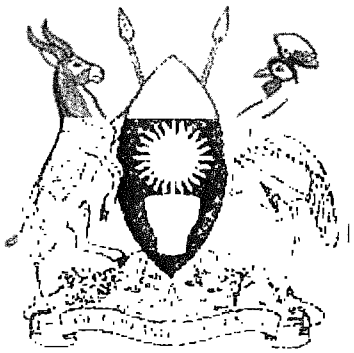
Public Disclosure Authorized

Public Disclosure Authorized



THE REPUBLIC OF UGANDA

REPORT OF THE AUDITOR GENERAL ON THE FINANCIAL STATEMENTS OF THE AGRICULTURAL TECHNOLOGY AND AGRIBUSINESS ADVISORY SERVICES PROJECT – NARO COMPONENT FOR THE YEAR ENDED 30TH JUNE 2018

OFFICE OF THE AUDITOR GENERAL

UGANDA

TABLE OF CONTENTS

LIST OF ACRONYMS 2
REPORT OF THE AUDITOR GENERAL ON THE FINANCIAL STATEMENTS OF AGRICULTURAL TECHNOLOGY AND AGRIBUSINESS ADVISORY SERVICES-NARO COMPONENT FOR THE YEAR ENDED 30TH JUNE, 2018 3
Opinion 3
Basis of Opinion 3
Key Audit Matters 4
- Implementation of Budget approved by Parliament 4
Other Matter 6
- Competitive Grant Scheme (CGS) Funds 6
Other Information 8
Responsibilities of the Accounting Officer for the Financial Statements 8
Auditor's Responsibilities for the Audit of the Financial Statements 9
Other Reporting Responsibilities 10
REPORT ON THE AUDIT OF COMPLIANCE WITH LEGISLATION 11
- Non-execution of performance security and undated Contracts 11
- Inspection of Project activities 12
REPORT OF THE AUDITOR GENERAL ON THE SPECIAL ACCOUNT OPERATIONS OF AGRICULTURAL TECHNOLOGY AND AGRIBUSINESS ADVISORY SERVICES (ATAAS) PROJECT-NARO COMPONENT FOR THE YEAR ENDED 30TH JUNE, 2018 15

LIST OF ACRONYMS

Acronym	Meaning
ATAAS	Agricultural Technology and Agribusiness Advisory Services
CGS	Competitive Grant Scheme
COVAB	College of Veterinary Medicine, Animal resources and Biosecurity
FYR	Financial Year
GOU	Government of Uganda
IDA	International Development Association
IESBA	International Ethics Standards Board for Accountants
ISA	International Standards on Auditing
ISSAIs	International Standards of Supreme Audit Institutions
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MOFPED	Ministry of Finance, Planning and Economic Development
MTR	Mid Term Review
NAADS	National Agricultural Advisory Services
NACCRI	
NARO	National Agricultural Research Organisation
NAROSEC	National Agricultural Research Organisation Secretariat.
PARI	Public Agricultural Research Institutes
RT.HON	Right Honourable
UGX	Uganda Shillings
URA	Uganda Revenue Authority
US $	United States Dollar
WB	World Bank
ZARDI	Zonal Agricultural Research Development Institute

REPORT OF THE AUDITOR GENERAL ON THE FINANCIAL STATEMENTS OF AGRICULTURAL TECHNOLOGY AND AGRIBUSINESS ADVISORY SERVICES-NARO COMPONENT FOR THE YEAR ENDED 30TH JUNE, 2018

THE RT. HON. SPEAKER OF PARLIAMENT

REPORT ON THE FINANCIAL STATEMENTS

Opinion

I have audited the accompanying financial statements of the Agricultural Technology and Agribusiness Advisory Services Project -NARO Component for the year ended 30th June 2018. The financial statements set out on pages 1 to 18 comprise of;

- Statement of receipts and payments
- Statement of Fund Balance
- Statement of Cash flows
- Statement of Special Designated Account Activity
- Notes to the financial statements including a summary of accounting policies used.

In my opinion, the project financial statements present fairly in all material respects the financial performance of the Agricultural Technology and Agribusiness Advisory Services (ATAAS) Project-NARO component for the year ended 30th June 2018 and the receipts and payments for the period then ended in accordance with the IDA guidelines and the basis of accounting described under note 1 to the financial statements.

Basis of Opinion

I conducted my audit in accordance with International Standards of Supreme Audit Institutions (ISSAIs). My responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the Financial Statement's section of my report. I am independent of the project in accordance with the Constitution of the Republic of Uganda (1995) as amended, the National Audit Act, 2008, the International Ethics Standards Board for Accountants Code of Ethics for Professional Accountants (Parts A and B) (IESBA Code), the International Organization of Supreme Audit Institutions (INTOSAI) Code of Ethics and other independence requirements applicable to performing audits of Financial Statements in Uganda.

Other Information

The Accounting Officer is responsible for the other information. The other information comprises the statement of responsibilities of the Accounting Officer and the commentaries by the Head of Accounts and the Accounting Officer, and other supplementary information. The other information does not include the financial statements and my auditors' report thereon.
My opinion on the financial statements does not cover the other information and I do not express an audit opinion or any form of assurance conclusion thereon.

In connection with my audit of the financial statements, my responsibility is to read the other information and, in doing so, consider whether the other information is materially consistent with the financial statements or my knowledge obtained in the audit, or otherwise appears to be materially misstated. If, based on the work I have performed, I conclude that there is a material misstatement of this other information, I am required to report that fact. I have nothing to report in this regard.

Responsibilities of the Accounting Officer for the Financial Statements

Under Article 164 of the Constitution of the Republic of Uganda, 1995 (as amended) and Section 45 of the Public Finance Management Act, 2015, the Accounting Officer is accountable to Parliament for the funds and resources of the Agricultural Technology and Agribusiness Advisory Services (ATAAS) Project-NARO.

The Accounting Officer is also responsible for the preparation of financial statements in accordance with the requirements of the Public Finance Management Act 2015, IDA guidelines and the basis of accounting described in note 1 to the financial statements, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatements, whether due to fraud or error.

In preparing the financial statements, the Accounting Officer is responsible for assessing the Project's ability to continue delivering its mandate, disclosing, as applicable, matters related to affecting the delivery of the mandate of the Agricultural Technology and Agribusiness Advisory Services (ATAAS) Project-NARO, and using the IDA Guidelines unless the Accounting Officer has a realistic alternative to the contrary.

The Accounting Officer is responsible for overseeing the Project's financial reporting process.

Auditor's Responsibilities for the Audit of the Financial Statements

My objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes my opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with ISSAIs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with ISSAIs, I exercise professional judgment and maintain professional skepticism throughout the audit. I also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Project's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Project's ability to deliver its mandate. If I conclude that a material uncertainty exists, I am required to draw attention in my auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify my opinion. My conclusions are based on the audit evidence obtained up to the date of my auditor's report. However, future events

or conditions may cause the Agricultural Technology and Agribusiness Advisory Services (ATAAS) Project-NARO to fail to deliver its mandate.

- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

I communicate with the Accounting Officer regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that I identify during my audit.

I also provide the Accounting Officer with a statement that I have complied with relevant ethical requirements regarding independence, and to communicate with him/her all relationships and other matters that may reasonably be thought to bear on my independence, and where applicable, related safeguards.

From the matters communicated with the Accounting Officer, I determine those matters that were of most significance in the audit of the financial statements of the current period and are therefore the key audit matters. I describe these matters in my auditor's report unless law or regulation precludes public disclosure about the matter or when, in extremely rare circumstances, I determine that a matter should not be communicated in my report because the adverse consequences of doing so would reasonably be expected to outweigh the public interest benefits of such communication.

Other Reporting Responsibilities

In accordance with sections 19(1) of the National Audit Act, 2008, I report to you, based on my work described on the audit of Financial Statements that;

Except for the matters raised in the compliance with legislation and funding requirements section below, and whose effect has been considered in forming my opinion on the financial statements, the activities, financial transactions and information reflected in the financial statements that have come to my notice during the audit, are in all material respects, in compliance with the authorities which govern them.

Item No.	Description of prototypes/Protocepts	Performance	
		Planned	Achieved
10.	Engineering prototypes (Information on Briquetting machine performance)	1	1
11.	Engineering prototypes (Precooked Bean)	1	5
12.	Gasifier stove prototype	1	0
13.	Carboniser prototype developed	1	0
14.	Briquetting machine prototype developed	1	0
15.	3 green protein protocepts for poultry		3
			13

3.3.12 Market linkages

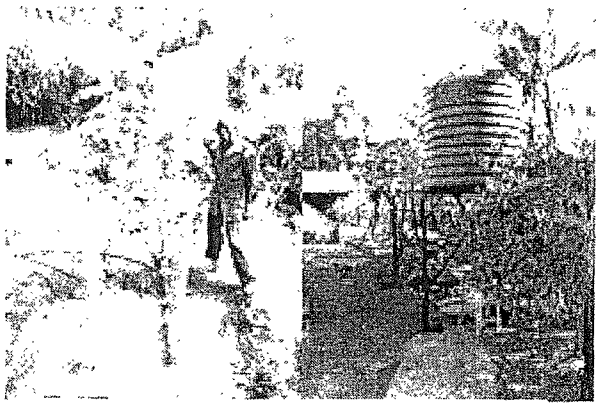
Linkages between fish famers and traders in central Uganda were evaluated. Results show that 74% of the farmers and 64% of the traders used personal selling against other product promotional activities. In addition, respondents adopted the use of mobile telephone. The extent of adoption of technology in fish marketing in the region (25% of farmers & 26% of traders use mobile telephone for marketing) was evaluated. Benefit cost rations for traders were conducted indicating that market segmentation yielded higher returns (1.14) against personal selling (0.52) and exhibitions (0.25). Personal selling stood-out among all the other strategies for farmers because 90% of farmers sold fish beside their ponds. Efficient market linkages used by farmers were established; linkages through a leading farmer, linkages through cooperatives and contract marketing to reduce transaction costs along the value chain.

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

3.4. Water for production

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

Two (2) Water Abstraction Technologies Adapted



Hydraulic ram irrigation system



Solar irrigation system

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

IP Identification and Protection Status; 1st May 2018

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

* Application for patent are undergoing substantive examination at ARIPO

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

4.3 Technologies delivered to Uptake pathways

4.1.1 Cassava

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

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

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

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

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

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

4.1.2 Bean

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

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

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

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

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

4.1.3 Coffee

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

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

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

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

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

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

4.1.4 Rice

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

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

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

4.1.5 Tea

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

4.1.6 Banana

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

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

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

4.1.7 Apiculture

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

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

4.1.8 Maize

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

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

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

worm and general maize production technologies were conducted on Kitara radio and KKCR for BuZARDI.

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

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

4.3.9 Apple

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

4.3.10 Irrigation

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

4.3.11 Demo Trials, Training and Publicity

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

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

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

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

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

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

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

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

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

4.1.12 Citrus fruit

Citrus orchards devastated by leaf and fruit spot diseases in Lango and Acholi sub regions were identified for rehabilitation. Farm tools and chemicals (fungicides and insecticides) for demonstration were procured.
One citrus disease management guide developed. One poster on citrus disease identification developed. One (1) citrus pest and disease management demonstration site established at Kitgum satellite station

Experiment on bio-pesticide options for management of orange fruit fly is on-going in at Nabuin.
One hundred (100) improved citrus seedlings produced at Nabuin.

Citrus management demonstrations have been established in Kamuli and Kayunga

4.1.13 Fish

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

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

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

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

A total of 20 participants (producers, processors, traders) were trained in principles of Business Plans.

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

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

Monitoring interventions were maintained to mitigate impacts of cage fish farming on SON fish farm; Monitoring to mitigate impacts of BEL on River Nile; project to promote Sustainable Land Management (SLM) practices around Lake Wamala in the Lake Victoria crescent.

The growth rate, survival rate and stocking density of Nile tilapia determined in four cages at Arecek dam. The fish grew by 0.93 cm in length and 4.63 g in weight at 2 months of age; initial weight was 10 g. Mortality rate was 0% at 2 months of age.

Three different products from Angara have been produced and displayed on different exhibitions. A total of 500 fish processors, handlers trained in aspects of fish handling, personal hygiene and packaging in Packwach district. A total of 100 fish processors trained in aspects of fish handling, personal hygiene and packaging in Packwach district.

A total of 2,000 brochures were produced and disseminated. One market centre comprising on Angara fish products established in Kampala (UMA).

A total of 430 stakeholders (30 farmers and 400 pupils and students) exposed to aquaculture production technologies under the auspices of BuZARDI.

4.7.14 Forestry and Fruit Trees and Fodder

A total of 25,000 seedlings of *M. volkensii* and 6,000 seedlings of *T. ivorensis* were raised and distributed to farmers.

One Farmers' training manual on above and below ground management of tree-crop interactions was developed. Potentially suitable sites for growing of *F. albida* trees in Uganda were selected and mapped out.

A total of 200 dairy farmers were selected in both L. Victoria Crescent (100) and Eastern highlands (100) AEZs; training needs determined as fodder tree growing for optimal biomass yield; minimizing of negative interactions e.g. invasiveness, competition and pest & disease hosting.

A total of 17 kg of *Calliandra* seed was distributed to 340 smallholder dairy farmers in Wakiso (120), Masaka (170) and Sironko (50); 5.5 MT of *Morus alba* cuttings was distributed to 80 smallholder dairy farmers in Wakiso (55) and Luwero (25).

Demonstrations were established of Tithonia optimum rates and application methods for enhanced soil fertility and cotton productivity. Tithonia and the recommended in-organic fertilizers (NPK and urea) were applied to the cotton for demonstration of results.

One (1) Shea tree orchard of 20 grafted Shea tree plantlets was established in Omodoi sub-county, Katakwi district.

A total of ten (10) farmers in Omodoi sub-county, Katakwi district were trained as ToTs on grafting of Shea trees using top-cleft method. Shea tree demonstration established by NaFORRI in Aduku sub-county, Apac district covering 2 acres.

A total of 25,100 seedlings of avocado were raised in the nursery at Kifu. A total of 13 avocado cultivars (Esther, Sheppard, Fuerte, Nabal, Ettinger, Semile 34, Semile 43, Wilson, Rincon, Reed, Hass, Dorsom 1 and 2) were identified in different parts of the country as sources of scions.

A total of 6 training needs of seed collectors, processors, suppliers and nursery operators in Buikwe, Mukono and Kayunga districts were identified. One (1) draft Training Needs Assessment report was produced. A total of 25 nursery operators and one (1) seed collector were identified for training. A total of 100 plants of hibiscus seedlings, 200 of Bougainvillea clones, were raised in the greenhouse. A total of 66,230 seedlings of assorted species were raised and managed ready for sale and research while 18 nursery beds were maintained.

A total of 64,430 clonal eucalyptus cuttings were harvested from mother gardens. A total of 8 tunnels for rooting of quality clonal germplasm were constructed. A total of 18,974 high quality clonal eucalypt were raised and ready for sale. A total of 12,000 assorted plantation tree seedlings were produced.
A total of 180 farmers were trained in mango fruit fly management techniques: Orchard sanitation, MAT and Baited sprays in Bamunanika sub-county, Luwero district. Farmers' practical guide for managing fruit fly was prepared.

A total of 2,500 pots for Maesiopsis eminii established in BuZARDI. A total of 500 Maesiopsis eminii planted in the pots seedlings generated and are still in the nursery. A total of 3,000 eucalyptus seedlings were generated.

RwebiZARDI acquired 1,000 seedlings for woodlot and evaluation trial establishment on-station.

One tree nursery established at Ikulwe satellite station, with capacity of producing 45,000 seedlings currently.

Three model mango orchards were established in Adjumani, Yumbe and Nebbi districts. Orchards maintained and monitored with survival rate of seedlings of 98%.

[illegible] Potato

Three (3) on farm sweet potato fields were established, demonstrating various effective measures of managing sweetpotao (*Ipomea batatas*) weevils (*Cylus spp*), virus disease (SPVD) and alternaria disease in Iriri (Napak) Kakomongole (Nakapiripirit) and Nyakwae (Abim district). Effective measure applied include: healthy vine selection for planting, ridging mound cracks after vine establishment, 30 cm depth vine placement in soil at planting for deep root expansion, tolerant variety Naspot8 & 10 and roguing of infected plants and gap filling at 2WAP.

One acre of vine multiplication site of tolerant sweet potato varieties at Nabuin ZARDI for enhancing availability of vines at planting was established.

Harvesting of sweet potato trials in Mayuge, Luuka, Kamuli and Namutumba Districts was done. Naspot 8 was the farmers' most favourite variety in all locations.

A total of 50 bags of vines were given out to famers in Namayingo, Namutumba, Mayuge and Pallisa. An area of 0.6ha of sweet potato multiplication field is at sprouting stage. A total of 4.5 tonnes of seed potato harvested and cured ready for uptake in late May 2018 in Buginyanya Zone.
RwebiZARDI generated and harvested 20 bags of potatoes which will be converted into seed.

Training was carried out of Farmer Research Groups (FRGs) on potato agronomic practices, Post-Harvest Handling, positive selection and rapid multiplication techniques in Kasese, Kamwenge, Kyenjojo and Kyegegwa districts. Meetings were held to facilitate marketing of potato seed for the districts of Kabarole, Kyenjojo, and Kyegegwa between potato seed producers and potato producers.
Sensitization meetings were held in Kamwenge with stakeholders to identify gaps and action planning for the potato value chain.

A total of 5.7 tonnes Rwangume and Victoria seed potato, 0.6t of Kinigi were found not suitable for seed due to late blight infestation. 400Kg of Rwangume acquired from KaZARDI.

[illegible] Groundnuts

Drafts of groundnut varieties album, brochures and posters were developed and reviewed. Current fact-sheets and manuals were updated and printed. Foundation seed of varieties serenut 5, 8 and 14 were planted on 0.5 ha & at germination stage in BugiZARDI.

4.1.17 Cotton

Demonstration sites for two new pre-released cotton varieties and applied with effective bio-pesticides and synthetic pesticides were identified and selected in Mubuku prisons in Kasese, in Barr sub-county in Lira district and in Bupadhengo sub-county in Kamuli district. Trials were planted in the selected sites and data on pest incidence before spraying collected.

Three demos new released varieties were established in the cotton growing regions were established in Lira, Nebbi, adjumani districts. Cotton was planted in Tororo, Luuka, Lira, Oyam, Kiryadongo and Arua districts in July for demonstration of foliar fertilizer use in cotton. Megacole and Bio-Zinc were sprayed to cotton in addition to the recommended soil applied in-organic fertilizers (NPK and urea).

4.1.18 Green-gram

A total of 6 six on-farm demonstrations of drought tolerant and early maturing green-gram was established in Okulonyo and Akoboi. A total of 320 farmers (180 female and 140 male) trained in Alebtong, Kumi and Kitgum districts on green-gram seed production and general agronomic practices. Two thousand (2000) copies of green-gram production guides were produced and distributed during national agricultural show at Jinja. A total of 800 green-gram leaflets produced and distributed during national agricultural show at Jinja and some were given to visiting farmers at NaSARRI.

4.1.19 Cowpea

A Draft Cowpea Disease and pest manual has been developed. Drafts for leaflets have been developed. Demonstration plots were planted at KaZARDI. A total 35 kg of breeder seed was multiplied.

4.1.20 Sorghum

A total of six (6) farmer groups in West Nile trained in production, post-harvest handling and marketing of improved sorghum varieties (Seso 1 and Seso 3). Copies of pearl millet socioeconomic and production characteristics in Uganda were generated for printing and to be distributed to stakeholders. Pearl millet production brochure was developed.

4.1.21 SLM

Training conducted on climate-smart soil and water conservation practices in Arua, Koboko, Maracha and Yumbe districts. A total of 165 (Male 88, Female 77) farmers attended the training.

4.2 Livestock research technologies dissemination

4.2.1 Pastures

A total of 276 bags of Napier (KAKA1) planting material and 45 kgs of Chloris gayana availed to various districts. Additional 120 and 20 bags of Napier (KAKA1) and chloris gayana were planting material availed to farmers in Sironko and Mayuge districts respectively.

A total of 12000 seedlings was generated (6000 of Brachiaria brizantha & 6000 of Brachiaria Hybrib) in BuZARDI. A total of 11 feed samples submitted to the lab for nutritional analysis. Feeding strategies and a feeding trial not carried out.

Two (2) acres of pasture were maintained RwebiZARDI on-station.

A total of 35 farmers (8 female & 27 male) in Mayuge district trained in silage and hay making as climate smart practices.

Dairy research technologies were exhibited at the source of the Nile agricultural show in Jinja and Gayaza high school open day. Information on seed production, feed utilisation and conservation was packaged, printed and distributed.

Two (2) new dairy production sites (cottages) were launched in Gulu & Hoima districts & facilitated with dairy pelleting equipment - Canaan Primary Sch., Hoima and Gulu Community Dairy Farmers Association.

Two 2 tons of calf and 8 tons of dairy pellets were produced; nine (9) marketing outlets were identified (Masaka, Gayaza, Gulu, Soroti, Hoima, Kajjansi, Nakyesasa, Bukomansimbi & Kampala). A total of 50,000 Calliandra seedlings were produced by youth groups, for production of ingredients.

A total of 1,250 stakeholders (770 female and 55 youth) were trained on NARO dairy feed pellets in Wakiso, Apac, Gulu, Mityana, Mubende, Hoima, Kole, Isingiro, Soroti and Sembabule districts.

A dairy book was reviewed/edited by two editors. One radio programme was presented on *Rupiny* Radio. Dairy pellets were exhibited during Jinja show. A total of 3 Newspaper articles were published in the New Vision, Rupiny & the Monitor papers. One (1) staff facilitated to conduct feedback workshop. Dissemination of management and selection information of improved indigenous chickens for high productivity under low input conditions was done at the source of the Nile Agricultural show in Jinja.

First draft of dairy feeding manual was developed by Ngetta ZARDI. Information on forage conservation protocol documented for developing training manuals and brochures.

4.2.2 Livestock

In NaLIRRI, a total of 25 bucks selected and procured for distribution to farmers. A total of 25 Elite goats were screened and procured (current established flock size is 60 goats), 7 out of 9 have produced twins.

A total of 74 goats (18 male and 56 female) at Bulegeni for breeding herd & 4 breeding pure Boer bucks were availed for farmers in nucleus breeding.

4.2.3 Poultry

A total of 100 farmers were trained on on-farm poultry management and on-farm performance evaluation in Lira and Tororo. A total of 100 farmers were trained on on-farm poultry management and on-farm performance evaluation in Lira and Tororo, 120 farmers were identified for on-farm evaluation in four districts.

4.2.4 Piggery

Two (2) cambrough pigs maintained on-station (Nabuin) as parent stock. Thirty (30) acres of pastures (*Chloris gayana, Brachiaria* Mulato, Glycine and *Centrosema pubescens*) established and maintained for animal experiments. Eleven (11) native pasture species most utilised by ruminants in Karamoja rangelands identified by participatory approaches as: *Sehima nervosum* (Rottler) Stapt., *Cymbopogon giganteus* Chiov., *Sporobolus festivus* A. Rich., *Cenchrus ciliaris* L., *Setaria sphacelata* (Schum.) Moss., *Sporobolus pyramidalis* P. Beauv., *Panicum maximum* Jacq., *Heteropogon contortus* (L.) Roem., *Cynodon dactylon* (L.) Pers., *Themeda triandra* Forssk., *Commelina africana* L.

A. Multi stakeholder Innovation platforms

NARO is working with multi-stakeholder innovation platforms to pilot up take of improved technologies through innovation platforms. 24 MSIPs have been supported in various ways as follows:

Number established or Supported	Description of the platform	

3 potato supported	3 platforms supported. Chahi (3 farmer groups (30@) in group marketing and processing) , Bufundi (6 farmer groups in group marketing and processing). Bubale (6 farmer groups in processing and agronomy). (Kachwekano ZARDI)
1 potato supported	6 farmer groups (@ 25 farmers) in Manafa, Mbale, Kapchorwa, Kween districts. (Buginyanya ZARDI)
1 potato supported	Operates in Kyenjojo, Kamwenge and Kyegegwa districts viable seed industry and sustainable markets (Rwebitaba ZARDI)
2 bean supported	2 functional bean platforms maintained in Sheema and Rakai districts (NACRRI)
1 bean supported.	1 functional bean platforms maintained in Chahi, Kisoro districts. (Kachwekano ZARDI)
1 on Dairy supported	1 functional Milk platform supported (management, book keeping synergies and demand articulation) in Bushenyi (Mbarara ZARDI)
1 on Milk supported	1 functional ghee platform supported in Kiruhura (CGS-Mbarara Z)
1 on Dairy supported	In Bulisa . Training and information (Bulindi ZARDI)
2 cassava supported	2 cassava platforms established and maintained in Pader and Oyam.(NACRRI)
1 cassava supported	Cassava- (Capacity development, synergies and demand articulation, farmers mobilization, Establish local level MSIP leadership structures) in W N zone (24F, 6M Moyo, Arua, Nebbi). (Abi ZARDI in collab. with OWC.)
4 Apiary (Honey, propolis, wax, bee venom) (26 groups supported for product development	4 Apiary MSIPs supported (for product development and marketing Honey, propolis, wax, bee venom). (CGS project coordinated by Rwebitaba ZARD and a consortium of 6 PARIs, TUNADO, Makerere University. Capacity strengthening of 26 farmer groups (Abi = 6 (Maracha, Yumbe, Arua); Nabuin = 5; Bulindi = 5; Rwebitaba = 5; NaLIRRI = 5) with 549 beekeepers. Marketing platforms established included the World of Bees Honey specialty shop (TUNADO) and KABECOS bee products shop (Kasanje sub county Beekeepers Association (KABEKA)).
1 mango supported	Mango - Capacity development, synergies and demand articulation, farmers mobilization, Establish local level MSIP leadership structures identification and up scaling (Abi ZARDI)
1 Fish supported	Koboko, Maracha, Arua (Abi ZARDI) Capacity development, synergies and demand articulation, farmers mobilization, Establish local level MSIP leadership structures.
1 Beans supported	Facilitated MSIP establishment Arua, Zombo (Abi ZARDI) in collab. with ISSD.

1 Irish potatoes supported	Zombo (Abi ZARDI) in collab. with ISSD.
1 cowpea supported	Nebbi-Panyango (Abi ZARDI) in collab. with Muni Univ.
1 Maize supported	IP is on collective action towards storage and marketing of maize in Nakaseke, Mukono ZARDI
1 soil erosion control	Bugobero Innovation Platform is in Bugobero subcounty, Manafwa district collective action towards soil erosion control. NaFORRI working a local NGO, Mbale CAP and a 9-member IP committee, 15 local leaders and 300 farming households. 4,000 m of contour bands established and 1,000 Grevillea robusta and Calliandra calothyrsus trees planted.
1 Forest restoration	Nakitoma Innovation Platform is in Nakitoma sub county, Nakasongola district. IP is addressing degradation of Savannah woodlands in Uganda's cattle corridor. The platform has identified the use of ISSD stoves and establishment of bioenergy woodlots of Melia volkensii as options to explore. The NAFORRI worked with 9 farmer groups to extend 200 ISSB stoves to households.
1 IP for coffee, 1 IP for honey, 1 IP for dairy	NAFORRI
1 finger millet supported	NASARRI is supporting a finger millet seed system in capacity development, synergies and demand articulation, farmers mobilization
	30 supported

5.0 Challenges and opportunities

Although a number of technologies, innovations and management practices have been generated over the years, agriculture is still predominated by smallholder farmers who operate in very militating environments characterized by a suite of issues that include: predominance of traditional practices such as over reliance on the hand hoe, local land races, mindsets, Mother nature, land fragmentation; low adoption of improved technologies, inputs and knowledge; and asymmetrical information flow. These coupled with poor access to input and output markets as well as weak farmer-market-extension-research linkages affect agricultural growth. As a result, farmers continue to use poor husbandry; limited access to technical advice; poor access to credit; and insecure land tenure and user rights leading to observed low productivity.

The recurring pests and diseases outbreaks undermine the efforts by research and development agencies. The outbreak of pests like the fall armyworm greatly threatens crop production leading to likely incidences of food insecurity. However, NARO has built capacity in-terms of human and infrastructure resources to mitigate and control the effects of pests and diseases.

Predominantly rain-fed agriculture amidst climatic change and variability is a major challenge. Climate change affects agricultural production in various ways namely; droughts, floods, pest and disease outbreaks and new frontiers, and infrastructure breakdown.

Uganda's agricultural sector has continued to be characterized by inadequate and very low levels of mechanization in all aspects along the commodity value chains. Presently 90% of farmers are still relying on use of human muscle powered tools and methods for all farming operations and only 10% have access to improved mechanization technologies (MAAIF 2012). Such a persistent dependence on inefficient and unproductive technologies and methods affect value addition and also limit the ability of smallholder farmers to evolve from subsistence to commercial agriculture.

Agricultural research and investment continues to be faced with low funding and unsustainable investment for science and technology. Despite the Sub-Sahara Africa governments' continent-wide commitment to allocate 10 percent of national budget to the agriculture sector, the sector remains under-funded, which constitutes a main challenge. It's time for government to deliver on this long overdue commitment to the agriculture sector.

The outputs of research in form of new varieties, technologies, effecient methodologies remain on the shelf if theres no direct link and a working relationship between researchers,

extension and farmers. To mitigate this challenge, NARO has priotized institutional and human capacity strengthening for Research-Extension-Farmer (R-E-F) linkages in different agroecological zones. Information and communication materials on NARO technologies have been produced to equip extension workers with relevant tools to facilitated dissemination to farmers. Multi-stakeholder Innovation Platforms (MSIPs) approach has also been promoted alongside the predominant agricultural research technology dissemination to strengthen the research-extension-farmers linkages. The MSIPs guide Zonal research priorities and the uptake of its outputs by the end users along the technology path ways. NARO also supports and promotes joint priority setting, planning and implementation of on-farm adaptive research and demonstrations between NARO, MAAIF and district local government. The District Adaptive Research Support Teams (DARSTs), ZARDI scientists and extension workers in the Local Governments are trained and they received resources to set up adaptive trials and on-farm demonstrations to test new technologies, including participatory variety selection, under local conditions in response to client priority demands.

NARO in collaboration with MAAIF and other partners has employed a number of dissemination approaches including field days, exposure visits, radio and television programs, film shows (cinema), leaflets and posters, agricultural shows, on-station and on-farm demonstrations, community seed multiplication among others. Despite the dissemination and outreach efforts, there's still low technology uptake by farmers and other users. The uptake is currently estimated at 23% which is way below the desired level. To increase technology uptake, NARO through the research institutes supports seed multiplication and marketing initiatives. Strong linkages exist between NARO and MAAIF which plays a regulatory function in the seed value chain. Seed companies are brought on board to enhance seed distribution channels and maintenance of quality standards. To mitigate this challenge, a more robust technology transfer strategy will be developed and implemented to ensure that technologies are accessed by both public for subsistence use (farmers) and private sector (commercialization). The strategy will focus on pluralistic approach of bringing on board key actors and formalizing relationships to scale up dissemination of technologies, an inclusive approach of tailor made approaches and targeted messages for different gender groups. NARO scientists' capacity will be refreshed to appreciate the role and different approaches of facilitating R4D for impact. Uses of Mobile application (ICT) in technology dissemination will be one of the key areas of focus moving forward. Climate Smart Interventions will be demonstrated to mitigate the effect of drought. To attract private sector, technology business centres will be facilitated in strategic locations to test and popularize technologies with commercial potential. Regular monitoring and tracking of adoption rates will be conducted through assessments and surveys. A database on technology uptake will be facilitated.

Other challenges to agricultural research and development include;

- Low participation and investment by the private sector in R&D
- Delay in enactment of Biotechnology and Bio-safety Bill 2012
- Gender and youth engagement
- Low technology uptake

- Declining soil fertility resulting from heavily degraded and depleted soils

6.0 Recommendations

For agricultural transformation to occur and move this country towards the mid-income economy, NARO has poised itself to sustain productivity and production levels. The growth in agricultural production achieved over the past fifteen years resulted largely from expanding the area under agriculture than increased productivity per unit input. To raise productivity, farmers need high-yielding seed and semen, effective fertilizer, pesticides and sufficient water. NARO will therefore continue to engage in cutting-edge science and innovations research leading to genetic improvement, development and deployment of improved technologies in crop, livestock, fisheries and forestry. About 80 transgenic bio-fortified pro vitamin A and enriched lines have also been generated and ready for confined trials. These technologies are ready for release and promotion to uptake pathways once the bill is passed. This is envisaged to improve yields and contribution to the fight against hunger and malnutrition. Further, efforts will be made to develop and establish sustainable control methods to manage the Fall Army Worm (FAW) that will require building capacity (both human and infrastructure) in insectary research. Building capacity for basic and strategic pre-discovery science (new insights leading to new discovery) while require long-term funding, laboratory and human capacity development.

With a projected doubling of the population by the year 2050, strategic interventions targeting Pre-urban and Urban agriculture especially using the green house technologies is likely to contribute to food and income security. NARO envisages contributing to developing new technologies to guide Pre-urban and Urban agriculture while conserving the environment.

To achieve the envisioned vision 2040, youth and gender responsive innovation and technologies remain critical. Agricultural transformation in Africa will not happen without reaching and tapping into to the potential of women and young people. Vibrant rural communities depend in empowering women and the increasing numbers of the youth in rural areas with the means and opportunities to contribute to and make a living from profitable agricultural enterprises.

There is need for value chain mechanization of the entire agricultural sector. NARO will in the coming years focus on generating demand driven pre- and post-harvest mechanization technologies including generating irrigation technologies for all year round commercial farming for enhancing market competitiveness of small-holder farmers. In addition, options for utilization of agricultural biomass into industrial products such as bio-active carbon and bio-char will be explored. For the technologies to pay-off, there will be need to promote utilization of proven technologies including pre and post-harvest mechanization for impact. This will require strengthening Research-Extension-Farmer linkages as well as strategic

partnerships with the private sector to engage in commercialization of proven technologies and research products.

In addition, NARO plans to employ climate smart agriculture by supporting farmers to engage in farming methods that increase productivity, enhances resilience (adaptation) to changes in climate for improved food security and venturing into research that reduces greenhouse gas emissions from agriculture (crops, livestock and fisheries). This will require development of land and crop suitability maps and generation of policy recommendations to guide implementation.

Improving crop and animal management practices as well as management of plant and animal health will be critical. Vaccine development for livestock management will be priority on the research agenda. A suitable and efficacious tick control and vaccines needs to be developed. Specifically, efforts should concentrate on bio- ethno vaccines. There should be deliberate plans to engage the private sector in commercial products.

Intellectual Property Rights future direction considers bridging the gap between research and industry through the technology transfer; in continuous liaison the researchers identify demand and market driven research areas. There will be deliberates efforts to court the private sector to fund research and also commercialize the research technologies. Research plans to establish spin off companies to enhance commercialization of the research technologies generated in NARO

Bio-prospecting of indigenous plants: aquatic, terrestrial and subterranean will be an important area of focus in the coming years. NARO will conduct research in the use of Geno-medicines in aqua-culture, forestry, pest control (especially ticks) and bio-prospecting which includes the search for plant and animal species from which medicinal drugs and other commercially valuable compounds. This expected to reduce the costs of production. This will help in addressing persistent pests and diseases that are difficult to eradicate.

Accelerating the envisioned transformation in the agriculture sector will require an integrated approach that takes cognizance of the fragility of production environments, rich biodiversity and the complexity of agricultural systems. This necessitates increased partnerships and collaboration, human capacity and infrastructure development, heavy private sector engagement/linkages as well as increased and sustainable funding to facilitate science and innovation.

7.0 Project Financial Statements

Subject Name Agricultural Technology Agribusiness Advisory Services (ATAAS)

Implementing Agency: National Agricultural Research Organization

Credit Number: 47690-UG

PROJECT FINANCIAL STATEMENTS

FOR THE YEAR ENDED 30TH JUNE 2018

Prepared in accordance with the Cash Basis of Accounting Method

Statement of Management Responsibilities

The Financial Statements attached herewith have been prepared in accordance with the provisions of the Public Finance and Management Act, 2015 (The Act). The financial statements have been prepared on the Cash Basis of Accounting and comply with the generally accepted accounting practice fort the public sector and the Project Financing Agreement.

We are pleased to submit the required financial statements in compliance with the Act and Project Financing Agreement. We have provided, and we will continue to provide all the information and explanations as may be required in connection with these financial statements.

To the best of our knowledge and belief, these financial statements agree with the books of account, which have been properly kept.

We accept responsibility for the integrity of these financial statements, the financial information they contain and their compliance with the terms and conditions of the Loan Agreement and the applicable Government of Uganda Regulations.

Signed on behalf National Agricultural Research Organization

Dr. Ambrose Agona
Director General

Mrs. Mary T. Kiggundu
Director Finance

28th August 2018