**

Two candidate sorghum varieties were submitted to the NVRC. The released NARO sorghum hybrids varieties are; PAC 501 and PAC 537. The special attributes of Variety PAC 537 are; medium maturing 110-120 days, high yield potential of 3200-3500kg/ha, tolerant to shoot fly and stem borer, tolerant drought and lodging. Six (6) low tannin sorghum lines are under NPT (other key traits are; striga and stem borer resistant, tolerant to drought). Women prefer the low tannin sorghum for food and the shorter plant height makes it easy to harvest by all

Medium maturity (120 days)
Less waxy glume cover
Leaf angle is 45 degrees
Compact elliptical panicle
Shorter plant height (160-170 cm)
Light yellow leaf midrib Less thick stem

**Figure 8: Sorghum Variety (PAC537)**

Early maturity (100-110days)
More waxy glume cover
Greater than 45 degrees
Semi compact inverted pyramidal panicle.
Plant height (190-200) cm
Slivery white mid rib

**Figure 9: Sorghum Variety (PAC501)**

## Vegetables

Vegetables are important sources of many nutrients necessary for growth and development of children as well as expectant mothers. These nutrients include potassium, folic acid, Vitamins A and C. In an effort to increase production levels of vegetables, NARO has submitted for release twelve (12) vegetables. These comprise of two varieties of each namely; tomatoes, eggplants, cabbage, Kale, cucumber and Chinese cabbage and high yielding of the varieties.

The Kale varieties of matjang and jelguijok are high yielding with more leaves on the plant, soft with a palatable test and they do not flower during the hot weather. Two eggplant varieties have been submitted for release (Miggeuni and Heukmi). Miggeuni is highly tolerant to the bacterial

wilt and fusarium crown rot and a long fruit size. Heukmi is highly resistant to bacterial wilt and fusarium crown rot and big fruit size.

Additionally, the Chinese cabbage varieties, Bualm3ho and Noranja on average are high yielding 1.1 to 6.2 kgs and 0.9 to 5.8 kgs respectively. Generally Noranja and Bulam3ho varieties have less disease infection as compared to local varieties. Noranja is more resistant to Diamond backmoth. Cucumber varieties - Gangryuk-samcheok and Sinbi-nakhap – were also released. Their special atributes include; resistance to cucumber mosaic virus, resistance to powdery mild dew, fruit yield tonnage for Gangryuk-samcheok and Sinbi-nakhap is 21.4 t/ha and 9.6 t/ha respectively.


**Figure 10:Tomatoes Varieties Ten Ten and Pink Top**

### 3.1.2 Livestock research

During the FY 2019/20 livestock research in NARO focused on vaccine development, forage seed and feed production, maintenance of elite livestock herds, and relocation and operationalization of Nakyesasa and Maruzi campuses. The approach is from production to product support by circular research interventions.

*Vaccine Research and Development*

NARO has constituted a Vaccinology Research programme at NaLIRRI under which all vaccine research and development is being undertaken. The team has embarked on developing three vaccine products (Anti-tick, FMD and ASF vaccines research). Developing livestock vaccines will enhance food and nutrition security, household incomes and household insurance. Ticks are the most economically important livestock pests, which affect livestock health. The death of an animal affects the stability of a household. Hence, women are safe and secure where their animals are healthy. Key achievements are as follows: -

- Four candidate anti-tick vaccine candidates namely *Rhipicephalus appendiculatus* (NARO-RA), *Amblyomma variegatum* (NARO-AV), *Rhipicephalus decoloratus (*NARO-*RD)* and a *cocktile vaacine* (NARO-CV) were formulated and evaluated on 50 experimental cattle comprising of indigenous and Friesian crosses in an on-station evaluation trial at Nakyesasa. The cross-protective efficacy of NARO-RA, NARO-AV, NARO-RD and NARO-CV vaccines against the three ticks (namely brown ear tick, blue tick and bont tick) was 88, 88, 50 and 63% respectively. Overall, the mean cross-protective efficacy for all the vaccine candidates was 75%. Other than NARO-CV, all the other vaccines performed better than the only commercial

anti-tick vaccine whose efficacy against cattle tick species (*Boophilus microplus*) is 50%. It is worth noting that the latter vaccine is the only commercial anti-tick vaccine in the whole world currently used to control cattle ticks in Cuba. The two NARO vaccines namely NARO-RA and NARO-AV that demonstrated high efficacy levels against native tick species in Uganda present an exciting possibility for sustainable control and management of tick burdens in Uganda's livestock sector. The results of the study were synthesized into a high-profile manuscript, which was submitted to the world's leading journal in vaccinomics called "Vaccines" with Impact Factor 4.76. The manuscript has been reviewed and the authors have been asked to address minor comments prior to publication.

- Efforts towards the development of a Foot and Mouth Disease (FMD) vaccine during the FY 2019/20 focused on institutional capacity building for serotyping native FMD virus strains through acquisition of an Antigen Elisa Fast IZLER Kit capable of serotyping the circulating FMD virus serotypes in one day. NARO acquired serotype specific primer sets for serotyping four different serotypes (O, A, SAT1 and SAT2.). A total of 42 suspected FMD field samples were screened and serotyped, and the results showed that O and A were the circulating FMD virus strains in three sampled regions of Uganda. Also, a reliable virus repository (pathogen bank) capable to maintain pathogens at negative 80$^{o}$C to enable long term storage of different viruses and pathogens has been established. In addition, NARO has established a National FMD vaccine evaluation platform to support the country in evaluation of imported FMD vaccines before they are used in the country. Connectedly, the imported Foot and mouth disease Vaccines from Kenya and Botswana are being evaluated on station at Nakyesasa to guide Government on their effectiveness in the Ugandan environment.

- As a step towards developing efficacious vaccines against ASF virus of genotype X, NARO has developed the first-ever soft tick colony in Uganda. The soft ticks, collected from Western Uganda, are the primary reservoirs of the ASF virus from warthogs and are suspected to maintain ASF outbreaks from the wild to the domestic pigs. The ticks are being multiplied and carefully prepared for isolation of circulating ASF virus strains in Uganda. In addition, NARO scientists collected viruses from an active outbreak from Eastern Uganda and these are currently being studied for development of the most common genotype IX ASF.

*Improve tick control*

NARO has provided information to dairy farmers about the choice of method used in chemical acaricide application for more effective control of ticks and tick-borne diseases. At an average herd size of 80 head of cattle, a farmer has to either invest UUGX 107.7 million (US$ 28,710) in motorised pump, UUGX 145.1 million (US$ 38,695) in a spray race or UUGX 266.4 million (US$ 71,040) in a bucket pump every 20 years. However, for more cost-effective use of each of these methods, a farmer with a herd size of 40 - 112 should use a bucket pump, a motorised pump if the herd size is 35 - 170 or a spray race for a farm keeping 100 - 600 head of cattle.

*Forage improvement and conservation*

Livestock forages are very important in households practicing zero grazing. They are also known as primary boosters of milk production. Women, mothers, children, the elderly and the sick are the prime beneficiaries of milk and milk products. In the effort to develop high yielding, drought

resilient and highly nutritious forage varieties for livestock, NARO has established a vibrant forage improvement program. In the FY 2019/2020, NARO has developed four Lablab candidate lines namely NAROLAB-1, NAROLAB-2, NAROLAB-3 and NAROLAB-4 with high levels crude protein amounting to 31, 28.6, 28.2 and 27.7% respectively as compared to commercial lablab variety (Rongai variety) with crude protein content of 24.5%. The candidate lines are currently under multi-locational trials in preparation for official release by the national variety release committee. As regards to conservation of native and exotic forage and pasture germplasm, NARO continues to maintain and conserve over 300 species of native fodder grasses, pasture grasses, herbaceous forage legumes and fodder tree species to safe guard against genetic erosion of indigenous germplasm. Current efforts are underway to assemble, characterize and evaluate over 1000 lines of forage germplasm in East and Southern Africa for food and feed.

*Forage seed production and feed preservation*

In an effort to address the challenge of scarcity of livestock feed, NARO continues to be the leading producer of forage seed and conserved feed in the country. In the FY 2019/2020, NARO produced over 315 Metric tonnes (MT) of hay and silage that was availed to farmers across the country to address the challenge of dry season feed scarcity. NARO has also supported farmers with feed conservation equipment at a cost-recovery basis to enable mechanised hay and silage production on over 500 acres resulting into production of over 10,000 tons of conserved feed notably silage. As regards to forage seed production, NARO continues to be the leading producer of elite forage/pasture seed to address the national forage seed demands. During FY 2019/2020, NARO produced over 2 metric tons of foundation seed for *chloris gayana* that was availed to farmers to rehabilitate over 300 acres of degraded pasture in the cattle corridor of Uganda notably in Nakasongola, Nakaseke, Masindi, Kiruhura, Koboga, Kyankwanzi, Mbarara, Sembabule and Karamoja region.

*Genetic improvement and conservation of indigenous cattle and goat breeds*

- Desirous to enhance the productivity of native livestock breeds coupled with the need to safeguard against genetic erosion, NARO has continued to improve and conserve indigenous cattle breeds notably Ankole cattle mainly at MbaZARDI, Small East African Zebu at Serere and Nganda cattle at Kamenyamigo.

- NARO has continued to facilitate community-led goat improvement schemes in Hoima, Nakapiripiri, Napak and Masindi Districts with the aim of selecting elite Mubede and Small East African indigenous goat breeds. The intervention focuses on systematically, identifying and selecting elite young male goats and use them for breeding within the goat farming communities in the above districts. During the financial year 2019/2020, a total of 16 and 18 elite breeding bucks were selected and exchanged among members of breeding groups in Kyabigambire and Buseruka sub-counties respectively. The breeding objective is to improve body weight at six months from 10 kg to 18 kg, and twinning ability from 30 to 50 %. During the financial 2019/2020, the intervention results in elite goats with 15kg at six months. Consequently, the participating farmers were able to sell 136 elite breeding animals at a cost of 300,000/= each compared to the 100,000- 150,000/= they used to sell at the local market before the intervention.

*Evaluation of exotic dairy breeds in Uganda conditions*

Desirous to guide the country on the best dairy breed under Ugandan conditions, NARO introduced the Viking Jersey dairy breed. During the FY 2019/20, NARO has evaluated the performance of Viking Jersey calves under intensive production systems. The results of the study revealed that the average daily weight gains of the calves during pre-weaning phase ranged from 392.9 g/day to 654.8 g/day with an average 532.6 g/day. During post-weaning phase, the mean daily weight gain for all calves was 450 $gday^{-1}$. Because the Jersey is a small animal with mature live weight of about 320kg, results on growth performance revelled that the calves reached 60% of the mature live weight (210kg) in 16 months. Attaining 60% of mature live weight implies that that the animals has attained sexual maturity and has reached mating weight. Therefore, as compared to other exotic dairy breeds like the Friesians and Ayrshire that attain mating weight in 24 months, the Jersey can be mated between 14 and 16 months. NARO will continue evaluating the performance of the breed in various parameters including feed utilisation efficiency, biogas production potential, adaptability, and disease tolerance among others.

*Relocation and Operationalization of NaLIRRI at Nakyesasa and Maruzi*

NARO has continued to transfer NaLIRRI to Nakyesasa and Maruzi campuses following the establishment of a phosphate fertilizer production complex at Tororo where NaLIRRI was housed. During the FY 2019/20, NARO has made significant progress towards acquiring a land title for 10 square miles of Maruzi ranch. The title has been processed and awaits transfer in to NARO's name. In order to strengthen capacity for large scale mechanised feed and forage production to address to the feed scarcity challenge in the country particularly during drought, NARO has established an implement and machinery workshop equipped among others with two tractors, hay baler, forage choppers, planter, boom sprayer and ploughing implements at Maruzi. To sustain availability and supply of quality forage/pasture seed and conserved feed resources notably hay and haylage to livestock farmers in Uganda, NARO established and maintained over 500 acres of forage production fields for different forages including *chloris gayana*, fodder maize, lablab, Brachiaria and Alfalfa among others at Maruzi and Nakyesasa resulting in production of 315 tons of conserved feed resources and over 2 metric tones of forage foundation seed.

*Stingless bee research*

NARO is increasing the potential of stingless bees in Uganda towards improved pollination, medicinal, and ecology. So far, four (4) stingless bee species have been identified (*Meliponula bocandei M. ferruginea, M. nebulata* and *Plebeina hilderbrandtii*). *M. bocandei* and *M. ferruginea* so far exhibit potential for commercial value and are under evaluation. Two stingless beehive prototypes (NAROSBH 1 & NAROSBH 7) have been developed and are being tested for the domestication of *M. bocandei, M. ferruginea* and *P. hilderbrandtii.* Three novel and high value stingless bee products (honey, pollen and propolis) for use in the in food and pharmaceutical industries have been developed and are being profiled physio-chemical properties.

*Rangeland improvement*

NARO has demonstrated that rangelands can be improved and enhanced to reduce drought related constraints, reduce livestock migration, and boost household dry season feeding in the

Karamoja sub-region. In this effort, NARO rehabilitated 85 acres of degraded pasture and established 35 acres of improved drought tolerant dry fodder banks in Nakapiripirit, Nabilatuk and Moroto districts. Rehabilitation of degraded pastures involved removal of unpalatable species, introduction of improved grass and legume species namely *Chloris Guyana*, *Cenchrus Cilliaris, Centrosema pubescens* and *Glycine max*. In addition, there was conservation of the improved pastures during the wet season and controlled rational grazing of the rehabilitated fields during the dry season that October – April with a peak between January to March. Results obtained indicated that the biomass dry matter weight of rehabilitated sites was six (6) times that of non-rehabilitated sites. The total area under pastures rehabilitated (115 acres) could sustain 300 livestock units of 250 Kg for during the peak period of the dry spell of 95 days. Besides, fodder production from 47 acres could sustain 300 livestock units for 101 days without migrating. This implies that by rehabilitating and implementing protective grazing on one (1) square mile, pastoral communities raising 3,000 to 8,000 livestock units per kraal are able to retain 1500 livestock units without migration. This would save kraals average loses due to mortality of 15 per cent of the herd during migration valued at not less than shillings 225,000,000 per annum per kraal. Five (5) Beneficiary committees of nine (9) members each comprising of kraal leaders, local council leaders, elders, representatives of livestock owners, herdsmen leaders, land owner/host farmers, women and youth mobilisers, animal health workers, Village Health Teams (VHTs) and community demonstration site attendants have been established, skilled and tasked to ensure post-project sustainability in all project sites.

### 3.1.3 Fisheries research

Research undertakings in fisheries during the FY 2019/20 have achieved the following;

- Adopted a POCKIT™Nucleic Acid Analyzer diagnostic kit, and validated TILV detection protocols of Chang et al., 2012 and Tsai et al., 2012 using IQ Plus™ TiLV Reagent sets.
- Quality brood stocks/seed (faster growing) of Tilapia (seed - 108,688; brood stock - 1,340) and African Cat fish (seed - 30,415) has been provided to six seed multipliers and 136 farmers. In addition, multiplication and maintenance of improved Nile tilapia and the African catfish at Kajansi ARDC has been strengthened. Two thousand Nile tilapia broodstock were collected from Lake Victoria and are currently under acclamatisation on-station before use in selective breeding of the species,
- The abundance, diversity and type of plastics in sediment and water have been established to aid planning and mitigation measures for plastic pollution on Lake Victoria. In addition, distribution maps of hotspots of micro plastic occurrence and diversity in sediment and water of Lake Victoria have been produced,
- Annual fish production trends and economic value of fish catch production as of 2019 in lakes Albert (335,000 tonnes valued at 700 bn), Edward, George and the Kazinga Channel (6,630 tonnes valued at ~ 47 bn) have been generated. This will inform developing strategies for improving fisheries sub-sector,
- Evaluation of ecological status of two pollution hotspots (Murchison bay and Napoleon Gulf) on Lake Victoria is on- going. This information will aid monitoring of pollution as a result of human activities,

- Production of value-added products (fish sausages). Received additional support to upgrade production line from 0.5 tonnes to 10 tonnes per day at Wakiso district. Prior COVID 19, produced 3 tonnes per day for local and regional markets (Kenya, DRC & Rwanda), Live fish sales have increased from 100kg to about 500 kg per day in Wandegeya Market. The project received extra support from *MSINGI* to install a cold chain to increase sales to more than 5 tonnes per day. COVID 19 affected sales during lockdown: closed markets.
- Land with its title has been secured and structural designs approved for establishment of proposed satellite fisheries research station on Lake Albert,

### 3.1.4 Forestry research

- Under the forestry sub-sector, NARO directed research interventions on tree species and management options, medicinal tree database establishment and supporting households' soil and water management. These interventions registered the following achievements;
- Suitability maps were developed for tree species and management options across different sites in Eastern Uganda and farmer circumstances that depict erosion hotspots, runoff potential and appropriate land and water management options,
- Smallholder farmers in 14 villages of Manafwa and Kapchorwa districts have adopted calliandra fodder shrubs, resulting in a 2 fold increase in milk production of their cows. .
- Biological agents (4,650 C. nockae and 2,000 P. bliteus) released against bronze bug and Red Lerp Psyllid in the field. Field performance of C. nockae and P. bliteus bio-agents in the field rated at over 70 % effectiveness. Sampling for resistant Eucalyptus species/hybrids done in Eastern and Western AEZs. Leaf samples from susceptible and resistant Eucalyptus trees collected for genetic identification. The biological control agents, particularly *P. bliteus* released much earlier are a success and have saved over 50,000 ha of Eucalyptus equivalent to 1.75 trillion Uganda Shillings from being wiped out.
- A database of tree and shrub species used in diabetes treatment in Uganda was assembled, and will contribute to efforts towards development of a herbal cure for diabetes in Uganda.
- A total of 550 households were supported in use of water management technologies namely; contour grass strips, terraces, and unlined, run-off ponds for irrigation in Eastern Uganda. Significant improvement in soil health has been observed as indicated by improved crop yields
- Optimized a protocol for tissue culture mass micropropagation of bamboo seedlings that will eventually sustain the raw material base for development of various value-added bamboo products. Further, over 50,000 bamboo seedlings involving two species – Giant bamboo (*Dendrocalamus giganteus*) and common bamboo (*Bambusa vulgaris*) have so far been conventionally produced in Kifu green houses.

### 3.1.5 Tea research

Tea research and development activities focused on identifying high quality speciality tea clones for commercialization, tea agroforestry, and climate and landscape smart tea practices. A total of 140 tea accessions at Rwebitaba Tea Research Centre were analysed and characterized using eight biochemical markers that included polyphenols, catechins flavonoids, fermentation rate, crude fiber, caffeine, colour, and brightness. Based on high fermentation rate and polyphenol content, 14 tea clones were found superior for black tea, and thus potential candidates for

commercialisation. Further evaluation of these clones for agronomic and resistance traits, is on-going.

To understand the contribution of agroforestry trees in tea farming, a survey was conducted in tea growing areas of Kabarole and Kyenjojo. The results revealed a need for increased adaption of agroforestry trees in tea farming as one of the major promising climate smart practices contributing significantly to sequestration of greenhouse gases. Furthermore, NARO in collaboration with its partners, especially Solidaridad, Rainforest Alliance, and Smallholder Tea estate factories developed a Manual on Tea Climate and Landscape Smart Tea Practices for Uganda. The manual will support sustainable climate and landscape smart practices for tea production in Uganda. NARO also built capacity of 250 key tea stakeholders in sustainable tea production.

### 3.1.6 Agricultural engineering

During the FY 2019/2020, NARO developed a second prototype of ram pump (NARORAMP-2) with a higher discharge of 1,440 lts /hr at delivery head of 4m and two models of second generation of commercial food grade fish smoking kiln (NAROFIK-3-D4 and NAROFIK-3-D6) with capacity of 400 to 700 Kg/day. Use of the ram pump has increased vegetable cropping regime from 2 to 3 per year and farmers along rivers and streams can now grow vegetables and earn a living all year round. The fish kiln (Figure 1) processes high quality smoked fish and has reduced cancer-causing compounds in our smoked fish from 40,000 *ppb* to 0.88 *ppb* well below the maximum limit of 2 *ppb* set by EU markets.

**Figure 11: NARO PAH-Safe Fish Smoking Kiln – NAROFIK-3-D6**

This has enabled Ugandan smoked fish competitive in export market. The expected lifespan of the entire kiln assembly is 20 years without any major repairs. After 20 years a new heat insulation system will have to be built on the stainless steel part of dehydration chamber. In addition new smoke generation and filter units are fabricated thus producing a new kiln using the same stainless steel section of the dehydration chamber. When in operation, the kiln should be placed in a well-aerated housing structure.

In addition, NARO is promoting smallholder agricultural machinery hire service enterprises that increase access of farm machinery to farmers at same time creating jobs for the rural people and the youth. To this effort a total of 60 multi-crop planters, 27 NARO lightweight rice threshers, 23 food grade cassava chippers, 75 Ox-weeders were distributed to 63 farmer entrepreneurs in 25 sub counties, in Acholi sub-region and Adjuman district. Furthermore, skills of 488 (40% women) farmer entrepreneurs and equipment operators in Kitgum, Lamo and Agago districts was enhanced in operating equipment hire service as business and processing high quality cassava chips and flour.

### 3.1.7 Value addition

In a bid to promote agro-industrialisation and create niche markets, NARO has directed part of its efforts to value addition, and the following achievements were registered;

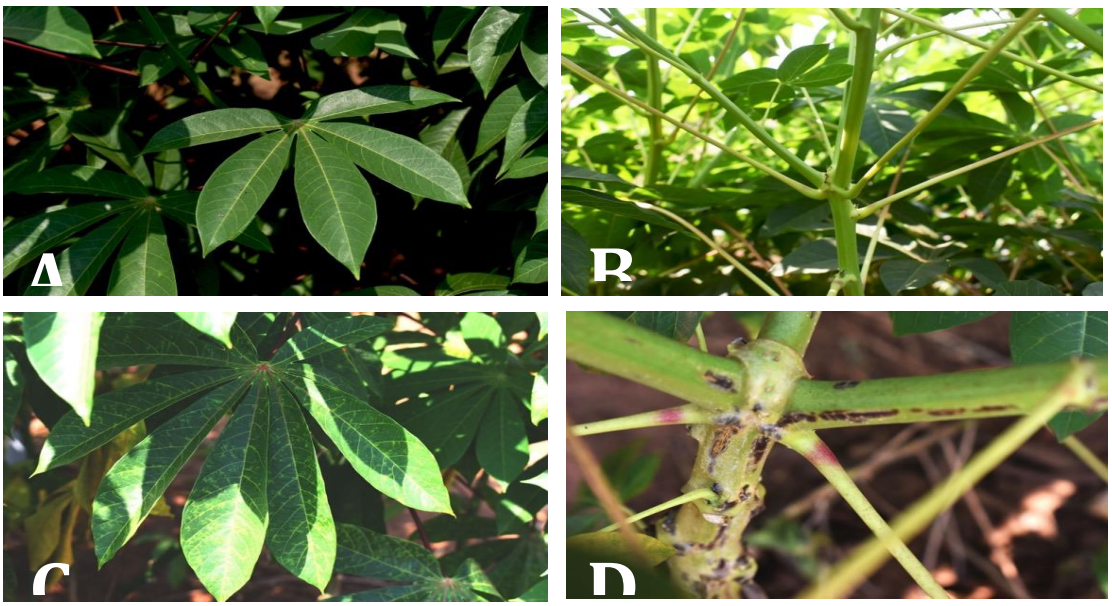
- Milk fortification was undertaken to improve on micronutrient status and alleviate common health problems. Development of safe and stable milk-based nutraceutical products with anti-ulcer, diabetes and cancer properties are ongoing. In addition, plant-based pharmaceutical compounds: tannins, phenols, flavonoid, antioxidants, anthocyanin for evaluation of anti-cancer, anti-ulcer and anti-diabetic properties were extracted, bulked and constituted in milk-based products. To date, 50 plant species were screened for availability of target biochemical compounds. 11 plants were pre-selected based on Frap values, availability in the community and ease of extraction. The 5 best plants based on the above criteria were chosen for fortification in yoghurt samples. In addition, a complete blood profiling protocol for testing in mice based on production of antibodies and other blood parameters against the target ailments has been completed for submission to the research and ethics committee for approval.
- Three Market oriented fish products were generated (Nile perch oil with respect to optimizing protocols for Nile perch oil production; Plant N (bio-control agent for fish pathogens); Waste water cleaning algae),
- A feed mill at Kajjansi ARDC has been repaired and production of 9 ton/week fish feeds including powder and pellets for sale to farmers is on-going,
- Two snack prototypes of a nutrient dense (pro-vitamin A, protein, Iron and Zinc) Market-Smart AroNutro Instant Maize Snack were developed.
- A total of four (4) starter culture formulae for processing milk products (1 for ghee; 2 for yogurt and 1 for probiotic yoghurt) were developed. This has improved the quality of traditionally produced products (yoghurt, butter and ghee) of at least 2 cottage industries in which about 500 women are involved in dairy product processing and marketing.
- The main cooking and beer brewing banana varieties with potential for high banana juice yield in southwestern Uganda have been identified and mapped. The 4 cooking banana

varieties are Kibuzi, Mbwazulume, Ntalagaza and Nshasha; and the 6 beer brewing varieties are Mbidde, Musa, Kisubi, Kayinja, Mufunyakobe and Fhia 23. Most important is that one banana variety that is market-preferred and with the best juice and wine producing attributes and well adapted to the local agro-ecological conditions has been selected for use by the industries.

- One (1) enzymatic banana juice extraction method has been developed. This method, which uses Pectinase enzyme at 0.08% (by weight) can propel the banana juice processing cottage industries to a much higher level. Use of the method greatly reduces labour, reduces fuel energy, reduces extraction time and enhances the quantity and quality of banana juice and wine produced.
- Two (2) clay-based anti-aflatoxin formulae designed for pre-treatment of maize bran-based feeds. Treatment of maize bran with the aflatoxin binder (developed from the locally selected minerals) reduces the aflatoxin content in the animal feeds by 80-98%, that is, a percentage higher than any commerce available aflatoxin binder on the market. This significantly reduces the risks associated with the consumption of aflatoxins in fish and livestock products. , what have they improved?
- Four (4) feed formulae for poultry (2 broilers; starter and grower; 2 layers; chick and growers), the rations produced by use of these formulae significantly increase growth rate/weight gain and egg production. Expect application manual?
- Two feed formulae for cattle (1 dairy meal and calve starter). This has improved calf growth by 17% and increased milk production by 46% where these diets are in use.

### 3.1.8 Bio-technology

Biotechnology research focused on addressing the challenge of nutrition deficiency in banana and devastating diseases in cassava namely: Cassava Brown Streak Disease (CBSD) and Cassava Mosaic Disease (CMD). Under banana research, two biotechnology research products: Hybrid M9 [Kabana 5] and Nakitembe, enhanced with pro-vitaminA [pVA], were approved by National Biosafety Committee.



The two varieties have further been advanced to four multi-locational confined field evaluation trials representing banana agroecological zones in Buginyanya, Mbarara, Bulindi and Kawanda. In addition, evaluation of transgenic cassava plants with genes for enhanced ammonia and nitrogen dioxide uptake is also on-going and so far, at least five (5) cassava varieties have been evaluated. Trials for validation of resistance to Cassava Brown Streak Virus established in Namulonge showcase promising results of GMO cassava plants are tolerant to CBSD (*details - Figures 11 and 12*) and Serere. Advanced Yield Trials established in four (4) locations (Namulonge, Tororo, Serere, and Arua) with 32 clones (22 white and 10 yellow fleshed).**Figure 12: Top GMO Cassava plants with no CBSD Symptoms, Bottom: Non GMO cassava plants showing CBSD symptoms**

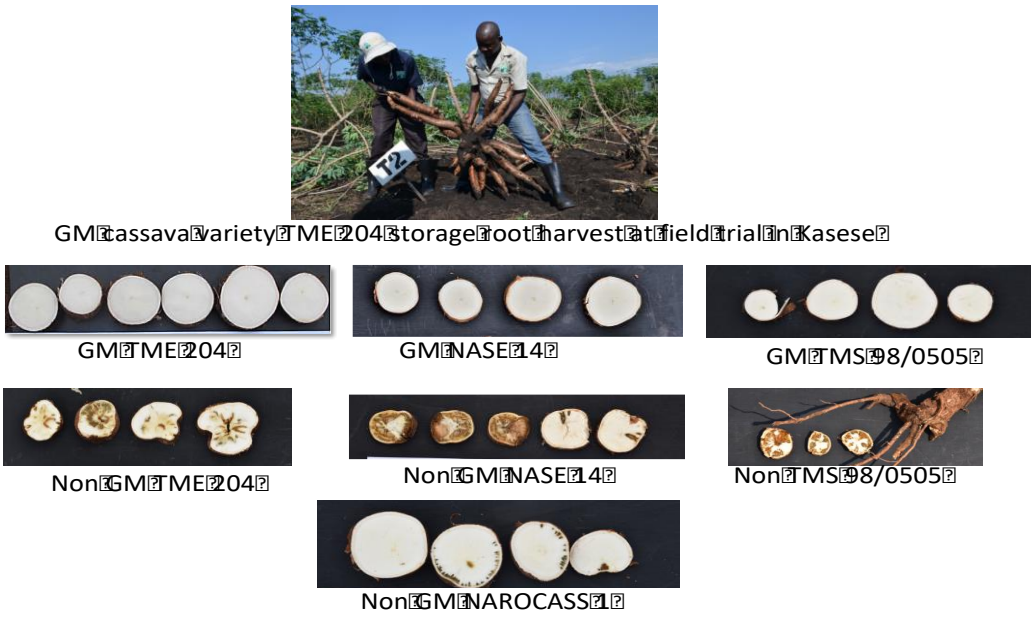



**Figure 13: Clean storage roots of GMO cassava plants with no CBSD symptoms, compared to heavily diseased roots of Non GMO**

Also, advances were made on the GM potato against late blight resistance by using 3R genes extracted from wild relatives of potato. The transgenic potato lines have consistently shown field resistance to late blight. One line vic.172 has been tested under confinement in multi-locational trials at Kachwekano, Rwebitaba and Buginyanya and currently data collection for the regulatory phase is ongoing.

### 3.1.9 Socioeconomic and cross-cutting research

***Gender mainstreaming in agricultural research for development***

During the FY 2019/2020 NARO has continued to register considerable achievements in the implementation of its gender and diversity programs. In an effort to ensure that all gender categories (children, women, youth, the elderly and persons with disabilities) benefit from its

technological development and dissemination initiatives at the grassroots the organization has endeavored to develop technologies and knowledge generated in various disciplines to cater for production challenges. Furthermore stakeholder skills enhancement programmes have been designed and implemented to cater for the all gender categories. The key achievements are:

- 48 environmental social safe guard/gender focal persons in PARIs were trained in gender analysis and strategy development,
- Gender assessment and monitoring tools developed for integrating of gender in research at all PARIs,
- 4 institutes were consulted and guided on the implementation of gender actions in their projects especially ensuring that women's voices are included in decision-making, accessing and controlling production factors, engaged in research, extension and capacity building processes; and interests of youth in agriculture, food, income insecurity and poor nutrition.

NARO has also been engaged in the management of social risks. This has involved building capacity of the local communities including institute workers, staff and community personnel to address social concerns including child-labour, HIV/AIDS, gender and sexual harassment.

***Invasive Weed Species Management***

Efforts in controlling aquatic invasive weeds was directed to Kariba weed (*Salvinia molesta*) management and the key achievements registered are as follows:

- Lakes Kyoga, Kwania and Kibimba dam which were previously Kariba weed hotspots are now over 90% clear of the weed due to the deployment of an integrated management approach using bio-agents (*Cyrtobagous salviniea* weevils) and some mechanical removal,
- Information on Kariba weed occurrence and infestation level, and a map of Kariba weed occurrence produced for five water bodies in the country. Lake Nakuwa in Kaliro district and Lumbuye swamp in Buyende district are now the new Kariba weed hotspots,
- To accelerate the control of Kariba weed, a total of 23,000 adult weevils from the 2 lake shore rearing facilities and Namulonge rearing station were released in Lake Kyoga, Lake Nakuwa and Kibimba dam (Bugiri district),
- Skills of five weevil rearing facility managers identified from the local communities were enhanced on weevil rearing at Budipa Landing site on Lake Nakuwa.
- One weevil rearing facility was set up and stocked with 560 weevils at Budipa Landing site on Lake Nakuwa,
- Kariba weed management information has been packaged for dissemination to control of the weed on Uganda's water bodies.

***Biodiversity***

The achievements in biodiversity are as follows:

- A tracking and monitoring system for fall armyworms developed based on two pheromones (Chem Tica from USA and Russel IPM from the UK),
- NARO supported a community seed bank in Nakasongola, Uganda banana cooperative union and one food industry platform,

- Genetic population structure and information on 47 pearl millet accessions in place to support breeding.

### 3.2 Research extension interface promoted and strengthened

#### 3.2.1 Partnerships, technology promotion and dissemination

NARO in the FY 2019-2020 worked closely with a number of strategic partners to achieve various outputs along the technology generation and promotion chain. The partners are summarized in table 4.

**Table 3: Summary of partner categories NARO worked with in FY 2019 -2020**

| Partner Category | Number of partners |
|---|---|
| Uganda Government MDAs | 12 |
| District Local Governments | All (Intensive in 50) |
| Farming Households | 2000 |
| Farmer Organizations/Cooperatives | 16 |
| CSOs/NGOs/CBOs | 26 |
| Commercial Seed Companies | 14 |
| Local Community Based Seed Entities | 4 |
| Fish farms/hatcheries | 17 |
| United Nations Agencies | 3 |
| CGIAR centers | 11 |
| Development partners | 19 |
| International research centers | 16 |
| Regional partnerships | 13 |
| National Universities | 10 |
| International and Regional Universities | 19 |

#### 3.2.2 Strategic Positioning of NARO for Improved Visibility

In the FY 2019/2020, NARO's strategic positioning took center stage at the national policy level, media fraternity and the agricultural sector at large. The NARO online portal is almost ready and will be available for use in the next financial year making our relevance resonate with the new norms in the post COVID-19 era. Other achievements registered to improve NARO Visibility were;

- Five (5) high-level dialogues and strategic meetings were organized with: Parliamentary Committee on Budget (PACOB); Parliamentary Committees on Agriculture and Trade; Ministry of Public Service; Ministry of Science, Technology and Innovation; Cabinet; and Permanent Secretary and Secretary to Treasury of MoFPED,
- NARO participated in the South-to-South, Forum on China-Africa Cooperation (FOCAC) meetings that focused on the relevance and input of agricultural research into sustainable food security,
- NARO innovations were promoted on different shows; the World Food day event at Bulindi ZARDI; the Nile Jinja Agricultural show; NRM youth event in Kololo, Kampala and Harvest Money Expo at Namboole,

- Four (4) Farm Clinics were held at NaCORI, Ngetta ZARDI, BugiZARDI and MuZARDI. A total of 6,232 (42% women) beneficiaries attended. Several NARO technologies were promoted,
- Three (3) Television and four (5) Radio talk shows were held to promote NARO Technologies, Innovations and Management Practices. These televisions have a combined viewership of 6 million people. Furthermore, NARO dedicated resources towards the streamlining of its online visibility, which all stakeholders will benefit from in the next financial year as a contribution to mitigate effects of COVID-19.

### 3.2.3 Seed Production

NARO produced substantial quantities of breeder (pre-basic) seed, foundation (basic) seed, seedlings and vegetative planting materials of several commodities and provided to technology uptake pathways (farmers, farmer groups, NGOs, MSIPS, Local Governments). The assorted quantities of the breeder and foundation seed of crop varieties produced in FY 2019/2020 is summaries in table 5 while that for vegetative materials and seedlings of superior varieties of crops like cassava, sweet potato, banana, potato, horticultural crops, coffee, tea, and trees is provided in table 6.

**Table 4: Breeder and Foundation seed of improved crop varieties produced by NARO in FY 2019/20**

| PARI | Crop and quantity of seed (Kgs) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Maize** | **Rice** | **Sorghum** | **Finger millet** | **Wheat** | **Beans** | **Green gram** | **G.nuts** | **Cowpea** | **Simsim** | **Soya bean** |
| **NACRRI** | | | | | | 5,250 | | | | | |
| **NASARI** | | | 125 | 125 | | | 50 | 125 | 100 | | |
| **AbiZARDI** | 6,100 | 4,520 | | | | 1,982 | | | | 83 | 1,160 |
| **BugiZARDI** | 300 | 500 | | | 378 | 3,500 | | | | | |
| **MbaZARDI** | | | | | | 3,500 | | | | | 400 |
| **Ngetta** | 2,300 | 1,700 | | | | 480 | | 4,610 | | | 4,963 |
| **Nabuin** | 6,000 | | | | | | | | | | |
| **Rwebitaba** | | 2,222 | | | | 7,167 | | | | | |
| **Total** | **14,700** | **8,942** | **125** | **125** | **378** | **21,879** | **50** | **4,735** | **100** | **83** | **6,523** |

**Table 5: Vegetative planting materials and seedlings of superior varieties of different crops and tree species produced by NARO in FY 2019/20**

| PARI | Crop and quantity of planting material | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Cassava (Bags) | Sweet potato (Bags) | Banana suckers | Potato tubers (Kgs) | Potato seedling | *Coffee seedling | Coffee seed (Kgs) | Tea seedling | *Fruit | Tree seedling |
| **NARL** | | | 200 | | | | | | 4,000 | 1,000 |
| **NACORRI** | | | | | | 334,364 | 1,122 | | | |
| **NAFORRI** | | | | | | | | | 15,731 | 469,881 |
| **AbiZARDI** | 430 | 235 | | 1,600 | | | | | | |
| **BugiZARDI** | 2,500 | 1,200 | 1,200 | 800 | 7,000 | 50,500 | | | 350 | |
| **Bulindi** | 3,500 | 1,250 | 500 | | | 2,250 | | | 5,500 | |
| **KaZARDI** | | | | 35,000 | 215,215 | | | | 5320 | |
| **Mukono** | 50 | 12 | | | | 17,061 | | | 1,418 | 1,260 |
| **Ngetta** | 670 | | | | | | | | | 2,250 |
| **Rwebitaba** | | | 1,500 | 6,954 | 21,811 | | | 30,000 | | |
| **Kiige** | | | | | | | | | 38,000 | 320,000 |
| **Total** | **7,150** | **2,697** | **3,400** | **44,354** | **244,026** | **404,175** | **1,122** | **30,000** | **70,319** | **794,391** |

** Fruit (mango, citrus, avocado, apples, guava) seedlings*

**Coffee Clonally propagated plantlets of CWD-r varieties of Robusta coffee is 298,2000 seedlings and seedlings and seed of Arabica coffee produced were 36,164 and 1,122 kg respectively.*

*Livestock and fish seed were produced and distributed to various farmers:*

- Assorted seeds of 5 improved pasture varieties including NARO Napier 1, 2, 3 and Kakamega and Brachiaria mulato were produced and distributed at Mbarara ZARDI
- Assorted research products including Chloris gayana, Cenchrus ciliaris; Napier stunt tolerant planting material, silage, Hay, Haylage, Jersey Semen, Fleckvick Semen, forage conservation technology was produced at NALIRRI,

- Four (4) improved livestock breeds (Sahiwal cross breed, Cambrough pigs, Toggenburg goats breed & Bovan Brown chicken produced and distributed to famers at Nabuib ZARDI,
- 250 bags of forages, 2000 Nile tilapia fish seed, and 32 piglets were distributed at Bulindi ZARDI
- 20,000 high quality tilapia fingerlings were produced and distributed to farmers at Mukono ZARDI;

Five (5) technologies on fish seed (1,000,000)/broodstock, live foods for juvenile fish (artemia, moina and rotifers), fish feed formulations (dry rations)

### 3.2.4 Scientific information dissemination material

In order to enhance access of novel scientific information for beneficiaries including farmers, scholars, private sector and general public, NARO has continued to prepare and package scientific information for different categories of users. Achievements registered are as follows:

- A total of 165 scientific papers were published in peer-reviewed journals as in table 4. Out of which seven technological innovations were packaged as farming information materials (3 training manual, one brochure and leaflets, [one climate smart agriculture farmer's manual, one in value addition, two in appropriate engineering],
- Scientific papers and posters presented at various conferences (Details -Annex 1)

**Table 6: Number of NARO Publications**

| Number of Peer-reviewed Scientific Publications for the FY 2019/20 | | |
|---|---|---|
| **ID** | **Institute** | **Number** |
| **1** | NaCRRI | 52 |
| **2** | NaCORI | 3 |
| **3** | NaFIRRI | 22 |
| **4** | NaFORRI | 14 |
| **5** | NaRL | 5 |
| **6** | NaLIRRI | 20 |
| **7** | NaSARRI | 12 |
| **8** | Abi ZARDI | 2 |
| **9** | Bulindi ZARDI | 12 |
| **10** | Buginyanya ZARDI | 3 |
| **11** | Kachwekano ZARDI | 5 |
| **12** | Mbarara ZARDI | 5 |
| **13** | Mukono ZARDI | 6 |
| **14** | Nabuin ZARDI | 4 |
| **15** | Ngetta ZARDI | 2 |
| **16** | Rwebitaba ZARDI | 3 |
| | **Total** | **165** |

## 3.3 Agricultural research capacity strengthened

### 3.3.1 Governance and Management

In execution of its role in providing oversight of implementation of the organization mandate and strategic plan, the NARO Council approved the following policies and strategies:

***Policies***

- Data Management Policy and Strategy
- Knowledge Management Policy
- Records, Information and Communication Management Policy and Strategy
- Publishing Policy and Guidelines
- One (1) forestry laboratory Standard Operating Procedures (SOPs) was developed.
- The process for developing a framework for access to NARO plant varieties to streamline access of NARO plant varieties by third party was also initiated.

***Strategies***

The NARO Council approved new changes in the structure of the organization.

- Incubation and Commercialisation Unit has been established at NAROSEC. It aims to streamline access of NARO plant varieties by end-users. The unit will support NARO's control of her plant varieties, and hence ease tracking of their distribution, and quality control. The initiative will in-turn enhance NARO's attainment of benefit from the released varieties.
- New Directorate of Internal Audit.
- Establishment of Grants Office to support resource mobilisation initiatives.

The 38th NARO Governing Council meeting ratified the establishment of the NARO Grants Office to strengthen and widen funding base as a means of sustaining research intended for strategic interventions. The office will be manned by a Director Grants, Head Resource Mobilization and Economic and Development Analyst.

- The vacant positions of Directors of Research (for NaFIRRI and Mukono, Rwebitaba ZARDIs) and Program Leaders were advertise and filled.
- The Council endorsed the increase of staff annual gratuity to match gratuity of sister agencies in the agricultural sector.

### 3.3.2 Office of the Director General

In an effort to motivate, recruit and retain NARO Staff, the Director General NARO provided leadership and guidance, which has led to enhancement of NARO's MTEF by 30.761 billion for the FY 2020/21. Such enhancement is applied in the key sensitive areas as follows

- Salary enhancement (UGX 10.761 billion). This intervention is aimed at combating the resignation of scientists from NARO due to lack commensurate pay.
- The enhancement will strengthen NARO's capacity in the Agricultural engineering at Namalere (UGX 5billion), and
- Vaccine production facility at NaLIRRI (UGX 15 billion).

### 3.3.3 Internal Audit

In accordance with the Public Financial Management Act 2015 (section 48) and NARO Audit Charter, the Audit unit achieved the following;

- Conducted Systems audit one (1), each on Information Technology, Procurement, Human Resources Management, Assets Management and made recommendations for improvement in areas of weakness.
- Conducted one (1) core research audit and recommended for operationalization of laboratories by equipping and recruitment of laboratory Assistants and, allocation of resources to key result areas.
- Conducted two (2) financial and Management audits, and reviewed internal controls over financial management and compliance with the Public Financial Management (PFM) Act 2015,

- Conducted one (1) governance audit and advised management on areas of improvement such as the renewal of tenure for Advisory Committee members,
- Reviewed and monitored risk management processes and updated four (4) risk Registers for PARIs.
- Reviewed (12) audit to ensure that the payroll was free of ghost workers and that PAYE and NSSF computations were accurate and remitted in accordance with Income Tax Act and NSSF Act respectively,
- Provided assurance to the Audit and Risk Committee of the Governing Council by submitting (4) quarterly audit reports highlighting audit findings and recommendations.

### 3.3.4 Human resource management

NARO is committed to attracting, developing and retaining adequate, competent and motivated human resource to support its transformation agenda. The following key achievements were registered.

*a) Staff registered to professional bodies*

NARO staff have been registered with different professional bodies to enable them perform their functions. NARO paid all their annual subscription fees of the year 2020 to the respective professional bodies of; Association of Internal Auditors, Engineers Registration Board, Uganda Veterinary Association, Institute of Chartered Public Accountants, Uganda human resource managers, Federation of Uganda Employers and Association of Chartered Certified Accountants.

**Table 7: Subscription to professional bodies**

| | Professional body | Beneficiaries |
|---|---|---|
| 1. | Engineers Registration Board | Engineers in NARO service |
| 2. | Association of internal Auditors | 18 Internal Auditors |
| 3. | Uganda Veterinary Association | 20 NARO Veterinarians |
| 4. | Institute of Chartered Public Accountants | 20 Internal Audit staff and Accounts |
| 5. | Association of chartered Certified Accountants | 5 Internal Audit staff and Accounts |
| 6. | Uganda Human Resource managers Association | 16 NARO Human Resource officers |
| 7. | Federation of Uganda Employers (FUE) | NARO is a member of FUE |

*b) Staff Performance System and onboarding*

The implementation of new staff Performance appraisal system has improved organizational performance. NARO staffs are now self-driven to achieve set targets. During the period NARO recruited 13 requisite staff members. These included: (i) Deputy Director General ATP; Director Rwebitaba; Director NAFIRI and Director MUZARDI. In addition Seven (7) Program Leaders, and two consultants were recruited (Director Grants and Head Resource Mobilization. The officers are already on board and carrying out their respective activities.

*c) Long-term and short-term staff training*

- A total of 34 and 54 NARO staff completed their PhD and Masters degrees respectively. One (1) staff completed bachelors and 18 staff completed various short courses. In addition, 24 staff have enrolled for PhD and two (2) for Masters.
- Regarding staff who have not yet completed their studies, a sum 24 staff are currently enrolled for PhD, two (2) for Masters and one (1) staff for professional training.

*d) Short-term trainings*

- The Directorate of Human Resources conducted a series of short term trainings as in the table below:

**Table 8: NARO Staff Training by DHR**

| | Short term course | No of participants |
|---|---|---|
| 1. | Induction of new staff | 65 |
| 2. | Training of PARI Directors and Human Resource officers in performance. | 40 |
| 3. | Leadership/management training for PARI Directors | 35 |

NARO enhanced skills and competencies in other different areas of leadership and management such as:

- NARO ESS/gender focal persons (48) were trained on gender analysis and strategy development. In addition, a gender assessment was conducted in 4 institutes and gender monitoring tools developed to determine the gender responsiveness of NARO research undertakings.
- The Biometrics Research Support Unit (BRSU) conducted in-house training to twenty seven NARO scientists and technicians in three (3) PARIs namely, Ngetta ZARDI (7), Nabuin ZARDI (13) and Abi ZARDI (7). This was .in a bid to promote e-data management practices, integrity, quality assurance and quality control in design and implementation of agricultural research. The BRSU extended support/training in reinvigorating researcher's skills in data analysis and interpretation of research results.

### 3.3.5 Infrastructure management

The research infrastructure improvement for the FY 2019/20 focused mainly at those in Rwebitaba ZARDI, NaSARRI, NaLIRRI, and Nabuin ZARDI. These physical infrastructure development projects include renovations and new constructions that have either been completed or nearing completion. The key achievements made are as follows:

- *Rwebitaba ZARDI* - The administration block has been completed and awaiting handover, while the laboratory and conference facilities are near completion (Figure 13).

Administration and Laboratory

Conference Hall

**Figure 14: Newly constructed research infrastructure at Rwabitaba ZARDI**



- *NaLIRRI* - Infrastructures under development are: Milk quality control platform and production storage almost complete; calf-barn, vaccine and waste management facilities completed; expendable calf groupings and Isolation calf pens are on-going,
- *Nabuin ZARDI* - Infrastructure development are: Two (2) screen houses for crop protection and crop improvement which are completed, Staff houses - phase 2 under rehabilitation,
- *NAFIRRI* - Rehabilitation of the hatchery and pump house as well as repairs of tanks to enhance fish seed and fish feed production completed,
- *NaFORRI* - Renovation of a Guest House is 80% completed,
- *Ngetta ZARDI* - Renovation of fishponds undertaken in preparation for demonstration of improved aquaculture practices,
- *NARL* - Renovation of Food Biosciences Agribusiness laboratory is ongoing.

### 3.3.6 ICT

NARO has continued to build a standard and usable ICT environment specifically the following were achieved:

- Gaps have been identified and recommendations made to Top Management for decision making to improve NARO's current ICT environment in compliance to government's ICT standards,
- Improved NARO's ICT risk management and disaster recovery ability. There are document backups and restore procedures for all servers and staff computers. Furthermore, there has been upgrades of server management software, computers and software to prevent potential vulnerability issues,
- Improved telephony and intercom services through the acquisition and implementation of an E1 circuit connectivity, which allows placement of calls external to NARO.
- NARO has upgraded her ICT in a bid to cope with the COVID 19 pandemic and effects, to enable staff work from home and conduct zoom meetings.

### 3.3.7 Planning, Monitoring and Evaluation

In order to plan, track and report performance of NARO, the PM&E unit has continued to undertake planning, monitoring, reporting and evaluation functions. During the year, focus was on generation of performance reports, streamlining the planning function for better work plan and budget, tracking implementation of the annual work plan, and support to resource mobilization through proposal development. The unit has continued to operationalize the NARO

Strategic Plan 2018/19 – 2027/28. To that effect the unit developed a Mid-Term Operational Plan (2018/19 – 2022/23) to fast track the realization of the Aspired 10 year strategic results. To support the internal efforts, two review workshops were held to assess progress and achievements of various interventions. Specifically, the following achievements were registered;

- Developed a replacement retooling project, "Support to NARO (Project Code P0382)" for GoU funding,
- Provided leadership in development of two (2) project proposals. Of these, the Development Initiative for Northern Uganda (DINU) Project (FED/2019/412-808) worth UGX 25.5 billion has been awarded by European Union (EU) with implementation period of 40 months beginning March 2020. The second project is on Climate Smart Agriculture (CSA). The Concept Note has been developed, approved by Agricultural Sector Working Group (ASWG) for submission to Ministry of Finance, Economic Planning and Development (MFPED)-Development Committee,
- Sensitized PARIs on planned implementation of an effective PM&E system,
- Conducted, provided leadership and guidance in three (3) planning and review workshops for Competitive Grant Scheme (CGS) projects,
- Conducted a monitoring exercise on all the 40 CGS Cohort V Projects,
- Prepared and disseminated quarterly, half yearly, JASAR and annual, reports for Office of the Prime Minister; MFPED and MAAIF,
- Provided support to Audit Unit in ensuring value for money and compliance,
- Developed ad-hoc papers, contribution to budget speech and Ministerial Policy Statement to Parliament,
- Developed the 2020/2021 NARO Workplan.

### 3.3.8 Resource mobilization

In a bid to abate the challenge of inadequate funding for sustaining agricultural research and development, NARO has remained committed to putting in place mechanisms for securing adequate and sustainable resources from a wide array of sources.

#### 3.3.8.1 New Off-budget projects

Over the past few years, a significant funding contribution for agricultural research interventions of NARO have been attributed to off-budget projects. In the FY 2019/20, a total of 114 off-budget projects amounting to a total value of UGX 42.9 Billion was to be implemented. In this 2019/20 report, the following key off-budget projects under implementation are presented;

i. **Development Initiative for Northern Uganda (DINU):** This project seeks to chase poverty and hunger in northern Uganda by diversifying food systems for food and nutrition security, poverty reduction and inclusive development. With an implementation period of 40 months, the DINU project targets eight (8) districts in two (2) Livelihood Sub-Regions of Acholi and Lango. It has a total indicative budget of 6,375,941.00 EUR of which, 5,738,346.90 EUR is the requested EU contribution. The consortium partners include; SOLIDARIDAD, SG 2000, PALM Corps, Lira University, AUPWAE, AGRENES and Muni University.

ii. **Climate Smart Agriculture (CSA) Project:** In August 2019, the CSA Concept was developed, presented and approved by ASWG for submission to MFPED Development Committee. Relatedly, the process of securing a Consultant (CIAT Nairobi) to conduct a Climate Risk Profiling for the different agro-ecological zones (12) and four (4) value chains is on-going. NARO and MAAIF teams will participate in Climate Risk Profiling activity with CIAT for capacity

building. The CSA concept note is scheduled for presentation to the Development Committee (MFPED) on 11th August 2020.

iii. **Developing a Market–Oriented and Environmentally Sustainable Beef Meat Industry in Uganda Project (MOBIP):** This project seeks to improve competitiveness and productivity of the beef sub-sector through fostering gender responsive, inclusive and sustainable rangelands, agro-forestry and water resources management in Uganda..

iv. **The Livestock Agribusiness Incubation Programme (LAIP):** (ADB; DC)

**3.3.8.2 Other resource mobilization initiatives**

With one of the most important topical discussion being securing adequate resources for supporting agricultural research, NARO management engaged in high-level dialogues and strategic meetings such as PS/ST, PACOB, Parliamentary Committee on Agriculture, MoPS, MoSTI, Cabinet, etc. In addition, NARO management supported and convened various proposal writing teams leading to research grants, assorted proposals and concept notes.

### 3.3.9 Procurements

The procurement activities within the work plan for the financial year 2019/20 comprised of three categories namely; goods and non-consultancy services, consultancy services and civil works as well as micro procurements. The tables (12, 13, 14) in annex 2 reflect the implementation of the three categories in terms of the various stages involved in the procurement cycle as well as the current status. However some of the procurements were affected by lack of funds and therefore contracts not signed.

## 4.0 Outstanding challenges and actions being taken

The following are the key outstanding challenges of NARO;

a) ***Effectively conducting research under budget support:***

Most of NARO's budget is under support to NARO (GoU Development) and mainly caters for capital items. The expenditures on core technology generation and dissemination and maintenance of infrastructure are categorized as consumptive expenditure and restricted to about 20% of the total budget. NARO has continued to request MoFPED to provide a code for the purpose.

b) ***Meeting expectations with inadequate and unsustainable funding*:**

NARO operates with a very limited budget which has affected generation and dissemination of agricultural technologies and; adequate engagement to stakeholders. For the past 10 or so years Uganda's agricultural research intensity ratio – that is, agricultural research spending as a share of its GDP (Ag GDP) – has remained less than the minimum investment target of 1 percent set by the African Union and the United Nations. This calls for deliberate step up in increasing spending on agricultural research.

c) ***Working with limited research infrastructure*:**

While there have been concerted efforts and funding from GoU and partners towards improvement of agricultural research infrastructure, the current infrastructure is still to undertake cutting edge research and respond to emerging issues. There are inadequate facilities such laboratories, scientific equipment, staff houses and transport to effectively conduct

research. There is need to improve infrastructure to adequately contribute to agriculture transformation.

d) ***Operating under competing land use interests*:**
NARO operates under uncertain land ownership and distressing pressure from interested parties with immense development plans on land designated for agricultural research. This has slowed down investments in research infrastructure and interrupted effective implementation of land-use plans. This warrants investment in securing land for agricultural research.

*e)* ***Relocation of NaLIRRI to Maruzi via Nakyesasa.***
NARO has remained committed to **o**perationalizing NaLIRRI in Maruzi albeit now faces vivid challenges. While the project is posted on the Integrated Bank Projects (IBP), it has no direct budget allocation from MoFPED. In addition, it has received meager support by encumbering on Support for NARO P0382 for the last two consecutive fiscal years. Consequently, the relocation of NaLIRRI to Maruzi now faces a possible risk of being removed from the PIP by MoFPED thereby potentially delaying the project operationalization.

***f) Covid-19 Pandemic.***
NARO closed some of its operations for 12 weeks following the covid-19 outbreak from March 2020. Prior to closure of offices, NARO Management assessed the impact of COVID-19 related restrictions on the implementation of the scheduled work for the FY 2019/20 Work Plan in order to refocus efforts in areas that could still be delivered while working remotely.

**Table** 9**: The Impact of COVID-19 on NARO and the mitigation strategies and measures undertaken to address the impact.**

| Effect of COVID 19 Pandemic | Mitigation measures |
|---|---|
| **Budget Cuts** | Reduced operations |
| **Lean Staff (30%)** | Remote working and working in shifts<br>Re-prioritized activities |
| **Unpreparedness with remote working tools** | Staff keen to adopt to the new normal |
| **Reduced field monitoring affected data collection** | Re-prioritized activities |
| **Slowed down in research and support services** | Maintain lean staff at every PARI |

**Table** 10**: Challenges and their respective actions taken**

| Challenges | Actions being taken |
|---|---|
| Effectively conducting research under budget support | NARO is engaging with MoFPED to provide a code for the purpose. |
| Meeting expectations with inadequate and unsustainable funding | Engaging the Government of Uganda to deliberately increase spending on agricultural research and staff.<br><br>Generating internal revenues to support Agricultural research. |

| | |
|---|---|
| Working with limited research infrastructure | Sourcing for more funds to construct adequate centralized lab facilities that respond to emergencies.<br><br>NARO is in the process to have its Laboratories accredited and certified by International agencies. |
| Operating under competing land use interests | Efforts continue to secure all NARO land. |

**Lessons Learnt**

Partnerships with local, regional and international partners are key in the generation and dissemination of agricultural technologies. Strengthening institutional partnerships and collaborations also go a long way in offsetting infrastructural limitations in the short term. Efforts should therefore continue to support formation of these partnerships and more especially those in the private sector where donor support is tilted.

Communities easily participate in development interventions through existing community-based organizations that have good record of trust, openness and accountability to the people.

It is critical to develop formal agreements on roles and expected benefits with various stakeholders for success and sustainability of interventions.

Pooling critical mass of research tools and human skills continues to give NARO a competitive advantage in accessing resources for research.

**5.0 Compliance of NARO to existing frameworks**

To a great extent, NARO has ensured to address all the areas or gaps from previous assessments/to ensure compliancy with NPA, PPDA, Equal Opportunity, and BAMU guidelines and frameworks. During the reporting period, NARO complied well with the ratings of various frameworks as indicated below;

- NPA on project performance 70%
- PPDA 2018/19 score 77.3%
- Equal opportunity score 76%
- Reputation index 72%
- NARO JASAR for FY 2018/19 attained 100%
- Audited accounts for FY 2018/19 secured “Unqualified Opinion”

This clearly shows that NARO is reflected as a healthy and compliant institution.

**6.0 Conclusion**

NARO has delivered on her mandate as it has performed above the set targets. NARO has contributed towards stabilizing production, increased commodity productivity, increased household income, and improved human health. Despite this performance, agricultural communities in Uganda still face challenges of involvement of stakeholders especially farmers, climate change, pests and diseases and; low total factor productivity.

## 3.6.2 National Agricultural Advisory Services (NAADS)

## 1.0 Introduction

The National Agricultural Advisory Services (NAADS) has, since the refocusing of its mandate to supporting farmers with the provision of agricultural inputs for wealth Creation, 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.

The overall Objective of the NAADS interventions is to increase access to critical agricultural inputs, agribusiness and value chain services for improved household food security and incomes. This report presents an overview on the performance on implementation of the planned activities for the period (July,2019 – June ,2020 FY 2019/20) covering Season 2019 B and season 2020A The performance is reported based on immediate outputs, including quantities of materials distributed, number of beneficiary Districts and households covered; and projected acreage for crop commodities.

The NAADS Secretariat approved budget for the FY 2019/20 is UGX 145.894Bn; and by end of Quarter Four for the period July, 2019 – June, 2020 UGX 145.9 (100%) had been released. Out of the budget released, a total of UGX 145.670Bn (99.8%) was spent on the various interventions for provision of agricultural inputs for crops, livestock ,value addition equipment & agro machinery to farmers and or farmers groups for season 2019B and Season 2020A as well as offsetting outstanding balances on prior year commitments.

## 2.0 Overview of NAADS Annual Budget Performance for (July, 2019 - June, 2020) FY 2019/20

| | | Approved budget (bn) | Released by end of Q 4 (bn) | Spent by end of Q4 (bn) | % budget released | % budget spent | % releases spent |
|---|---|---|---|---|---|---|---|
| Recurrent | Wage | 2.185 | 2.185 | 2.185 | 100.00% | 100.00% | 100.00% |
| | Non-Wage | 2.859 | 2.859 | 2.821 | 100.00% | 98.67% | 98.67% |
| Dev't | GoU | 140.85 | 140.85 | 140.644 | 100.00% | 99.84% | 99.84% |
| **Total** | | **145.894** | **145.894** | **145.670** | **100.00%** | **99.82%** | **99.82%** |

## 3.0 Highlights of Cumulative (July, 2019 – June, 2020) physical performance

During the reporting period, the NAADS interventions for wealth creation 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.

The performance is reported based on immediate outputs, including quantities of materials distributed, number of beneficiary Districts and households covered; and projected acreage for crop commodities. Specific progress is as indicated below;

### 3.1 Food security interventions;

1. Procured and distributed 2,932.332 tons of maize seed against a target of 1,400 tons. The seed was distributed to farmers in 125 DLGs as well as to constituencies under the food security initiative for constituencies, for the establishment of 293,233.2 acres of Maize benefiting 586,466 households including vulnerable groups. More farming households were supported with maize seed as part of food security interventions during season 2020A.
2. Procured and distributed 632,187 Banana tissue cultured-planting materials against a target of 333,333 Banana tissue Cultured suckers. The banana suckers were distributed to 57 DLGs, for the establishment of 1,405 acres of banana for 2,810 households.
3. Procured and distributed 4,080 Bags of seed potato as planned to 25 DLGs for the establishment of 680 acres for 1360 households.
4. Procured & distributed 70,651 bags of cassava cuttings against a target of 75,000 cuttings under the Gulu Catholic Archdiocese Cassava Commercialization Project to establish 10,714 acres for 10,714 households. The COVID-19 lockdown and related control measures affected distribution of all the cassava cuttings in Northern Uganda.
5. Procured 35,000 (5gm Sackets) of Onion seed (OPV) as planned to 29 District Local Governments & 45,120 (5gm Packs) of hybrid onion seeds as planned to 12 DLGs to mitigate negative effects of COVID -19 on food security.
6. Procured and distributed vegetable seed as planned i.e. 27,600 (5 gm Sackets of Eggplant seed), 27,600 (5 gm Sackets of Amaranthus seed), 27,600 (5 gm Sackets of Sukuma wiki seed) to farmers in 111 DLGs to mitigate negative effects of COVID -19 on food security.
7. Procured and distributed 175,000 bags of cassava cuttings against target of 87,500 cuttings in 46 districts in Northern, Eastern and West Nile (sub) regions (Karamoja, Teso, Madi, and Busoga) to mitigate negative effects of COVID 19 on food security. Additional cassava cuttings were procured & distributed as part of emergency food security intervention to mitigate effects of COVID-19 in Northern, Eastern and West Nile sub regions.

### 3.2 Strategic crop & livestock commodities

1. Procured and distributed 166,695 Cashew nut seedlings as planned to 28 DLGs, for the establishment of 2,381acres for 238 households
2. Procured 39,568,393 million tea seedlings against a target of 20,000,000 million seedlings for farmers in Buhweju, Kabale, Sheema, Zombo & Rwampara districts to establish 7913 acres for 7913 households. Additional tea seedlings procured for distribution to farmers in Buhweju DLG.
3. Procured 814,817 to establish 10,185 acres targeting 10,185 households in ten selected District Local governments (DLGs) in selected priority fruits clusters, including Soroti Kumi, Ngora, Gulu Amuru, Nwoya, Adjumani, Nakaseka, Luwero and Nakasongola. Less seedlings procured against the target of 2,407,407 seedlings as funds were partially utilized to settle outstanding arears on mango seedlings from FY 2018/19.

4. Procured & distributed 111,804 apple seedlings to establish 339 acres for 678 households in 12 DLGs. Less seedlings procured and distributed against the target of 222,222 as funds were partially utilized to settle outstanding arears on planting materials from FY 2018/19.
5. Procured & distributed 160 heifers targeting 160 households in Bududa, Mbale, Bulambuli, Sironko, Manafwa, Namisindwa, Mukono, Jinja, Rukungiri and Kabale. Less heifers procured and distributed against the target of 1,200 heifers as funds were partially utilized to settle outstanding arears on Livestock materials from FY 2018/19.


Mugisa Sarah of Fort Portal municipality and another beneficiary of the Rwengaju model village initiative in Kabarole district


Wasswa Herbert and Clovis Agaba and his wife have transformed their livelihoods through piggery. Each received 5 pigs (4 female and 1 male) under the Rwengaju model village

6. Procured and distributed 1540 (Gilts & Boars) to beneficiaries in 12 selected DLGs. Less improved pigs were procured and distributed against the target of 3,750 as funds were partially utilized to settle outstanding arears on Livestock materials from FY 2018/19.
7. Procured and delivered 10,000 day old layer chicks, 24,000kgs Chick and duck Mash and 20,000kgs growers mash as planned.

### 3.3 Support to Atiak Sugar cane production (Amuru, Lamwo, Adjumani, Gulu)

GoU, through the NAADS is supporting the sugar cane out growers scheme under the sugarcane production project in selected districts in Northern Uganda. This project is being supported and implemented under a Memorandum of Understanding (MOU) between NAADS, participating District Local Governments (Amuru, Lamwo, Gulu, Adjumani), Horyal Investment Holding Company and two farmer Cooperatives ( Atiak Sugar out growers Cooperative Society Limited and Gem Pacilo farmers' Cooperative Society).

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. During the reporting period, NAADS Continued implementation activities for production of sugar cane at the Atiak site in Amuru District, Palabek Kal & Palabek Ogilli sites in Lamwo, which included harrowing, furrowing and planting. The key achievements to date include the following:

#### 3.3.1 Atiak production site, Amuru district

1. Bush clearing: cleared 13,841 acres out of 13,841 acres (100% progress) at Atiak site
2. First ploughing: ploughed 9,473.5 acres out of 13,841 acres (68.5% progress);
3. Second ploughing: ploughed 8,455.4 acres out of 13,841 acres (61.1% progress)
4. Land harrowing: harrowed 8,353 acres out of 13,841 acres (60.4% progress);
5. Land furrowing: furrowed 7,943 acres out of 13,841 acres which (57.4% progress);
6. Seed cane: procured and delivered 23,721 tons out of 41,523 tons of seed cane (57.1% progress);
7. Fertilizer application:7,906 bags (50 kgs bag) of DAP fertilizer out of 13,841 bags applied to plant sugar cane (57.1% progress);
8. Planting: 7,907 acres out of 13,841 acres has been planted (57.1% progress);
9. Manual weeding: 2,909 acres out of 13,841 acres weeded (25.4% progress);
10. Farm roads: 132.8 kms of farm roads have been established in sugarcane fields.(100% progress)

**1. Palabek Kal production site (Lamwo 1), Lamwo district:**

1. Bush clearing was completed in Lamwo 1 with all the 15,000 acres completed representing 100 progress.
2. First ploughing: 4,048.25 acres is ploughed out of 4,880 acres representing 82.9% progress.
3. Second ploughing: 2,957.16 acres is ploughed acres out of 4,880 acres representing 60.6% progress.
4. Harrowing: 2,660.18 acres is harrowed out of 4,880 acres representing 54.5% progress.
5. Furrowing: 2,563.4 acres is furrowed out of 4,880 acres representing 52.2% progress.

6. Seed cane: 6,288 tons procured and delivered out of 14,640 tons of seed cane representing 42.9% progress.
7. Fertilizer application: 2,096 bags (50 kgs bags) of DAP fertilizer out of 4,880 bags applied to plant sugar cane. This represent 42.9% progress.
8. Planting: 2,096 acres out of 4,880 acres has been planted representing 42.9% progress.
9. Farm roads: 131.36 kms of farm roads out of 218.29 km have been established in sugarcane fields. This represents 60.2% progress.
10. Construction of labour houses in Palabek Kal (Lamwo 1) is about 75% completed.

**2. Palabek Ogilli production site (Lamwo 2), Lamwo district**

1. Bush clearing: 3,647, acres bushed cleared out of 31,159 acres representing 11.7% progress.
2. Farm roads: 209.76 kms of farm roads out of 500 km have been established in sugarcane fields. This represents 41.1% progress.

**3. Seven support staff** were recruited & their salaries paid to support the sugarcane production project in northern Uganda i.e. Six Field Based Supervisors (2 audit, 2 finance & 2 agriculture) and 1 driver.

NAADS board members inspecting construction works of workers quarter in Lamwo district under Atiak sugar project

### 3.4 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 change. Specific progress during the reporting period is indicated below;

### *1. Provision of tractors & matching implements*

1. Delivered & distributed 280 tractors as planned for beneficiary groups in 119 DLGs and Conducted Training for the 560 tractor operators across the country on proper operation & maintenance of the tractors.
2. Procured 20 tractors and matching implements as planned and delivery of the tractors and matching implements to be concluded during Q1 FY 2020/21.

A tractor given to Naboa Multipurpose Cooperative Society in Budaka district

### *2. Provision of Appropriate Irrigation Technologies…*

1. Installed 14 sites of solar water pumping systems as planned in Ntungamo, Hoima, Mubende, Kamuli, Koboko, Kumi, Kabale, Mukono, Kiboga, Buvuma, Sembabule, Kayunga & Yumbe districts to need to promote adoption of improved and efficient water for agricultural production technologies for both crops & livestock.
2. Procured 21 solar powered water-pumping systems as planned for irrigation purposes at 21-targeted sites in 21 DLGs i.e. Kaberamaido, Kaliro, Buikwe, Butebo, Masindi, Mubende, Butambala, Bukomansimbi, Kapchorwa, Iganda, kaabong,Rukungiri,Amolar, Adjumani, Mbale & Pader, Rukungiri, Rukiga, Nakaseke,Katakwi. Delivery and installation still ongoing.

## 3.5 Provision of Value addition equipment for agro processing

This intervention aims to enhance agro processing for increased household incomes through provision of value addition equipment for 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. Specific progress during the reporting period is indicated below;

| | Planned Interventions | Achievements/Progress | Remarks |
|---|---|---|---|
| a. | Delivery & installation of equipment as well as Construction works for the expansion and completion of the Yumbe Mango fruit processing factory | – Equipment delivered, installed & tested.<br>– Completion works for the factory in advanced stages and currently at 85% progress. | Planned Capacity of the plant is 5MT per hour |

| | Planned Interventions | Achievements/Progress | Remarks |
|---|---|---|---|
| b. | Delivery and installation of pineapple processing equipment as well as construction works for completion of the factory structure– Kayunga fruit processing Plant | – Equipment delivered, installed & tested.<br>– Construction works for completion of the factory structures on going. | Planned Capacity of the plant is 8 to 11 MT/day |
| c. | Procurement, Delivery & installation of multi-fruit processing equipment for Kapeeka multi-fruit processing plant in Nakaseke district | – Procurement of the equipment conducted up to evaluation stage | Procurement of equipment cancelled due to the non-responsiveness of the bid to requirements. |
| d. | Procurement, delivery & installation of 12 MT/Hr multi-fruit processing equipment for Nwoya multi fruit processing factory | – Procurement of the equipment conducted up to evaluation stage | Procurement process cancelled due to the non-responsiveness of the bid to requirements. |
| e. | Supply, delivery and installation of 36 sets of maize milling equipment and 10 sets feed milling equipment | – Delivered & installed 20 sets of maize milling equipment & 6 sets of feed milling equipment to beneficiary groups in 21 DLGs i.e Yumbe, Moyo, Kitgum, Agago, Kalangala, Pader, Arua, Sironko, Mbale, Buyende, Katakwi, Amudat, Kumi, Soroti, Luuka, Iganga, Kaliro, Kween, Maracha, Moyo, Mayuge<br>– Procured additional 19 sets of small-scale grain milling equipment for beneficiaries in Bukedea, Mityana, Ibanda, Manafwa, Isingiro, Namutumba, Lyantonde, Kapchorwa, Apac, Mukono, Kapelebyong, Kyankwanzi, Kibaale, Koboko, Butambala,Wakiso,Lira DLGs. Delivery and installation ongoing. | Up to 20 sets of maize mills & 6 sets of feed mills delivered and installed by end of Q4. The installation of the remaining 16 maize mills & 4 feed mills is still ongoing |
| f. | Conduct two Feasibility studies for establishment of fruit processing plants in Greater Masaka and Busoga areas. | – Procured consultant to carryout feasibility studies<br>– Field data collection conducted in greater Masaka and greater Busoga areas | Feasibility studies to be concluded in Quarter 1 FY 2020/21 |
| g. | Deliver and install 8 sets of milk coolers and matching generators to dairy groups in selected DLGs. | – Delivered and installed 8 sets of milk coolers and matching generators to dairy groups in Kyankwanzi, Pallisa, Kamuli, Kibuku, Nakaseke ,Luwero, Kabarole & Kiruhura DLGs. | The milk coolers are installed & operational |

A maize mill given to Nkondo Multipurpose Rural Produce cooperative society in Buyende district

Members of Noteber Farmers Group in Alebtong district with a rice mill they received in 2018

Out of this rice mill which they received in 2018, farmers of Bugiri Integrated Farmers and Agribusiness Association have bought 50 acres of land for rice growing and secured a plot in Bugiri town to construct their permanent home

A feed mill given to Mikwano EV Uganda, a farmers' Association in Kaliro district. It has reduced the cost of feeds

The Chairperson of Umoja Women's Heifer Project in Pallisa district Ecaat Rose and a 1000 litre milk cooler which they received from NAADS

Technical commissioning of Yumbe Fruit Factory. 80% of the construction work has been completed

Kayunga fruit factory, construction works at 80%

Feasibility studies to establish fruit processing facilities in Greater Masaka and Busoga Regions have commenced

### 3.6 Establishment of Kabarole & Kasese Agro industrial parks

NAADS and Operation Wealth Creation have embarked on the implementation of Presidential initiative on Agro-Industrialization for Local Economic Development (AGRILED). The AgriLED strategic interventions being piloted in Rwenzori sub region and some of the key planned undertakings for FY 2019/20 include establishment of the Kasese & Kabarole Industrial and Business Parks respectively. In an effort to ensure coherent and smooth implementation, the NAADS Secretariat Constituted Joint stakeholders working group and also set up two committees for physical infrastructure & investment to fast track the NAADS interventions for AgriLED in Kasese and Kabarole industrial and business parks. The key stakeholders involved include: representatives from line MDAs ( NAADS,OWC, NW&SC,UIA,UDC,UNRA,UIRI); representatives from the DLGs of Kasese & Kabarole ( CAOs, District Planners, District Engineers) ; representatives from The Municipal Councils of Kabarole & Kasese ( Town Clerks, physical Planners, Commercial Officers & Town Engineers). Specific milestones on the establishment of the agro industrial and business parks are as indicated below:

**a) Kasese industrial Park – progress to date**

1. Opening of Roads, Construction of a Surface Storm Water Drainage Channel and Clearing of Plots at Kasese Industrial and Business Park – about 40% of the project has been executed both physical work and deliveries of materials.
2. Extension and Construction of Water Transmission Network with Booster Pump and Reservoir Tank at Kasese Industrial and Business Park (Phase 1)- about 50% of the project has been executed both physical work and deliveries of materials. Trenching and pipe laying had been achieved at 90%.
3. Extension and Construction of 33KV 3-Phase High Voltage (3.94km) and 11KV Low Voltage (0.5km) Power Line at Kasese Industrial and Business Park – Procurement process on-going; yet to be concluded.

**b) Kabarole Industrial park – Progress to date:**

The three land owners in Kaborale namely Kabaroale District Local Government(KDLG), Mountains of the Moon (MMU) and National Agricultural Research Organization (NARO) have agreed on pooling land for the purpose of establishing the Kabarole Industrial and business Park. The procurement of a consultant to formulate and develop the Master plan for Kabarole Industrial and Business park (is ongoing); based on the Memorandum of Agreement between UIRI, UDC and NAADS.

*Kabarole Industrial Park Project Implementation Challenges; The following implementation challenges were faced for the period under review:*

i. Failure by the three lands owner (KDLG, MMU, NARO) to agree on the acreage of land to be offered for the purpose of establishing the Industrial Park.

***Important to note:***

The activities of the Kabarole Industrial and business park have been planned and budgeted for implementation in the FY 2020/21.

## 4.0 Budget execution challenges

During the period under review, number of challenges have been experienced in the budget execution and these include the following:

1. Accumulation of arrears from previous FY 2018/19 hence limited budget provisions on planned interventions for planting & stocking materials as well as agro machinery for the FY 2019/20
2. Planting materials for Beans seed and Sorghum sed were not procured and distributed as planned due to limited availability of quality seed on the market. In addition, 4,286 improved goats were not procured & distributed as planned due to outbreak of PPR disease in the source districts for goats.
3. Delayed release of funds for development activities for Q4 affected timely implementation of some planned activities.
4. Inadequate extension services tagged to inputs distribution leads to poor handling and management of inputs provided to farmers in district local governments.
5. Delivery and distribution of the cassava cuttings was disrupted/delayed to some extent by COVID 19 lockdown and related control measures/guidelines
6. Experienced slow progress in the on-going procurement process for agro-processing equipment for Nakaseke Kapeeka and agro-processing equipment and civil works for Nwoya due to delays in response by the UK-based bidder as well as disruption by the outbreak of the COVID-19 pandemic and related lockdown
7. Experienced delays in the progress in executing on-going civil and installation works for establishing fruit processing facilities for Yumbe and Kayunga districts due to disruption and delays related to the COVID-19 pandemic and related lockdown and other financial and operational related challenges
8. The progress of works for establishment of Kasese Agro Industrial & Business Park was hampered by the heavy rains experienced in the month of April, 2020 which ravaged the Rwenzori region and causing devastating floods in Kasese where the project site is located;

1. a *cocktile vaacine* (NARO-CV) were formulated and evaluated on 50 experimental cattle comprising of indigenous and Friesian crosses in an on-station evaluation trial at Nakyesasa. The cross-protective efficacy of NARO-RA, NARO-AV, NARO-RD and NARO-CV vaccines against the three ticks (namely brown ear tick, blue tick and bont tick) was 88, 88, 50 and 63% respectively. Overall, the mean cross-protective efficacy for all the vaccine candidates was 75%. Other than NARO-CV, all the other vaccines performed better than the only commercial anti-tick vaccine whose efficacy against cattle tick species (*Boophilus microplus*) is 50%. It is worth noting that the latter vaccine is the only commercial anti-tick vaccine in the whole world currently used to control cattle ticks in Cuba. The two NARO vaccines namely NARO-RA and NARO-AV that demonstrated high efficacy levels against native tick species in Uganda present an exciting possibility for sustainable control and management of tick burdens in Uganda's livestock sector. The results of the study were synthesized into a high-profile manuscript, which was submitted to the world's leading journal in vaccinomics called "Vaccines" with Impact Factor 4.76. The manuscript has been reviewed and the authors have been asked to address minor comments prior to publication.

2. Efforts towards the development of a Foot and Mouth Disease (FMD) vaccine during the FY 2019/20 focused on institutional capacity building for serotyping native FMD virus strains through acquisition of an Antigen Elisa Fast IZLER Kit capable of serotyping the circulating FMD virus serotypes in one day. NARO acquired serotype specific primer sets for serotyping four different serotypes (O, A, SAT1 and SAT2.). A total of 42 suspected FMD field samples were screened and serotyped, and the results showed that O and A were the circulating FMD virus strains in three sampled regions of Uganda. Also, a reliable virus repository (pathogen bank) capable to maintain pathogens at negative 80$^{o}$C to enable long term storage of different viruses and pathogens has been established. In addition, NARO has established a National FMD vaccine evaluation platform to support the country in evaluation of imported FMD vaccines before they are used in the country. Connectedly, the imported Foot and mouth disease Vaccines from Kenya and Botswana are being evaluated on station at Nakyesasa to guide Government on their effectiveness in the Ugandan environment.
3. As a step towards developing efficacious vaccines against ASF virus of genotype X, NARO has developed the first-ever soft tick colony in Uganda. The soft ticks, collected from Western Uganda, are the primary reservoirs of the ASF virus from warthogs and are suspected to maintain ASF outbreaks from the wild to the domestic pigs. The ticks are being multiplied and carefully prepared for isolation of circulating ASF virus strains in Uganda. In addition, NARO scientists collected viruses from an active outbreak from Eastern Uganda and these are currently being studied for development of the most common genotype IX ASF.

*Improve tick control*

NARO has provided information to dairy farmers about the choice of method used in chemical acaricide application for more effective control of ticks and tick-borne diseases. At an average herd size of 80 head of cattle, a farmer has to either invest UUGX 107.7 million (US$ 28,710) in motorised pump, UUGX 145.1 million (US$ 38,695) in a spray race or UUGX 266.4 million (US$ 71,040) in a bucket pump every 20 years. However, for more cost-effective use of each of these methods, a farmer with a herd size of 40 - 112 should use a bucket pump, a motorised pump if the herd size is 35 - 170 or a spray race for a farm keeping 100 - 600 head of cattle.

*Forage improvement and conservation*

Livestock forages are very important in households practicing zero grazing. They are also known as primary boosters of milk production. Women, mothers, children, the elderly and the sick are the prime beneficiaries of milk and milk products. In the effort to develop high yielding, drought resilient and highly nutritious forage varieties for livestock, NARO has established a vibrant forage improvement program. In the FY 2019/2020, NARO has developed four Lablab candidate lines namely NAROLAB-1, NAROLAB-2, NAROLAB-3 and NAROLAB-4 with high levels crude protein amounting to 31, 28.6, 28.2 and 27.7% respectively as compared to commercial lablab variety (Rongai variety) with crude protein content of 24.5%. The candidate lines are currently under multi-locational trials in preparation for official release by the national variety release committee. As regards to conservation of native and exotic forage and pasture germplasm, NARO continues to maintain and conserve over 300 species of native fodder grasses, pasture grasses, herbaceous forage legumes and fodder tree species to safe guard against genetic erosion of indigenous

germplasm. Current efforts are underway to assemble, characterize and evaluate over 1000 lines of forage germplasm in East and Southern Africa for food and feed.

*Forage seed production and feed preservation*

In an effort to address the challenge of scarcity of livestock feed, NARO continues to be the leading producer of forage seed and conserved feed in the country. In the FY 2019/2020, NARO produced over 315 Metric tonnes (MT) of hay and silage that was availed to farmers across the country to address the challenge of dry season feed scarcity. NARO has also supported farmers with feed conservation equipment at a cost-recovery basis to enable mechanised hay and silage production on over 500 acres resulting into production of over 10,000 tons of conserved feed notably silage. As regards to forage seed production, NARO continues to be the leading producer of elite forage/pasture seed to address the national forage seed demands. During FY 2019/2020, NARO produced over 2 metric tons of foundation seed for *chloris gayana* that was availed to farmers to rehabilitate over 300 acres of degraded pasture in the cattle corridor of Uganda notably in Nakasongola, Nakaseke, Masindi, Kiruhura, Koboga, Kyankwanzi, Mbarara, Sembabule and Karamoja region.

*Genetic improvement and conservation of indigenous cattle and goat breeds*

1. Desirous to enhance the productivity of native livestock breeds coupled with the need to safeguard against genetic erosion, NARO has continued to improve and conserve indigenous cattle breeds notably Ankole cattle mainly at MbaZARDI, Small East African Zebu at Serere and Nganda cattle at Kamenyamigo.
2. NARO has continued to facilitate community-led goat improvement schemes in Hoima, Nakapiripiri, Napak and Masindi Districts with the aim of selecting elite Mubede and Small East African indigenous goat breeds. The intervention focuses on systematically, identifying and selecting elite young male goats and use them for breeding within the goat farming communities in the above districts. During the financial year 2019/2020, a total of 16 and 18 elite breeding bucks were selected and exchanged among members of breeding groups in Kyabigambire and Buseruka sub-counties respectively. The breeding objective is to improve body weight at six months from 10 kg to 18 kg, and twinning ability from 30 to 50 %. During the financial 2019/2020, the intervention results in elite goats with 15kg at six months. Consequently, the participating farmers were able to sell 136 elite breeding animals at a cost of 300,000/= each compared to the 100,000- 150,000/= they used to sell at the local market before the intervention.

*Evaluation of exotic dairy breeds in Uganda conditions*

Desirous to guide the country on the best dairy breed under Ugandan conditions, NARO introduced the Viking Jersey dairy breed. During the FY 2019/20, NARO has evaluated the performance of Viking Jersey calves under intensive production systems. The results of the study revealed that the average daily weight gains of the calves during pre-weaning phase ranged from 392.9 g/day to 654.8 g/day with an average 532.6 g/day. During post-weaning phase, the mean daily weight gain for all calves was 450 $gday^{-1}$. Because the Jersey is a small animal with mature live weight of about 320kg, results on growth performance revelled that the calves reached 60% of the mature live weight (210kg) in 16 months.

Attaining 60% of mature live weight implies that that the animals has attained sexual maturity and has reached mating weight. Therefore, as compared to other exotic dairy breeds like the Friesians and Ayrshire that attain mating weight in 24 months, the Jersey can be mated between 14 and 16 months. NARO will continue evaluating the performance of the breed in various parameters including feed utilisation efficiency, biogas production potential, adaptability, and disease tolerance among others.

*Relocation and Operationalization of NaLIRRI at Nakyesasa and Maruzi*

NARO has continued to transfer NaLIRRI to Nakyesasa and Maruzi campuses following the establishment of a phosphate fertilizer production complex at Tororo where NaLIRRI was housed. During the FY 2019/20, NARO has made significant progress towards acquiring a land title for 10 square miles of Maruzi ranch. The title has been processed and awaits transfer in to NARO's name. In order to strengthen capacity for large scale mechanised feed and forage production to address to the feed scarcity challenge in the country particularly during drought, NARO has established an implement and machinery workshop equipped among others with two tractors, hay baler, forage choppers, planter, boom sprayer and ploughing implements at Maruzi. To sustain availability and supply of quality forage/pasture seed and conserved feed resources notably hay and haylage to livestock farmers in Uganda, NARO established and maintained over 500 acres of forage production fields for different forages including *chloris gayana*, fodder maize, lablab, Brachiaria and Alfalfa among others at Maruzi and Nakyesasa resulting in production of 315 tons of conserved feed resources and over 2 metric tones of forage foundation seed.

*Stingless bee research*

NARO is increasing the potential of stingless bees in Uganda towards improved pollination, medicinal, and ecology. So far, four (4) stingless bee species have been identified (*Meliponula bocandei M. ferruginea, M. nebulata* and *Plebeina hilderbrandtii*). *M. bocandei* and *M. ferruginea* so far exhibit potential for commercial value and are under evaluation. Two stingless beehive prototypes (NAROSBH 1 & NAROSBH 7) have been developed and are being tested for the domestication of *M. bocandei, M. ferruginea* and *P. hilderbrandtii.* Three novel and high value stingless bee products (honey, pollen and propolis) for use in the in food and pharmaceutical industries have been developed and are being profiled physio-chemical properties.

*Rangeland improvement*

NARO has demonstrated that rangelands can be improved and enhanced to reduce drought related constraints, reduce livestock migration, and boost household dry season feeding in the Karamoja sub-region. In this effort, NARO rehabilitated 85 acres of degraded pasture and established 35 acres of improved drought tolerant dry fodder banks in Nakapiripirit, Nabilatuk and Moroto districts. Rehabilitation of degraded pastures involved removal of unpalatable species, introduction of improved grass and legume species namely *Chloris Guyana*, *Cenchrus Cilliaris, Centrosema pubescens* and *Glycine max*. In addition, there was conservation of the improved pastures during the wet season and controlled rational grazing of the rehabilitated fields during the dry season that October – April with a peak between January to March. Results obtained indicated that the biomass dry matter weight of rehabilitated sites was six (6) times that of non-rehabilitated sites. The total area under pastures rehabilitated (115 acres) could

sustain 300 livestock units of 250 Kg for during the peak period of the dry spell of 95 days. Besides, fodder production from 47 acres could sustain 300 livestock units for 101 days without migrating. This implies that by rehabilitating and implementing protective grazing on one (1) square mile, pastoral communities raising 3,000 to 8,000 livestock units per kraal are able to retain 1500 livestock units without migration. This would save kraals average loses due to mortality of 15 per cent of the herd during migration valued at not less than shillings 225,000,000 per annum per kraal. Five (5) Beneficiary committees of nine (9) members each comprising of kraal leaders, local council leaders, elders, representatives of livestock owners, herdsmen leaders, land owner/host farmers, women and youth mobilisers, animal health workers, Village Health Teams (VHTs) and community demonstration site attendants have been established, skilled and tasked to ensure post-project sustainability in all project sites.

### 3.1.3 Fisheries research

Research undertakings in fisheries during the FY 2019/20 have achieved the following;

- Adopted a POCKIT™Nucleic Acid Analyzer diagnostic kit, and validated TILV detection protocols of Chang et al., 2012 and Tsai et al., 2012 using IQ Plus™ TiLV Reagent sets.
- Quality brood stocks/seed (faster growing) of Tilapia (seed - 108,688; brood stock - 1,340) and African Cat fish (seed - 30,415) has been provided to six seed multipliers and 136 farmers. In addition, multiplication and maintenance of improved Nile tilapia and the African catfish at Kajansi ARDC has been strengthened. Two thousand Nile tilapia broodstock were collected from Lake Victoria and are currently under acclamatisation on-station before use in selective breeding of the species,
- The abundance, diversity and type of plastics in sediment and water have been established to aid planning and mitigation measures for plastic pollution on Lake Victoria. In addition, distribution maps of hotspots of micro plastic occurrence and diversity in sediment and water of Lake Victoria have been produced,
- Annual fish production trends and economic value of fish catch production as of 2019 in lakes Albert (335,000 tonnes valued at 700 bn), Edward, George and the Kazinga Channel (6,630 tonnes valued at ~ 47 bn) have been generated. This will inform developing strategies for improving fisheries sub-sector,
- Evaluation of ecological status of two pollution hotspots (Murchison bay and Napoleon Gulf) on Lake Victoria is on- going. This information will aid monitoring of pollution as a result of human activities,
- Production of value-added products (fish sausages). Received additional support to upgrade production line from 0.5 tonnes to 10 tonnes per day at Wakiso district. Prior COVID 19, produced 3 tonnes per day for local and regional markets (Kenya, DRC & Rwanda), Live fish sales have increased from 100kg to about 500 kg per day in Wandegeya Market. The project received extra support from *MSINGI* to install a cold chain to increase sales to more than 5 tonnes per day. COVID 19 affected sales during lockdown: closed markets.
- Land with its title has been secured and structural designs approved for establishment of proposed satellite fisheries research station on Lake Albert,

### 3.1.4 Forestry research

- Under the forestry sub-sector, NARO directed research interventions on tree species and management options, medicinal tree database establishment and supporting households' soil and water management. These interventions registered the following achievements;
- Suitability maps were developed for tree species and management options across different sites in Eastern Uganda and farmer circumstances that depict erosion hotspots, runoff potential and appropriate land and water management options,
- Smallholder farmers in 14 villages of Manafwa and Kapchorwa districts have adopted calliandra fodder shrubs, resulting in a 2 fold increase in milk production of their cows. .
- Biological agents (4,650 C. nockae and 2,000 P. bliteus) released against bronze bug and Red Lerp Psyllid in the field. Field performance of C. nockae and P. bliteus bio-agents in the field rated at over 70 % effectiveness. Sampling for resistant Eucalyptus species/hybrids done in Eastern and Western AEZs. Leaf samples from susceptible and resistant Eucalyptus trees collected for genetic identification. The biological control agents, particularly *P. bliteus* released much earlier are a success and have saved over 50,000 ha of Eucalyptus equivalent to 1.75 trillion Uganda Shillings from being wiped out.
- A database of tree and shrub species used in diabetes treatment in Uganda was assembled, and will contribute to efforts towards development of a herbal cure for diabetes in Uganda.
- A total of 550 households were supported in use of water management technologies namely; contour grass strips, terraces, and unlined, run-off ponds for irrigation in Eastern Uganda. Significant improvement in soil health has been observed as indicated by improved crop yields
- Optimized a protocol for tissue culture mass micropropagation of bamboo seedlings that will eventually sustain the raw material base for development of various value-added bamboo products. Further, over 50,000 bamboo seedlings involving two species – Giant bamboo (*Dendrocalamus giganteus*) and common bamboo (*Bambusa vulgaris*) have so far been conventionally produced in Kifu green houses.

### 3.1.5 Tea research

Tea research and development activities focused on identifying high quality speciality tea clones for commercialization, tea agroforestry, and climate and landscape smart tea practices. A total of 140 tea accessions at Rwebitaba Tea Research Centre were analysed and characterized using eight biochemical markers that included polyphenols, catechins flavonoids, fermentation rate, crude fiber, caffeine, colour, and brightness. Based on high fermentation rate and polyphenol content, 14 tea clones were found superior for black tea, and thus potential candidates for commercialisation. Further evaluation of these clones for agronomic and resistance traits, is on-going.

To understand the contribution of agroforestry trees in tea farming, a survey was conducted in tea growing areas of Kabarole and Kyenjojo. The results revealed a need for increased adaption of agroforestry trees in tea farming as one of the major promising climate smart practices contributing significantly to sequestration of greenhouse gases. Furthermore, NARO in collaboration with its partners, especially Solidaridad, Rainforest Alliance, and Smallholder Tea estate factories developed a Manual on Tea Climate and Landscape Smart Tea Practices for Uganda. The manual will support sustainable climate and landscape smart practices for tea

production in Uganda. NARO also built capacity of 250 key tea stakeholders in sustainable tea production.

### 3.1.6 Agricultural engineering

During the FY 2019/2020, NARO developed a second prototype of ram pump (NARORAMP-2) with a higher discharge of 1,440 lts /hr at delivery head of 4m and two models of second generation of commercial food grade fish smoking kiln (NAROFIK-3-D4 and NAROFIK-3-D6) with capacity of 400 to 700 Kg/day. Use of the ram pump has increased vegetable cropping regime from 2 to 3 per year and farmers along rivers and streams can now grow vegetables and earn a living all year round. The fish kiln (Figure 1) processes high quality smoked fish and has reduced cancer-causing compounds in our smoked fish from 40,000 *ppb* to 0.88 *ppb* well below the maximum limit of 2 *ppb* set by EU markets. This has enabled Ugandan smoked fish competitive in export market. The expected lifespan of the entire kiln assembly is 20 years without any major repairs. After 20 years a new heat insulation system will have to be built on the stainless steel part of dehydration chamber. In addition new smoke generation and filter units are fabricated thus producing a new kiln using the same stainless steel section of the dehydration chamber. When in operation, the kiln should be placed in a well-aerated housing structure.

**Figure 16: NARO PAH-Safe Fish Smoking Kiln – NAROFIK-3-D6**

In addition, NARO is promoting smallholder agricultural machinery hire service enterprises that increase access of farm machinery to farmers at same time creating jobs for the rural people and the youth. To this effort a total of 60 multi-crop planters, 27 NARO lightweight rice threshers, 23 food grade cassava chippers, 75 Ox-weeders were distributed to 63 farmer entrepreneurs in 25 sub counties, in Acholi sub-region and Adjuman district. Furthermore, skills of 488 (40% women) farmer entrepreneurs and equipment operators in Kitgum, Lamo and Agago districts was

enhanced in operating equipment hire service as business and processing high quality cassava chips and flour.

### 3.1.7 Value addition

In a bid to promote agro-industrialisation and create niche markets, NARO has directed part of its efforts to value addition, and the following achievements were registered;

- Milk fortification was undertaken to improve on micronutrient status and alleviate common health problems. Development of safe and stable milk-based nutraceutical products with anti-ulcer, diabetes and cancer properties are ongoing. In addition, plant-based pharmaceutical compounds: tannins, phenols, flavonoid, antioxidants, anthocyanin for evaluation of anti-cancer, anti-ulcer and anti-diabetic properties were extracted, bulked and constituted in milk-based products. To date, 50 plant species were screened for availability of target biochemical compounds. 11 plants were pre-selected based on Frap values, availability in the community and ease of extraction. The 5 best plants based on the above criteria were chosen for fortification in yoghurt samples. In addition, a complete blood profiling protocol for testing in mice based on production of antibodies and other blood parameters against the target ailments has been completed for submission to the research and ethics committee for approval.
- Three Market oriented fish products were generated (Nile perch oil with respect to optimizing protocols for Nile perch oil production; Plant N (bio-control agent for fish pathogens); Waste water cleaning algae),
- A feed mill at Kajjansi ARDC has been repaired and production of 9 ton/week fish feeds including powder and pellets for sale to farmers is on-going,
- Two snack prototypes of a nutrient dense (pro-vitamin A, protein, Iron and Zinc) Market-Smart AroNutro Instant Maize Snack were developed.
- A total of four (4) starter culture formulae for processing milk products (1 for ghee; 2 for yogurt and 1 for probiotic yoghurt) were developed. This has improved the quality of traditionally produced products (yoghurt, butter and ghee) of at least 2 cottage industries in which about 500 women are involved in dairy product processing and marketing.
- The main cooking and beer brewing banana varieties with potential for high banana juice yield in southwestern Uganda have been identified and mapped. The 4 cooking banana varieties are Kibuzi, Mbwazulume, Ntalagaza and Nshasha; and the 6 beer brewing varieties are Mbidde, Musa, Kisubi, Kayinja, Mufunyakobe and Fhia 23. Most important is that one banana variety that is market-preferred and with the best juice and wine producing attributes and well adapted to the local agro-ecological conditions has been selected for use by the industries.
- One (1) enzymatic banana juice extraction method has been developed. This method, which uses Pectinase enzyme at 0.08% (by weight) can propel the banana juice processing cottage industries to a much higher level. Use of the method greatly reduces labour, reduces fuel energy, reduces extraction time and enhances the quantity and quality of banana juice and wine produced.
- Two (2) clay-based anti-aflatoxin formulae designed for pre-treatment of maize bran-based feeds. Treatment of maize bran with the aflatoxin binder (developed from the locally selected minerals) reduces the aflatoxin content in the animal feeds by 80-98%, that is, a percentage

higher than any commerce available aflatoxin binder on the market. This significantly reduces the risks associated with the consumption of aflatoxins in fish and livestock products. , what have they improved?

- Four (4) feed formulae for poultry (2 broilers; starter and grower; 2 layers; chick and growers), the rations produced by use of these formulae significantly increase growth rate/weight gain and egg production. Expect application manual?
- Two feed formulae for cattle (1 dairy meal and calve starter). This has improved calf growth by 17% and increased milk production by 46% where these diets are in use.

### 3.1.8 Bio-technology

Biotechnology research focused on addressing the challenge of nutrition deficiency in banana and devastating diseases in cassava namely: Cassava Brown Streak Disease (CBSD) and Cassava Mosaic Disease (CMD). Under banana research, two biotechnology research products: Hybrid M9 [Kabana 5] and Nakitembe, enhanced with pro-vitaminA [pVA], were approved by National Biosafety Committee. The two varieties have further been advanced to four multi-locational confined field evaluation trials representing banana agroecological zones in Buginyanya, Mbarara, Bulindi and Kawanda. In addition, evaluation of transgenic cassava plants with genes for enhanced ammonia and nitrogen dioxide uptake is also on-going and so far, at least five (5) cassava varieties have been evaluated. Trials for validation of resistance to Cassava Brown Streak Virus established in Namulonge showcase promising results of GMO cassava plants are tolerant to CBSD (*details - Figures 11 and 12*) and Serere. Advanced Yield Trials established in four (4) locations (Namulonge, Tororo, Serere, and Arua) with 32 clones (22 white and 10 yellow fleshed).

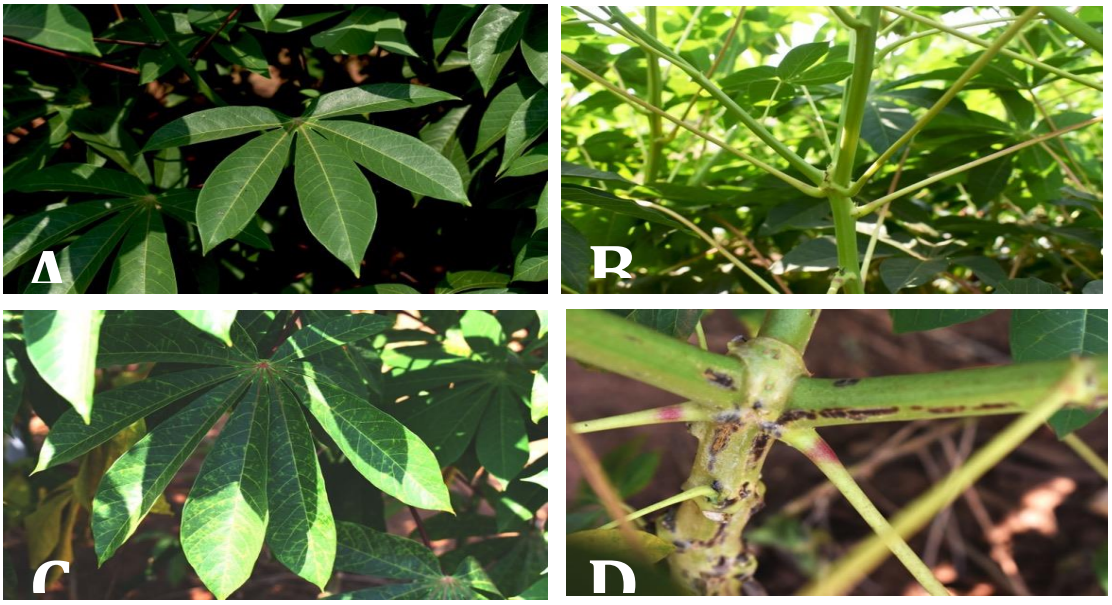



**Figure 17: Top GMO Cassava plants with no CBSD Symptoms, Bottom: Non GMO cassava plants showing CBSD symptoms**

Also, advances were made on the GM potato against late blight resistance by using 3R genes extracted from wild relatives of potato. The transgenic potato lines have consistently shown field resistance to late blight.

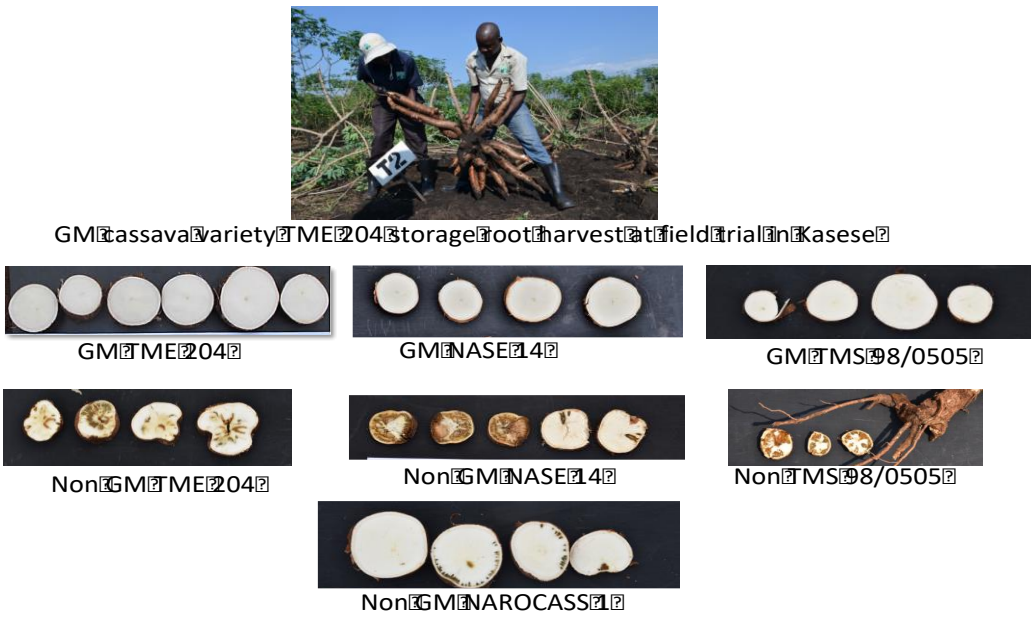



**Figure 18: Clean storage roots of GMO cassava plants with no CBSD symptoms, compared to heavily diseased roots of Non GMO**

One line vic.172 has been tested under confinement in multi-locational trials at Kachwekano, Rwebitaba and Buginyanya and currently data collection for the regulatory phase is ongoing.

### 3.1.9 Socioeconomic and cross-cutting research

***Gender mainstreaming in agricultural research for development***

During the FY 2019/2020 NARO has continued to register considerable achievements in the implementation of its gender and diversity programs. In an effort to ensure that all gender categories (children, women, youth, the elderly and persons with disabilities) benefit from its technological development and dissemination initiatives at the grassroots the organization has endeavored to develop technologies and knowledge generated in various disciplines to cater for production challenges. Furthermore stakeholder skills enhancement programmes have been designed and implemented to cater for the all gender categories. The key achievements are:

- 48 environmental social safe guard/gender focal persons in PARIs were trained in gender analysis and strategy development,
- Gender assessment and monitoring tools developed for integrating of gender in research at all PARIs,
- 4 institutes were consulted and guided on the implementation of gender actions in their projects especially ensuring that women's voices are included in decision-making, accessing and controlling production factors, engaged in research, extension and capacity building processes; and interests of youth in agriculture, food, income insecurity and poor nutrition.

NARO has also been engaged in the management of social risks. This has involved building capacity of the local communities including institute workers, staff and community personnel to address social concerns including child-labour, HIV/AIDS, gender and sexual harassment.

***Invasive Weed Species Management***

Efforts in controlling aquatic invasive weeds was directed to Kariba weed (*Salvinia molesta*) management and the key achievements registered are as follows:

- Lakes Kyoga, Kwania and Kibimba dam which were previously Kariba weed hotspots are now over 90% clear of the weed due to the deployment of an integrated management approach using bio-agents (*Cyrtobagous salviniea* weevils) and some mechanical removal,
- Information on Kariba weed occurrence and infestation level, and a map of Kariba weed occurrence produced for five water bodies in the country. Lake Nakuwa in Kaliro district and Lumbuye swamp in Buyende district are now the new Kariba weed hotspots,
- To accelerate the control of Kariba weed, a total of 23,000 adult weevils from the 2 lake shore rearing facilities and Namulonge rearing station were released in Lake Kyoga, Lake Nakuwa and Kibimba dam (Bugiri district),
- Skills of five weevil rearing facility managers identified from the local communities were enhanced on weevil rearing at Budipa Landing site on Lake Nakuwa.
- One weevil rearing facility was set up and stocked with 560 weevils at Budipa Landing site on Lake Nakuwa,
- Kariba weed management information has been packaged for dissemination to control of the weed on Uganda's water bodies.

***Biodiversity***

The achievements in biodiversity are as follows:

- A tracking and monitoring system for fall armyworms developed based on two pheromones (Chem Tica from USA and Russel IPM from the UK),
- NARO supported a community seed bank in Nakasongola, Uganda banana cooperative union and one food industry platform,
- Genetic population structure and information on 47 pearl millet accessions in place to support breeding.

## 3.2 Research extension interface promoted and strengthened

### 3.2.1 Partnerships, technology promotion and dissemination

NARO in the FY 2019-2020 worked closely with a number of strategic partners to achieve various outputs along the technology generation and promotion chain. The partners are summarized in table 4.

**Table 11: Summary of partner categories NARO worked with in FY 2019 -2020**

| Partner Category | Number of partners |
|---|---|
| Uganda Government MDAs | 12 |
| District Local Governments | All (Intensive in 50) |
| Farming Households | 2000 |
| Farmer Organizations/Cooperatives | 16 |
| CSOs/NGOs/CBOs | 26 |
| Commercial Seed Companies | 14 |
| Local Community Based Seed Entities | 4 |
| Fish farms/hatcheries | 17 |
| United Nations Agencies | 3 |
| CGIAR centers | 11 |
| Development partners | 19 |
| International research centers | 16 |
| Regional partnerships | 13 |
| National Universities | 10 |
| International and Regional Universities | 19 |

### 3.2.2 Strategic Positioning of NARO for Improved Visibility

In the FY 2019/2020, NARO's strategic positioning took center stage at the national policy level, media fraternity and the agricultural sector at large. The NARO online portal is almost ready and will be available for use in the next financial year making our relevance resonate with the new norms in the post COVID-19 era. Other achievements registered to improve NARO Visibility were;

- Five (5) high-level dialogues and strategic meetings were organized with: Parliamentary Committee on Budget (PACOB); Parliamentary Committees on Agriculture and Trade; Ministry of Public Service; Ministry of Science, Technology and Innovation; Cabinet; and Permanent Secretary and Secretary to Treasury of MoFPED,
- NARO participated in the South-to-South, Forum on China-Africa Cooperation (FOCAC) meetings that focused on the relevance and input of agricultural research into sustainable food security,
- NARO innovations were promoted on different shows; the World Food day event at Bulindi ZARDI; the Nile Jinja Agricultural show; NRM youth event in Kololo, Kampala and Harvest Money Expo at Namboole,
- Four (4) Farm Clinics were held at NaCORI, Ngetta ZARDI, BugiZARDI and MuZARDI. A total of 6,232 (42% women) beneficiaries attended. Several NARO technologies were promoted,
- Three (3) Television and four (5) Radio talk shows were held to promote NARO Technologies, Innovations and Management Practices. These televisions have a combined viewership of 6 million people. Furthermore, NARO dedicated resources towards the streamlining of its online visibility, which all stakeholders will benefit from in the next financial year as a contribution to mitigate effects of COVID-19.

### 3.2.3 Seed Production

NARO produced substantial quantities of breeder (pre-basic) seed, foundation (basic) seed, seedlings and vegetative planting materials of several commodities and provided to technology uptake pathways (farmers, farmer groups, NGOs, MSIPS, Local Governments). The assorted quantities of the breeder and foundation seed of crop varieties produced in FY 2019/2020 is summaries in table 5 while that for vegetative materials and seedlings of superior varieties of crops like cassava, sweet potato, banana, potato, horticultural crops, coffee, tea, and trees is provided in table 6.

**Table 12: Breeder and Foundation seed of improved crop varieties produced by NARO in FY 2019/20**

| PARI | Crop and quantity of seed (Kgs) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Maize** | **Rice** | **Sorghum** | **Finger millet** | **Wheat** | **Beans** | **Green gram** | **G.nuts** | **Cowpea** | **Simsim** | **Soya bean** |
| **NACRRI** | | | | | | 5,250 | | | | | |
| **NASARI** | | | 125 | 125 | | | 50 | 125 | 100 | | |
| **AbiZARDI** | 6,100 | 4,520 | | | | 1,982 | | | | 83 | 1,160 |
| **BugiZARDI** | 300 | 500 | | | 378 | 3,500 | | | | | |
| **MbaZARDI** | | | | | | 3,500 | | | | | 400 |
| **Ngetta** | 2,300 | 1,700 | | | | 480 | | 4,610 | | | 4,963 |
| **Nabuin** | 6,000 | | | | | | | | | | |
| **Rwebitaba** | | 2,222 | | | | 7,167 | | | | | |
| **Total** | **14,700** | **8,942** | **125** | **125** | **378** | **21,879** | **50** | **4,735** | **100** | **83** | **6,523** |

**Table 13: Vegetative planting materials and seedlings of superior varieties of different crops and tree species produced by NARO in FY 2019/20**

| PARI | Crop and quantity of planting material | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Cassava (Bags) | Sweet potato (Bags) | Banana suckers | Potato tubers (Kgs) | Potato seedling | *Coffee seedling | Coffee seed (Kgs) | Tea seedling | *Fruit | Tree seedling |
| **NARL** | | | 200 | | | | | | 4,000 | 1,000 |
| **NACORRI** | | | | | | 334,364 | 1,122 | | | |
| **NAFORRI** | | | | | | | | | 15,731 | 469,881 |
| **AbiZARDI** | 430 | 235 | | 1,600 | | | | | | |
| **BugiZARDI** | 2,500 | 1,200 | 1,200 | 800 | 7,000 | 50,500 | | | 350 | |
| **Bulindi** | 3,500 | 1,250 | 500 | | | 2,250 | | | 5,500 | |
| **KaZARDI** | | | | 35,000 | 215,215 | | | | 5320 | |
| **Mukono** | 50 | 12 | | | | 17,061 | | | 1,418 | 1,260 |
| **Ngetta** | 670 | | | | | | | | | 2,250 |
| **Rwebitaba** | | | 1,500 | 6,954 | 21,811 | | | 30,000 | | |
| **Kiige** | | | | | | | | | 38,000 | 320,000 |
| **Total** | **7,150** | **2,697** | **3,400** | **44,354** | **244,026** | **404,175** | **1,122** | **30,000** | **70,319** | **794,391** |

** Fruit (mango, citrus, avocado, apples, guava) seedlings*

**Coffee Clonally propagated plantlets of CWD-r varieties of Robusta coffee is 298,2000 seedlings and seedlings and seed of Arabica coffee produced were 36,164 and 1,122 kg respectively.*

*Livestock and fish seed were produced and distributed to various farmers:*

- Assorted seeds of 5 improved pasture varieties including NARO Napier 1, 2, 3 and Kakamega and Brachiaria mulato were produced and distributed at Mbarara ZARDI
- Assorted research products including Chloris gayana, Cenchrus ciliaris; Napier stunt tolerant planting material, silage, Hay, Haylage, Jersey Semen, Fleckvick Semen, forage conservation technology was produced at NALIRRI,
- Four (4) improved livestock breeds (Sahiwal cross breed, Cambrough pigs, Toggenburg goats breed & Bovan Brown chicken produced and distributed to famers at Nabuib ZARDI,

- 250 bags of forages, 2000 Nile tilapia fish seed, and 32 piglets were distributed at Bulindi ZARDI
- 20,000 high quality tilapia fingerlings were produced and distributed to farmers at Mukono ZARDI;

Five (5) technologies on fish seed (1,000,000)/broodstock, live foods for juvenile fish (artemia, moina and rotifers), fish feed formulations (dry rations)

### 3.2.4 Scientific information dissemination material

In order to enhance access of novel scientific information for beneficiaries including farmers, scholars, private sector and general public, NARO has continued to prepare and package scientific information for different categories of users. Achievements registered are as follows:

- A total of 165 scientific papers were published in peer-reviewed journals as in table 4. Out of which seven technological innovations were packaged as farming information materials (3 training manual, one brochure and leaflets, [one climate smart agriculture farmer's manual, one in value addition, two in appropriate engineering],
- Scientific papers and posters presented at various conferences (Details -Annex 1)

**Table 14: Number of NARO Publications**

| Number of Peer-reviewed Scientific Publications for the FY 2019/20 | | |
|---|---|---|
| **ID** | **Institute** | **Number** |
| **1** | NaCRRI | 52 |
| **2** | NaCORI | 3 |
| **3** | NaFIRRI | 22 |
| **4** | NaFORRI | 14 |
| **5** | NaRL | 5 |
| **6** | NaLIRRI | 20 |
| **7** | NaSARRI | 12 |
| **8** | Abi ZARDI | 2 |
| **9** | Bulindi ZARDI | 12 |
| **10** | Buginyanya ZARDI | 3 |
| **11** | Kachwekano ZARDI | 5 |
| **12** | Mbarara ZARDI | 5 |
| **13** | Mukono ZARDI | 6 |
| **14** | Nabuin ZARDI | 4 |
| **15** | Ngetta ZARDI | 2 |
| **16** | Rwebitaba ZARDI | 3 |
| | **Total** | **165** |

## 3.3 Agricultural research capacity strengthened

### 3.3.1 Governance and Management

In execution of its role in providing oversight of implementation of the organization mandate and strategic plan, the NARO Council approved the following policies and strategies:

***Policies***

- Data Management Policy and Strategy
- Knowledge Management Policy

- Records, Information and Communication Management Policy and Strategy
- Publishing Policy and Guidelines
- One (1) forestry laboratory Standard Operating Procedures (SOPs) was developed.
- The process for developing a framework for access to NARO plant varieties to streamline access of NARO plant varieties by third party was also initiated.

***Strategies***

The NARO Council approved new changes in the structure of the organization.

- Incubation and Commercialisation Unit has been established at NAROSEC. It aims to streamline access of NARO plant varieties by end-users. The unit will support NARO's control of her plant varieties, and hence ease tracking of their distribution, and quality control. The initiative will in-turn enhance NARO's attainment of benefit from the released varieties.
- New Directorate of Internal Audit.
- Establishment of Grants Office to support resource mobilisation initiatives.

The 38th NARO Governing Council meeting ratified the establishment of the NARO Grants Office to strengthen and widen funding base as a means of sustaining research intended for strategic interventions. The office will be manned by a Director Grants, Head Resource Mobilization and Economic and Development Analyst.

- The vacant positions of Directors of Research (for NaFIRRI and Mukono, Rwebitaba ZARDIs) and Program Leaders were advertise and filled.
- The Council endorsed the increase of staff annual gratuity to match gratuity of sister agencies in the agricultural sector.

### 3.3.2 Office of the Director General

In an effort to motivate, recruit and retain NARO Staff, the Director General NARO provided leadership and guidance, which has led to enhancement of NARO's MTEF by 30.761 billion for the FY 2020/21. Such enhancement is applied in the key sensitive areas as follows

- Salary enhancement (UGX 10.761 billion). This intervention is aimed at combating the resignation of scientists from NARO due to lack commensurate pay.
- The enhancement will strengthen NARO's capacity in the Agricultural engineering at Namalere (UGX 5billion), and
- Vaccine production facility at NaLIRRI (UGX 15 billion).

### 3.3.3 Internal Audit

In accordance with the Public Financial Management Act 2015 (section 48) and NARO Audit Charter, the Audit unit achieved the following;

- Conducted Systems audit one (1), each on Information Technology, Procurement, Human Resources Management, Assets Management and made recommendations for improvement in areas of weakness.
- Conducted one (1) core research audit and recommended for operationalization of laboratories by equipping and recruitment of laboratory Assistants and, allocation of resources to key result areas.
- Conducted two (2) financial and Management audits, and reviewed internal controls over financial management and compliance with the Public Financial Management (PFM) Act 2015,
- Conducted one (1) governance audit and advised management on areas of improvement such as the renewal of tenure for Advisory Committee members,

- Reviewed and monitored risk management processes and updated four (4) risk Registers for PARIs.
- Reviewed (12) audit to ensure that the payroll was free of ghost workers and that PAYE and NSSF computations were accurate and remitted in accordance with Income Tax Act and NSSF Act respectively,
- Provided assurance to the Audit and Risk Committee of the Governing Council by submitting (4) quarterly audit reports highlighting audit findings and recommendations.

### 3.3.4 Human resource management

NARO is committed to attracting, developing and retaining adequate, competent and motivated human resource to support its transformation agenda. The following key achievements were registered.

*a) Staff registered to professional bodies*

NARO staff have been registered with different professional bodies to enable them perform their functions. NARO paid all their annual subscription fees of the year 2020 to the respective professional bodies of; Association of Internal Auditors, Engineers Registration Board, Uganda Veterinary Association, Institute of Chartered Public Accountants, Uganda human resource managers, Federation of Uganda Employers and Association of Chartered Certified Accountants.

**Table 15: Subscription to professional bodies**

| | Professional body | Beneficiaries |
|---|---|---|
| 1. | Engineers Registration Board | Engineers in NARO service |
| 2. | Association of internal Auditors | 18 Internal Auditors |
| 3. | Uganda Veterinary Association | 20 NARO Veterinarians |
| 4. | Institute of Chartered Public Accountants | 20 Internal Audit staff and Accounts |
| 5. | Association of chartered Certified Accountants | 5 Internal Audit staff and Accounts |
| 6. | Uganda Human Resource managers Association | 16 NARO Human Resource officers |
| 7. | Federation of Uganda Employers (FUE) | NARO is a member of FUE |

*b) Staff Performance System and onboarding*

The implementation of new staff Performance appraisal system has improved organizational performance. NARO staffs are now self-driven to achieve set targets. During the period NARO recruited 13 requisite staff members. These included: (i) Deputy Director General ATP; Director Rwebitaba; Director NAFIRI and Director MUZARDI. In addition Seven (7) Program Leaders, and two consultants were recruited (Director Grants and Head Resource Mobilization. The officers are already on board and carrying out their respective activities.

*c) Long-term and short-term staff training*

- A total of 34 and 54 NARO staff completed their PhD and Masters degrees respectively. One (1) staff completed bachelors and 18 staff completed various short courses. In addition, 24 staff have enrolled for PhD and two (2) for Masters.
- Regarding staff who have not yet completed their studies, a sum 24 staff are currently enrolled for PhD, two (2) for Masters and one (1) staff for professional training.

*d) Short-term trainings*

- The Directorate of Human Resources conducted a series of short term trainings as in the table below:

**Table** 16**: NARO Staff Training by DHR**

| | Short term course | No of participants |
|---|---|---|
| 1. | Induction of new staff | 65 |
| 2. | Training of PARI Directors and Human Resource officers in performance. | 40 |
| 3. | Leadership/management training for PARI Directors | 35 |

NARO enhanced skills and competencies in other different areas of leadership and management such as:

- NARO ESS/gender focal persons (48) were trained on gender analysis and strategy development. In addition, a gender assessment was conducted in 4 institutes and gender monitoring tools developed to determine the gender responsiveness of NARO research undertakings.
- The Biometrics Research Support Unit (BRSU) conducted in-house training to twenty seven NARO scientists and technicians in three (3) PARIs namely, Ngetta ZARDI (7), Nabuin ZARDI (13) and Abi ZARDI (7). This was .in a bid to promote e-data management practices, integrity, quality assurance and quality control in design and implementation of agricultural research. The BRSU extended support/training in reinvigorating researcher's skills in data analysis and interpretation of research results.

### 3.3.5 Infrastructure management

The research infrastructure improvement for the FY 2019/20 focused mainly at those in Rwebitaba ZARDI, NaSARRI, NaLIRRI, and Nabuin ZARDI. These physical infrastructure development projects include renovations and new constructions that have either been completed or nearing completion. The key achievements made are as follows:

- *Rwebitaba ZARDI* - The administration block has been completed and awaiting handover, while the laboratory and conference facilities are near completion (Figure 13).

Administration and Laboratory

**fras**

Conference Hall

Administration block

Screen houses

- *NaLIRRI* - Infrastructures under development are: Milk quality control platform and production storage almost complete; calf-barn, vaccine and waste management facilities completed; expendable calf groupings and Isolation calf pens are on-going,
- *Nabuin ZARDI* - Infrastructure development are: Two (2) screen houses for crop protection and crop improvement which are completed, Staff houses - phase 2 under rehabilitation,
- *NAFIRRI* - Rehabilitation of the hatchery and pump house as well as repairs of tanks to enhance fish seed and fish feed production completed,
- *NaFORRI* - Renovation of a Guest House is 80% completed,
- *Ngetta ZARDI* - Renovation of fishponds undertaken in preparation for demonstration of improved aquaculture practices,
- *NARL* - Renovation of Food Biosciences Agribusiness laboratory is ongoing.

### 3.3.6 ICT

NARO has continued to build a standard and usable ICT environment specifically the following were achieved:

- Gaps have been identified and recommendations made to Top Management for decision making to improve NARO's current ICT environment in compliance to government's ICT standards,
- Improved NARO's ICT risk management and disaster recovery ability. There are document backups and restore procedures for all servers and staff computers. Furthermore, there has been upgrades of server management software, computers and software to prevent potential vulnerability issues,
- Improved telephony and intercom services through the acquisition and implementation of an E1 circuit connectivity, which allows placement of calls external to NARO.
- NARO has upgraded her ICT in a bid to cope with the COVID 19 pandemic and effects, to enable staff work from home and conduct zoom meetings.

### 3.3.7 Planning, Monitoring and Evaluation

In order to plan, track and report performance of NARO, the PM&E unit has continued to undertake planning, monitoring, reporting and evaluation functions. During the year, focus was on generation of performance reports, streamlining the planning function for better work plan and budget, tracking implementation of the annual work plan, and support to resource mobilization through proposal development. The unit has continued to operationalize the NARO Strategic Plan 2018/19 – 2027/28. To that effect the unit developed a Mid-Term Operational Plan

(2018/19 – 2022/23) to fast track the realization of the Aspired 10 year strategic results. To support the internal efforts, two review workshops were held to assess progress and achievements of various interventions. Specifically, the following achievements were registered;

- Developed a replacement retooling project, "Support to NARO (Project Code P0382)" for GoU funding,
- Provided leadership in development of two (2) project proposals. Of these, the Development Initiative for Northern Uganda (DINU) Project (FED/2019/412-808) worth UGX 25.5 billion has been awarded by European Union (EU) with implementation period of 40 months beginning March 2020. The second project is on Climate Smart Agriculture (CSA). The Concept Note has been developed, approved by Agricultural Sector Working Group (ASWG) for submission to Ministry of Finance, Economic Planning and Development (MFPED)-Development Committee,
- Sensitized PARIs on planned implementation of an effective PM&E system,
- Conducted, provided leadership and guidance in three (3) planning and review workshops for Competitive Grant Scheme (CGS) projects,
- Conducted a monitoring exercise on all the 40 CGS Cohort V Projects,
- Prepared and disseminated quarterly, half yearly, JASAR and annual, reports for Office of the Prime Minister; MFPED and MAAIF,
- Provided support to Audit Unit in ensuring value for money and compliance,
- Developed ad-hoc papers, contribution to budget speech and Ministerial Policy Statement to Parliament,
- Developed the 2020/2021 NARO Workplan.

### 3.3.8 Resource mobilization

In a bid to abate the challenge of inadequate funding for sustaining agricultural research and development, NARO has remained committed to putting in place mechanisms for securing adequate and sustainable resources from a wide array of sources.

#### 3.3.8.1 New Off-budget projects

Over the past few years, a significant funding contribution for agricultural research interventions of NARO have been attributed to off-budget projects. In the FY 2019/20, a total of 114 off-budget projects amounting to a total value of UGX 42.9 Billion was to be implemented. In this 2019/20 report, the following key off-budget projects under implementation are presented;

v. **Development Initiative for Northern Uganda (DINU):** This project seeks to chase poverty and hunger in northern Uganda by diversifying food systems for food and nutrition security, poverty reduction and inclusive development. With an implementation period of 40 months, the DINU project targets eight (8) districts in two (2) Livelihood Sub-Regions of Acholi and Lango. It has a total indicative budget of 6,375,941.00 EUR of which, 5,738,346.90 EUR is the requested EU contribution. The consortium partners include; SOLIDARIDAD, SG 2000, PALM Corps, Lira University, AUPWAE, AGRENES and Muni University.

vi. **Climate Smart Agriculture (CSA) Project:** In August 2019, the CSA Concept was developed, presented and approved by ASWG for submission to MFPED Development Committee. Relatedly, the process of securing a Consultant (CIAT Nairobi) to conduct a Climate Risk Profiling for the different agro-ecological zones (12) and four (4) value chains is on-going. NARO and MAAIF teams will participate in Climate Risk Profiling activity with CIAT for capacity

building. The CSA concept note is scheduled for presentation to the Development Committee (MFPED) on 11th August 2020.

vii. **Developing a Market–Oriented and Environmentally Sustainable Beef Meat Industry in Uganda Project (MOBIP):** This project seeks to improve competitiveness and productivity of the beef sub-sector through fostering gender responsive, inclusive and sustainable rangelands, agro-forestry and water resources management in Uganda..

viii. **The Livestock Agribusiness Incubation Programme (LAIP):** (ADB; DC)

**3.3.8.2 Other resource mobilization initiatives**

With one of the most important topical discussion being securing adequate resources for supporting agricultural research, NARO management engaged in high-level dialogues and strategic meetings such as PS/ST, PACOB, Parliamentary Committee on Agriculture, MoPS, MoSTI, Cabinet, etc. In addition, NARO management supported and convened various proposal writing teams leading to research grants, assorted proposals and concept notes.

**3.3.9 Procurements**

The procurement activities within the work plan for the financial year 2019/20 comprised of three categories namely; goods and non-consultancy services, consultancy services and civil works as well as micro procurements. The tables (12, 13, 14) in annex 2 reflect the implementation of the three categories in terms of the various stages involved in the procurement cycle as well as the current status. However some of the procurements were affected by lack of funds and therefore contracts not signed.

**7.0 Outstanding challenges and actions being taken**

The following are the key outstanding challenges of NARO;

g) ***Effectively conducting research under budget support:***

Most of NARO's budget is under support to NARO (GoU Development) and mainly caters for capital items. The expenditures on core technology generation and dissemination and maintenance of infrastructure are categorized as consumptive expenditure and restricted to about 20% of the total budget. NARO has continued to request MoFPED to provide a code for the purpose.

h) ***Meeting expectations with inadequate and unsustainable funding*:**

NARO operates with a very limited budget which has affected generation and dissemination of agricultural technologies and; adequate engagement to stakeholders. For the past 10 or so years Uganda's agricultural research intensity ratio – that is, agricultural research spending as a share of its GDP (Ag GDP) – has remained less than the minimum investment target of 1 percent set by the African Union and the United Nations. This calls for deliberate step up in increasing spending on agricultural research.

i) ***Working with limited research infrastructure*:**

While there have been concerted efforts and funding from GoU and partners towards improvement of agricultural research infrastructure, the current infrastructure is still to undertake cutting edge research and respond to emerging issues. There are inadequate facilities such laboratories, scientific equipment, staff houses and transport to effectively conduct

research. There is need to improve infrastructure to adequately contribute to agriculture transformation.

j) ***Operating under competing land use interests*:**
NARO operates under uncertain land ownership and distressing pressure from interested parties with immense development plans on land designated for agricultural research. This has slowed down investments in research infrastructure and interrupted effective implementation of land-use plans. This warrants investment in securing land for agricultural research.

*k)* ***Relocation of NaLIRRI to Maruzi via Nakyesasa.***
NARO has remained committed to **o**perationalizing NaLIRRI in Maruzi albeit now faces vivid challenges. While the project is posted on the Integrated Bank Projects (IBP), it has no direct budget allocation from MoFPED. In addition, it has received meager support by encumbering on Support for NARO P0382 for the last two consecutive fiscal years. Consequently, the relocation of NaLIRRI to Maruzi now faces a possible risk of being removed from the PIP by MoFPED thereby potentially delaying the project operationalization.

***l) Covid-19 Pandemic.***
NARO closed some of its operations for 12 weeks following the covid-19 outbreak from March 2020. Prior to closure of offices, NARO Management assessed the impact of COVID-19 related restrictions on the implementation of the scheduled work for the FY 2019/20 Work Plan in order to refocus efforts in areas that could still be delivered while working remotely.

**Table** 17**: The Impact of COVID-19 on NARO and the mitigation strategies and measures undertaken to address the impact.**

| Effect of COVID 19 Pandemic | Mitigation measures |
|---|---|
| **Budget Cuts** | Reduced operations |
| **Lean Staff (30%)** | Remote working and working in shifts<br>Re-prioritized activities |
| **Unpreparedness with remote working tools** | Staff keen to adopt to the new normal |
| **Reduced field monitoring affected data collection** | Re-prioritized activities |
| **Slowed down in research and support services** | Maintain lean staff at every PARI |

**Table** 18**: Challenges and their respective actions taken**

| Challenges | Actions being taken |
|---|---|
| Effectively conducting research under budget support | NARO is engaging with MoFPED to provide a code for the purpose. |
| Meeting expectations with inadequate and unsustainable funding | Engaging the Government of Uganda to deliberately increase spending on agricultural research and staff.<br><br>Generating internal revenues to support Agricultural research. |

| | |
|---|---|
| Working with limited research infrastructure | Sourcing for more funds to construct adequate centralized lab facilities that respond to emergencies.<br><br>NARO is in the process to have its Laboratories accredited and certified by International agencies. |
| Operating under competing land use interests | Efforts continue to secure all NARO land. |

**Lessons Learnt**

Partnerships with local, regional and international partners are key in the generation and dissemination of agricultural technologies. Strengthening institutional partnerships and collaborations also go a long way in offsetting infrastructural limitations in the short term. Efforts should therefore continue to support formation of these partnerships and more especially those in the private sector where donor support is tilted.

Communities easily participate in development interventions through existing community-based organizations that have good record of trust, openness and accountability to the people.

It is critical to develop formal agreements on roles and expected benefits with various stakeholders for success and sustainability of interventions.

Pooling critical mass of research tools and human skills continues to give NARO a competitive advantage in accessing resources for research.

## 8.0 Compliance of NARO to existing frameworks

To a great extent, NARO has ensured to address all the areas or gaps from previous assessments/to ensure compliancy with NPA, PPDA, Equal Opportunity, and BAMU guidelines and frameworks. During the reporting period, NARO complied well with the ratings of various frameworks as indicated below;

- NPA on project performance 70%
- PPDA 2018/19 score 77.3%
- Equal opportunity score 76%
- Reputation index 72%
- NARO JASAR for FY 2018/19 attained 100%
- Audited accounts for FY 2018/19 secured “Unqualified Opinion”

This clearly shows that NARO is reflected as a healthy and compliant institution.

## 9.0 Conclusion

NARO has delivered on her mandate as it has performed above the set targets. NARO has contributed towards stabilizing production, increased commodity productivity, increased household income, and improved human health. Despite this performance, agricultural communities in Uganda still face challenges of involvement of stakeholders especially farmers, climate change, pests and diseases and; low total factor productivity.