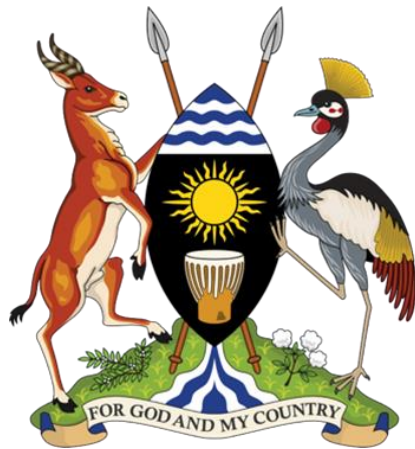


THE REPUBLIC OF UGANDA

**INFECTION PREVENTION AND CONTROL PLAN FOR THE AGRICULTURAL
SECTOR IN UGANDA**



Implementation Period 2023–2025

September 2022

**Ministry of Agriculture, Animal Industry and Fisheries, Directorate of Animal
Resources, P.O. Box 102/513, Entebbe, Uganda**

ACKNOWLEDGMENTS

We would like to thank the staff of the Ministry of Agriculture, Animal Industry, and Fisheries (MAAIF), particularly in the Department of Crop Protection (DCP), Department of Crop Inspection and Certification, Directorate of Animal Resources (DAR), and Directorate of Fisheries and Aquatic Resources (DFAR); various agencies of MAAIF; and staff from universities. They provided input to the development of this infection prevention and control (IPC) plan at various stages, including at conception and during stakeholder meetings and field visits.

We also would like to thank various stakeholders who contributed to this plan, such as district production officers (DPOs), district veterinary officers (DVOs), district agricultural officers (DAOs), district fisheries officers (DFOs), inspectors at border posts and other check points, research teams at Zonal Agricultural Research and Development Institutes (ZARDIs), and, lastly, the farmers. All these stakeholders provided relevant, valuable, and much-needed information and data at the regional, district, and community levels. The information was key in articulating the situation and clearly depicting the gaps, and therefore in the formulation of the IPC plan.

Finally, The Government of Uganda is grateful to the US Agency for International Development (USAID) Medicines, Technologies, and Pharmaceutical Services (MTaPS) Program implemented by Management Sciences for Health (MSH) for supporting formulation of this IPC plan.

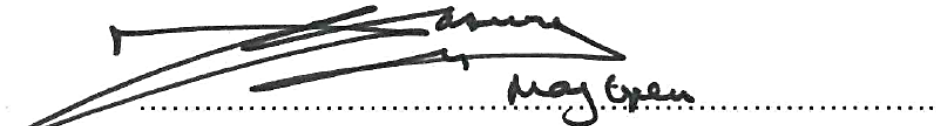
PREFACE

I am delighted to present the National Infection Prevention and Control Plan, which provides a framework for enhancing the management of plant and animal health in Uganda.

Various factors, such as climate change, have led to increased incidences of diseases, pests, and vectors, some of which are emerging, that are continuously being reported in important crops, livestock, and fish. The diseases disrupt local and international trade and livelihoods and threaten to derail the agro-industrialization agenda under Uganda’s National Development Plan III. Control of such diseases, vectors, and pests has largely been reliant on chemicals as a first line of action. Treatment of animal diseases with antibiotics and control of plant diseases and insects/pests with pesticides can lead to the development of antimicrobial resistance and pesticide resistance and tolerance and contribute to the accumulation of chemical residues and antimicrobial resistant genes in the waterways and soil. Antimicrobial resistance renders the use of antibiotics to treat human and animal diseases ineffective and has been ranked among the 10 most serious global public health problems. Alternative disease and pest management strategies to minimize antibiotic use need to be embraced.

The goal of this IPC plan is to strengthen plant and animal health systems through infection prevention at farm level as a cost-effective way of reducing plant and animal pests and diseases as well as the occurrence of AMR. This goal will be achieved by improving the infrastructural and human capacity for IPC, strengthening the supportive policy framework, enhancing early detection and rapid response for the control of pests and disease epidemics, increasing awareness creation and communication, and strengthening multidisciplinary and multi-institutional collaborations. Together, these efforts will eventually contribute to a reduced occurrence of AMR in agricultural systems and the increased availability of quality and safe products acceptable for local and export markets.

The IPC plan was developed through a consultative and participatory process that solicited key stakeholders’ input from government institutions, non-governmental organizations, non-government organizations (NGOs), academia, and farmers. I am particularly grateful to USAID/MTaPS and MSH for the financial and technical support.



PERMANENT SECRETARY, MINISTER OF AGRICULTURE, ANIMAL INDUSTRY AND FISHERIES

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ABBREVIATIONS AND ACRONYMS

AEZ	agro-ecological zone
AMR	antimicrobial resistance
AMUC	antimicrobial use and consumption
ARB	antimicrobial resistant bacteria
ARG	antimicrobial resistance genes
ASF	African Swine Fever
BBTD	Banana Bunchy Top Disease
BTVET	Department of Business Technical Vocational Education and Training
BXW	Banana Xanthomonas Wilt
CAH	Commissioner of Animal Health
CAHW	Community Animal Health Worker
CAO	Chief Administrative Officer
CBPP	Contagious Bovine Pleuropneumonia
CCIS	Commissioner Crop Inspection and Certification Services
CCPP	Contagious Caprine Pleuropneumonia
CMP	Carbon Management Practices
COMESA	Common Market for Eastern and Southern Africa
CWD	Coffee Wilt Disease
DAES	Directorate of Agricultural Extension Services
DAO	District Agricultural Officer
DAR	Directorate Animal Resources
DCP	Department of Crop Protection
DCR	Directorate of Crop Resources
DDA	Dairy Development Authority

DFO	District Fisheries Officer
DFR	Directorate of Fisheries Resources
DG	Director General
DIPC	District Infection Prevention Committee
DLG	District Local Government
DPO	District Production Officer
DRC	Directorate Crop Resources
DVO	District Veterinary Officer
e-MLE	Electronic Monitoring, Learning, and Evaluation
EAC	East African Community
ELISA	enzyme-linked immunosorbent assay
FAO	Food and Agriculture Organization
FGD	focus group discussion
FM	Frequency modulator (Radios)
FMD	Foot and Mouth Disease
FOC1	<i>Fusarium oxysporum</i> f. sp. cubence Race 1
FOCTR4	<i>Fusarium oxysporum</i> f. sp. Cubence Tropical Race 4
GHSA	Global Health Security Agenda
GoU	Government of Uganda
ICT	Information and Communications Technology
IDI	Institute of Infectious Diseases
IDM	integrated disease management
IPC	infection prevention and control
IPM	integrated pest/vector management
ISO	International Standards Organization
LC V	Local Council V
LG	local government

M&E	monitoring and evaluation
MAAIF	Ministry of Agriculture, Animal Industry, and Fisheries
MDAs	ministries, departments, and agencies
MEL	monitoring, evaluation, and learning
MTIC	Ministry of Trade, Industry, and Cooperatives
MoE	Ministry of Education
MoH	Ministry of Health
MoPS	Ministry of Public Service
MoU	Memorandum of Understanding
MSH	Management Sciences for Health
MTaPS	Medicines, Technologies, and Pharmaceutical Services
NAADS	National Agricultural Advisory Services
NADDEC	National Diseases Diagnostic and Epidemiology Center
NAGRIC & DB	National Animal Genetic Resources Centre and Data Bank
NAIPC-TWC	National Infection Prevention and Control Technical Working Committee
NAMRSC	National Antimicrobial Resistance Sub-Committee
NAP-AMR	National Action Plan for Antimicrobial Resistance
NARO	National Agricultural Research Organization
NARS	National Agricultural Research Systems
NCHE	National Council for Higher Education
NCD	Newcastle Disease
NGOs	non-governmental organizations
NPA	National Planning Authority
NPPO	National Plant Protection Officer
OIE	Office International des Epizooties (currently WOAH)
OPM	Office of the Prime Minister

PCR	polymerase chain reaction
PPR	Peste des Petits Ruminants, or goat plague
PRA	pest risk assessment
SCM	sub-clinical mastitis
TBDs	tick-borne diseases
TiLV	Tilapia Lake virus
ToR	Terms of Reference
ToT	Trainer of Trainers
UCDA	Uganda Coffee Development Authority
UGX	Ugandan Shilling
UNBS	Uganda National Bureau of Standards
UNDP	United Nations Development Program
USAID	United States Agency for International Development
USD	United States Dollar
UVA	Uganda Veterinary Association
WHO	World Health Organization
WOAH	World Organization of Animal Health (formerly OIE)
WTO	World Trade Organization
ZARDIs	Zonal Agricultural Research and Development Institutes

EXECUTIVE SUMMARY

The spread of transboundary, emerging, and endemic pests and diseases has significantly increased in recent years, affecting the food and income security of several million resource-poor farmers. The first management option for these diseases and pests by the farmers and extension staff in developing countries such as Uganda involves using chemicals as a panacea. The treatment of animal diseases with antibiotics and control of plant diseases/pests with pesticides contribute to accumulation of chemical residues, insect and pest resistance/tolerance, antimicrobial resistant bacteria (ARB), and antimicrobial resistant genes (ARGs). The accumulations find their way into waterways and soil, contributing to further development and spread of antimicrobial resistance (AMR). The practice also disrupts the local and export markets.

This IPC plan for the agriculture sector, which prioritizes action at farm level, will strengthen plant and animal health systems in Uganda through strategies for pest and disease control that consider host resistance, vaccination, and on-farm biosecurity practices, as well as chemical application as a last resort. The plan stresses improvement in infrastructural and human capacity for IPC, strengthening the supportive policy or regulatory frameworks, enhancing early detection through effective surveillance, and rapid response. The latter will allow effective and efficient control of pests and disease epidemics.

In addition, the plan includes increasing the creation and communication of awareness as well as strengthening multidisciplinary and multi-institutional collaborations to support the One Health approach. One Health is a collaborative, multisectoral, and transdisciplinary approach that involves working at the local, regional, national, and global levels with the goal of achieving optimal health outcomes, recognizing the interconnection between people, animals, plants, and their shared environment.

Together, these efforts will eventually contribute to the agricultural system's reduced transmission of resistant pathogens to humans, thus supporting a One Health approach. They will also increase the availability of quality and safe products acceptable for local and export markets and enhance land and labor productivity for the farmers and trading communities, with concomitant improvement and transformation of the rural and national economies.

1.0 INTRODUCTION

1.1 Background

Pests and diseases of crops, livestock, and fish are becoming increasingly prevalent and are significantly decreasing the production and productivity of the agriculture sector. Numerous diseases, vectors, and pests of important crops and livestock are continuously being reported. They are variably categorized as endemic, transboundary, epidemic, emerging, reemerging, and zoonotic, but all have the potential to greatly disrupt trade, livelihoods, and national economies.

The first management option often chosen by farmers and extension staff involves the use of chemicals as a panacea for these problems, which is an important driver of antimicrobial resistance (AMR) development and leads to contamination of soil and waterways due to its irrational use. The presence of heavy metals such as copper and zinc as well as pesticides and disinfectants is associated with the development of AMR (Barifaijo et al., 2009). Additionally, treatment for livestock and fish diseases with antibiotics and the use of manure, urine, and waste for soil fertility management contribute to the accumulation of chemical residues, ARB, and ARGs in the waterways and soil, as illustrated in figure 1 (Mc Lamb, 2020).

AMR cuts across different sectors—particularly health, agriculture, and the environment—and is a global problem requiring a global response. A One Health approach to fighting AMR, where each of these sectors has a clear role to play, has been recommended. The National Action Plan for Antimicrobial Resistance (NAP-AMR) 2018–2023 was developed to guide Ugandan stakeholders' contribution to containing the problem. The NAP-AMR is aligned with the WHO Global Action Plan's strategic objectives and proposed actions aimed at focusing government and partner efforts in the strategic areas, including improving the prevention, detection, and control of infectious agents (NAP-AMR, 2018).

Prevention of AMR development will be best achieved through the NAP-AMR's strategic area of improving prevention, detection, and control of infectious agents, which is the subject of this infection prevention and control (IPC) plan. IPC is the most effective and sustainable way of reducing chemical use and therefore AMR development. IPC requires the establishment of procedures and activities that aim to avoid or minimize risk of exposure to pathogens, pests, and vectors (Nalunkuma et al., 2021). Hence, this plan will inform IPC policy for the agriculture sector.

1.2 Principles of Infection prevention and control

IPC necessitates understanding the chain of infection in order to identify appropriate transmission-based precautions. The general concept of IPC involves the consistent application of routine practices. A systematic approach and risk assessment are necessary for determining the individual components of those routine practices.

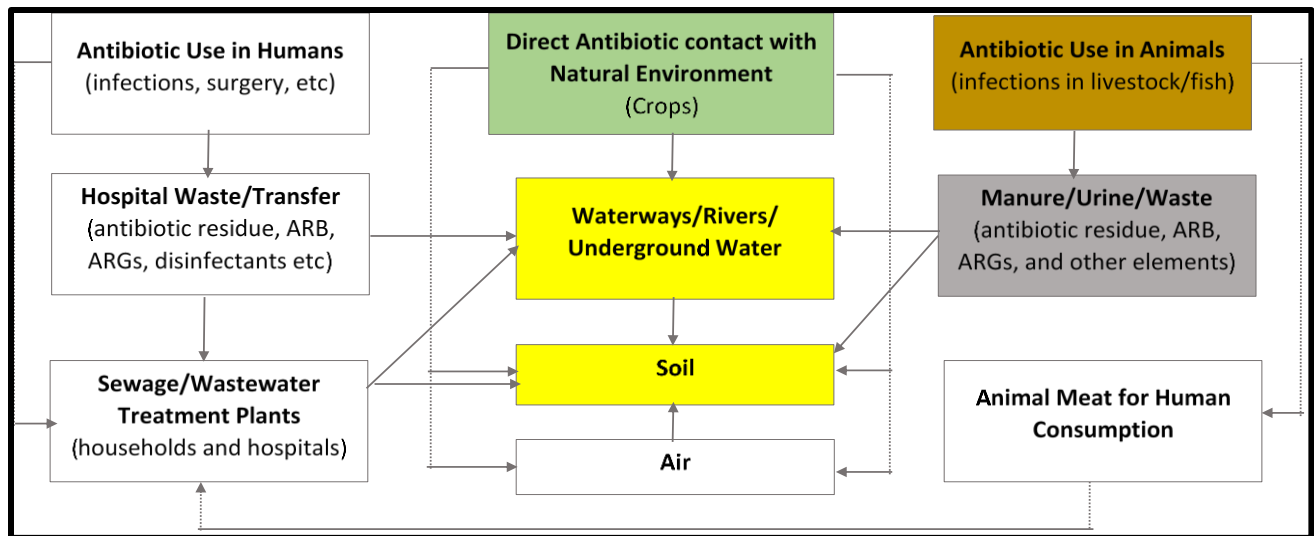


Figure 1. Agriculture activities and the contributing factors in AMR development (Source: Mc Lamb, 2020).

Concepts for infection prevention and control include:

- **Decreased exposure to pathogens:** This is achieved through the isolation of suspect or the removal of newly introduced individuals (plants or animals), routine cleaning and disinfection of the premises, proper farm-waste management and disposal, hand hygiene to minimize the contamination of surfaces and the transfer of pathogens to plants or animals by humans, control of access and traffic flow on the farm, and proper pest/vector and pasture management.
- **Decreased susceptibility to disease:** Management of underlying disease, reduced stress, implementation of good parasite control program, control of housing conditions, proper use of antibiotics and other medications, and implementation of health management through improved nutrition.
- **Increased resistance to disease:** Achieved through vaccination, which requires the development of an appropriate vaccination program, and by growing or keeping pest- and/or disease-tolerant crop varieties or animal breeds.

- Regular surveillance for diseases, AMR, and antimicrobial use and consumption (AMUC), as well as accurate and rapid diagnosis of infectious agents.
- Rational use of antimicrobial agents and pesticides for infectious disease control or adoption of alternative anti-infectives. Antibiotics and pesticides should be used with discretion and only under direction of plant or veterinary professionals, with a greater emphasis placed on alternatives. Such alternatives can be drawn from traditional indigenous knowledge and practices as well as emerging technologies and include biocontrol agents, probiotics, bacteriophages, botanical products, and nanoparticles.

With the above concepts in mind, chemicals such as pesticides and antibiotics should be applied as a last resort and in a judicious manner. The idea is to maintain a healthy population while minimizing antimicrobial use and reducing the development of AMR in the crop, livestock, and fisheries sub-sectors.

1.3. Situation analysis

To inform the drafting of the IPC plan, an assessment was conducted to understand the current situation of IPC in Uganda's agricultural sector. During the assessments, data was collected through literature reviews, stakeholder engagement meetings, and focus group discussions (FGDs) at farms and national and subnational administrative units. The assessment was conducted between from February to August of 2022. This section summarizes the key findings from that situation analysis.

Losses due to pests and diseases of crops were estimated at 10%–20% (pre-harvest); 20%–30% (post-harvest); and up to 100% for perishable and export crops. Annual losses due to the occurrence of diseases of priority crops is huge, although s specific data is not readily available.

This summary highlights a few examples to provide a glimpse of the burden of disease on the crop sub-sector. Banana *Xanthomonas* Wilt (BXW) caused by *Xanthomonas musacearum* incidence was reported at 70%–80% on all banana cultivars, with yield losses of 90% on some farms. National annual loss due to BXW was estimated at USD 35 million to USD 200 million (Tushemereirwe et al., 2004). Cassava Brown Streak Disease (CBSD) was reported to cause up to 100% yield loss in susceptible varieties (Alicai et al., 2007). In Mukono district, for example, 30% of the 87,000 acres under cassava cultivation was affected by CBSD in 2003, with an annual loss of USD 60 million to USD 80 million. Between 1993 and 2000, all robusta coffee-growing districts in Uganda had been affected by Coffee Wilt Disease (CWD), with an annual loss of USD 80 million (Musoli et al., 2013). Country-wide, CWD caused losses of USD 580 million from 1997 to 2007.

Diseases and their prevalence differ by region and type of livestock.

- In cattle, tick-borne diseases (TBDs), especially East Coast Fever, have prevalence of up to 47.4% (Kasozi, Matovu, et al., 2014). Contagious Bovine Pleuropneumonia (CBPP), originally endemic in Karamoja, where a majority of cases (89.9%) are found, is currently all over the country (Baluka et al., 2014; Ssemadaali & Majalija, 2017). Fifty-nine (59) Foot and Mouth Disease (FMD) outbreaks occurred between 2011 and 2016 and in 22 districts in 2020 (Kerfua et al., 2018; draft report NPA-UNDP, 2021). Prevalence of 60%–80% for sub-clinical mastitis, a significant production disease in dairy cattle, has been reported (Abrahmsén et al., 2014; Byarugaba et al., 2008; Kasozi, Tingiira, et al., 2014).
- Major goat diseases include helminthiasis, tick-borne diseases, and peste des petits ruminants (PPR) (also known as goat plague). Contagious Caprine Pleuropneumonia (CCPP) is currently present in 30 districts, but in other places where the causative agent has not been isolated, a seroprevalence of 18% among unvaccinated goats was established, which indicates exposure. (Akwongo et al., 2022; Atim et al., 2016; Nkamwesiga et al., 2019; NPA-UNDP, 2021; Atim et al., 2016; Emmanuel et al., 2014).
- For poultry, the most prevalent diseases are protozoan (39.3%), followed by bacterial (21.4%), viral (17.1%), and helminthiasis (11.1%). Nutritional and other diseases account for the remainder (Byaruhanga et al., 2017). The specific diseases commonly encountered are Newcastle Disease (NCD); Fowl Typhoid, Pullorum Disease, Fowl Cholera, Infectious Bursal (Gumboro) Disease; Collibacillosis and Coccidiosis. Infectious diseases account for 40%–80% of mortalities among indigenous poultry (Kagezi, 2019; Semakula et al., 2015). Commercial chicken farmers who regularly vaccinate their flocks experience relatively low mortalities.
- For pigs, total morbidity and mortality from five major diseases—that is, African Swine Fever (ASF); FMD; Helminthosis; Mastitis, Metritis, and Agalactia Complex; and Swine Erysipelas—is estimated at about 31% and 23%, respectively (Tatwingire, 2014). Other diseases exist, but they are not routinely screened for and reported (Dione et al., 2014; Kungu et al., 2017; Nsadha, 2013; Nsadha et al., 2014; Tatwingire, 2014; Wilfred et al., 2018). ASF is the biggest threat to the pig industry, and efforts to develop vaccines against it unfortunately have not yet been successful. ASF outbreaks were reported in 59 districts between 2001–2012, and a seroprevalence of 52.96% and 53.59% was determined among slaughter and on-farm pigs, respectively (Atuhaire et al., 2013). Vaccination of pigs for FMD is only done in areas currently experiencing outbreaks of that disease.

Losses in the livestock sector stem not just from animal deaths and the associated reduction in milk and meat production but also from the costs of disease prevention and

control efforts such as the purchase of acaricides and drugs. Annual losses of over USD 1.1 billion due to TBDs contribute more than 60% of total expenses in cattle (Kasaija et al., 2021). Data on economic losses due to goat diseases in Uganda is scanty; however, in neighboring Kenya, estimates of losses of €1,712.66 for a flock of 100 heads of goats or sheep due to CCPP were reported (Renault et al., 2019). Similarly, estimates of economic losses in Uganda associated with poultry diseases are not available, but mortality rates of 40%–80% in indigenous poultry due to infectious causes have been reported (Kagezi, 2019; Semakula et al., 2015). For pigs, ASF is the most serious disease, with up to 100% mortality, and 388 outbreaks of the disease were reported between 2001 and 2012 in 59 districts in Uganda (Atuhaire et al., 2013). Several zoonotic infections and infestations, including Anthrax, Zoonotic Influenza viruses, Crimean Congo Hemorrhagic Fever, Rift Valley Fever, Leptospirosis, Tuberculosis, and Brucellosis exist (Atherstone et al., 2020; Budasha et al., 2018; Nannozi et al., 2022; Sekamatte et al., 2018; Wampande et al., 2021). Estimates of economic losses in the fisheries sector are not accessible due to inadequate information on diseases and epidemiological data.

Despite the continuous occurrence of plant and animal diseases in Uganda, inadequate human and infrastructural capacity exists to manage them. Policy frameworks that relate to disease management are generally sufficient if well implemented. Surveillance remains ad hoc, without systematic and continuous assessment at national, district, and community levels; hence understanding of disease status is incomplete (Nantima et al., 2014). Small-scale subsistence farmers and local government leaders lack knowledge on biosecurity and biosafety needs for agricultural production and trade (Chenais, Sternberg-Lewerin et al., 2017; Joughin & Kjær, 2010). Implementation of biosecurity and biosafety measures is largely inadequate, except by a few commercial farmers. Delivery of effective disease and pest control services require collaboration among various stakeholders; however, they are not well coordinated.

1.3.1 Capacity for IPC implementation

Generally, there is low capacity in Uganda to detect, identify, prevent, and control pests and diseases. This varies with sub-sector and at various levels from the national level to the community level:

MAAIF and its agencies: MAAIF and its agencies lack adequate human resource capacity, both in numbers and in terms of orientation and in-service training of frontline staff, to adequately address pest and disease control. For example, by December 31, 2020, only 83 out of 146 required positions in the animal health workforce were filled, while crop resources and fisheries resources were similarly understaffed at 74 out of 148 positions filled and 67 out of 117 positions filled, respectively (MAAIF, 2021). MAAIF has laboratory structures in place, such as National Disease Diagnostic and Epidemiological Center (NADDEC) for veterinary services and Namalere for plant diagnostic services, but

although they have some basic and a few state-of-the-art pieces of equipment they often lack consumables and other modern technologies to address the disease and pest problems. Despite some National Agricultural Research Organization (NARO) institutes and agricultural colleges or schools in selected universities having fully functional laboratories with state-of-the-art technologies, they are not accredited. Unfortunately, MAAIF has not sufficiently utilized these laboratories to support its activities in performing its disease and pest control function.

Entry and exit points (border posts): The official entry points at the country borders are largely understaffed, lack facilities for screening incoming products, and largely depend on health certificates from points of origin to clear goods. Inspectors also depend largely on visual assessments, with minimal on-site testing ability and without the capacity to determine microbial and chemical contaminations such as aflatoxins. Border points do not have quarantine facilities or warehouses to use as holding grounds for suspicious commodities. The unofficial border entry points through which smuggling and other cross border social activities take place pose a big disease and pest spread risk.

Local government (subcounty/district) level: The staff appointed at the district and the sub-county levels for pest and disease control in agriculture are inadequate with respect to numbers, level of qualification, and, in some cases, appropriate skills. Country-wide, the government and private sector employ 1,525 and 3,331 animal health workers, respectively, to serve more than 2.4 million livestock households, as reported in the Annual Agricultural Survey, 2018 report (UBOS, 2020).

Although community animal health workers are not recognized by the Veterinary Statutory Board, many are serving in the Karamoja and Teso regions, which are grossly understaffed by government-employed veterinary and para-veterinary professionals. In contrast, the southwestern area is dominated by government-employed veterinary and para-veterinary professionals. A few private practitioners in extension, who are not regulated, are also operating. The district veterinary services depend on the few regional referral veterinary laboratories in Mbarara, Kabarole, Masaka, Arua, Lira, Moroto, and Mbale, which are not well-enough equipped or resourced to offer the needed diagnostic services (Vudriko et al., 2021). Some farmers from very remote areas still take their samples to Makerere University for disease diagnosis. The district laboratory facilities can be used by fisheries or veterinary professionals for fish disease diagnosis; however, this opportunity has not been effectively exploited.

Community level: Most farmers (80%) are operating at subsistence level, with the mindset of producing for consumption, not profit (UBOS, 2020), and they therefore do not invest enough to execute a viable biosecurity regime. What little knowledge about

biosecurity they possess is obtained from fellow farmers and extension workers with limited awareness about crop and animal health.

Emerging commercial farmers are often the target for biosecurity training even though they are mainly “telephone farmers,” which effectively excludes the workers who are usually unskilled but nevertheless handle daily activities on the farm. Agro-chemical input dealers, such as private extension service providers, are directly involved in disease control and prevention, but they have inadequate knowledge to ensure the proper or prudent use of agrochemicals.

Efforts are being made to improve the field diagnosis of plant and animal diseases through the One Health approach; however, few districts are currently involved. The MAAIF is planning to construct some laboratories across the country for fish health and quality monitoring (personal communication, Assistant Commissioner for Quality Assurance). Unfortunately, disease diagnosis is challenged by insufficient human and financial resources that limit the operationalization of the available laboratory infrastructure (Nakayima et al., 2016). Nevertheless, where possible, laboratory diagnostic services are offered at various institutions, such as the Uganda National Bureau of Standards (UNBS), universities, research institutes, and private laboratories (e.g., Chemiphar), to supplement the efforts of the district laboratories and NADDEC.

1.3.2 Existing policy frameworks complementing IPC

Both national and regional regulations are consistent with some of the legal frameworks for disease and pest control that are in place at the international level. Some such frameworks include the World Health Organization’s (WHO’s) International Health Regulations, the World Trade Organization’s (WTO’s) Sanitary and Phytosanitary (SPS) agreement, the WHO/Food and Agriculture Organization (FAO)’s Codex Alimentarius Commission Standards on Food Safety, the World Organization for Animal Health (WOAH) (formerly, the Office International des Epizooties, or OIE), and the Global Health Security Agenda (GHSA) 2024 Framework (GHSA, 2018).

At the regional level, various regulatory frameworks emphasize disease control in crops, fisheries, and livestock commodities for trade. These include the East African Community (EAC) Protocol on SPS measures (2013); the EAC Livestock Bill (2020), which provides for transboundary movement of livestock and control of animal diseases with special consideration of pastoral ecosystems; the EAC Food Security Article 105 on agriculture and food security and Article 108 on plant and animal disease control; and the EAC policy brief on Aflatoxin prevention and control, Policy Brief No, 5, 2018, Use of Biocontrol for Aflatoxin Prevention and Control in the EAC. The harmonized EAC Guidelines for Traders in Fish, Fishery, and Aquaculture Products and Inputs in Regional and International Trade (2019), as well as the Common Market for Eastern and Southern Africa (COMESA)

Livestock Policy Framework, aim to stimulate a more conducive healthy environment for public and private investments in the livestock and fisheries sectors.

The control of pest and diseases in Uganda is supported by policy frameworks addressing most of relevant aspects that relate to IPC. Together, the policies listed align well with the general objectives of the National Development Plan III (2020–2025) and the National Agriculture Policy (2013). The policy frameworks that relate to pest/vector and disease management are generally sufficient if well implemented.

Regarding crops, the existing policy framework covers the SPS policy (2019), National Disaster Preparedness and Management Policy (2010), Plant Protection and Health Act (2016), Seed and Plant Act (2006), National Seed Policy (2019), Agrochemical Control Act (2006), and attendant regulations. These frameworks support pest/disease management and diagnosis in the crop sector.

The animal sector is guided by various policies such as the National Delivery of Veterinary Services Policy (2001), National Veterinary Drugs Policy, Animal Diseases Act (Cap. 38) (amended 2000) and related rules, Animal Breeding Policy (2001), Cattle Traders Act (Cap. 43) (1943), National Drug Policy and Authority Act (Cap. 206) (1993) and Animal Feeds Bill (2019), among others.

The regulatory frameworks for the fisheries sector include the National Fisheries and Aquaculture Policy (2017), Fish (Aquaculture) Rules (2020), National Aquaculture Development Strategy and Action Plan of Uganda (2020–2025), Fisheries and Aquaculture Policy for the East African Community (2018), and the Fish Act (Cap. 197). These policies mainly address production rather than fish health management; however, the Fisheries and Aquaculture Bill (2021) that is under review includes disease control in the form of biosecurity and biosafety measures at farm and national levels. Furthermore, the Animal Diseases Act (Cap. 38) supplements the aquatic health needs.

These national policies are linked to the farming communities through the decentralization policy under the Local Government Act of 1997, which supports and guides the delivery of pest and disease control and management services at district and sub-county levels. Unfortunately, implementation and enforcement at the community level is largely insufficient.

1.3.3 Surveillance

Appropriate and timely response to existing (endemic) pests and diseases depends on the effectiveness of surveillance, reporting, and data analysis as well as the use of that data to inform policy and response. Surveillance data collected by many partners,

including researchers, extension workers, farmers, and inspectors, is not well coordinated. Reporting of pests and diseases is uncoordinated, with new disease outbreaks being reported to research institutes and to the mass media and those captured by the research fraternity being first published in peer journals without the knowledge of the government.

For example, the CWD outbreak was first noticed in Uganda by local government agriculture personnel in the Bundibugyo and Rukungiri districts, which border the Democratic Republic of Congo where the disease was reported in 1949. Local government staff reported CWD's presence in Uganda to the Coffee Research Center (currently, the Coffee Research Institute) through their district offices in 1993 (Hakiza et al., 2010). Mobilization of various institutions and stakeholders to effectively respond did not occur until 1997, when the disease had already spread to many other coffee growing areas (Musoli et al., 2010). The response likely could have been better implemented if the CWD introduction was reported initially to the competent authority in MAAIF.

For the animal sub-sector, it was observed during field visits that outbreaks of major diseases such as FMD, ASF, Anthrax, PPR, and Avian Influenza are routinely and widely reported by districts and appropriate responses are implemented to control them at the community level. Current practice is that during outbreaks of notifiable diseases, information flows from the farmers to district technical personnel (livestock and fisheries) and up to the Commissioner for Animal Health, also referred to as the Chief Veterinary Officer (CVO). The CVO, through NADDEC, carries out investigations to confirm the disease, then quarantines are instituted and targeted control strategies, such as ring vaccination, are implemented.

However, a lag between reporting and response often occurs due to challenges associated with staffing, availability of laboratory consumables and rapid test kits, and the ability to quickly mobilize resources. The situation is further complicated by interference from influential traders and local leaders, especially where quarantines are imposed. For endemic non-notifiable diseases, action remains at the farmer's discretion, which is mainly influenced by the availability of funds, and farmers usually seek assistance from drug shop dealers although they at times also make a report to local government production officers.

Surveillance for crop and animal diseases and pests is largely executed through observation and inspection based on visible symptoms due to the lack of more precise, robust, and rapid diagnostic tools and facilities. Asymptomatic infections and mycotoxin contamination in cereals/feeds cannot be easily detected, which has grave repercussions at the borders and in the markets. Consequently, diseases such as Banana Bunchy Top Disease (BBTD), FMD, PPR, and Tilapia Tilapine Virus Disease/Tilapia Lake Virus

Disease (TiLV) are often acquired through replacement stock and planting materials and further spread through cross-border trade. Surveillance systems are generally scanty for likely zoonotic diseases that can be spread through the interaction of wild and domestic animals as well as through animal interactions with humans around national parks. Indeed, wild animals are usually reservoirs of diseases that they spread through sharing of grazing areas. Human resource coverage is inadequate for active disease surveillance in certain areas of operation, so authorities instead depend on reports from farmers and other grassroots stakeholders, which influences timely response.

Surveillance efforts for AMR in the livestock and fisheries sub-sectors are largely limited and at very initial stages. Uganda developed its NAP-AMR (2018–2023) in line with the Global Action Plan on AMR (2015) with the aim of preventing, slowing, and controlling the spread of resistant organisms through collaborative action and by employing a One Health approach. Compared to the human health sector, the agricultural and other sectors are not in synch with respect to implementation of the NAP-AMR. However, with support from the Fleming Fund/Infectious Disease Institute (IDI) project, a system for surveillance for AMR occurrence and AMUC is being established in the animal and fish sub-sectors under MAAIF. Some districts, such as Mbale, Mbarara, and Masaka, already have structures for handling AMR surveillance and response.

1.3.4 Preparedness for response to pest and disease outbreaks

Uganda generally has the institutional machinery to effectively control pests and diseases of crops, livestock, and fish. MAAIF has departments responsible for disease and pest control, supported by agencies such as research institutes, and a legal framework is in place. However, for the control of diseases that spread rapidly, especially those that are transboundary, the existence of institutions and a legal framework alone is insufficient.

Lack of preparedness limits timely mitigation. The CWD outbreak, as described in section 1.3.3, began in 1949 but was controlled to lower incidence in the late 1950s through the adoption of sanitation practices and resistant varieties (Kalonji-Mbuyi et al., 2010). This experience could have informed an analysis of the potential risk of CWD and the development of contingency plans for its control in Uganda. Instead, CWD, which eventually entered the country in 1993, was only effectively controlled 15 years later (after losing USD 800 million) by deploying resistant coffee varieties (Musoli et al., 2013).

Some lessons were learned from the experience of CWD that helped inform a more positive reaction when BXW emerged in Mukono district in 2002 (Banana Bacterial Wilt Task Force Report, 2002, 2003). Farmers were rapidly mobilized and a BXW control agenda was defined and funded within a year of the disease outbreak.

However, more effort is needed to ensure a rapid response. For example, although BBTD, like CWD, has been in the Democratic Republic of Congo for a long time, Uganda has

undertaken no national effort to address the threat even though BBTB has been reported in the country since 2020. Embracing host resistance is key to taking an anticipatory approach to the management of diseases with a high biosecurity risk, and successful control of diseases such as Cassava Mosaic Disease (CMD), Fusarium Wilt of Bananas (FOC1), and CWD (Alicai et al., 2007; Musoli et al., 2010; Tushemereirwe et al., 2004) was only achieved after resistant varieties were deployed. But while the use of resistance to manage plant disease remains low, it is improving, especially among maize farmers.

For the animal sector, preparedness for the management of outbreaks of transboundary notifiable diseases such as FMD and PPR largely takes the form of vaccination, where available. Vaccines of public good importance, such as those to combat Rabies, CCBP, Anthrax, CCPP, PPR, and FMD, remain the responsibility of government (Pogoreltseva, 2019). Vaccines for brucellosis and other non-transboundary or less lethal diseases are mainly managed by private sector actors.

However, for the majority of vaccines, stocks are never sufficient, and reports of alleged counterfeit vaccines on the market have emerged. Additionally, the cold chain for vaccine storage is inadequate. At regional laboratories such as in Mbarara, Masaka, and Mbale, the functionality of the available cold chain is heavily hampered by power disruptions.

All poultry disease drugs and vaccines have been privatized (Pogoreltseva, 2019). Private actors, especially in the poultry industry, are relatively more reliable in their provision of vaccination services against various diseases such as Newcastle Disease and Gumboro. Recently, the United Nations Development Program (UNDP) funded the National Planning Authority (NPA), which engaged DanLink-EMSult Engineers Ltd in a feasibility study for livestock vaccine production and commercialization, where FMD, anti-tick, and Newcastle Disease vaccines were prioritized. Currently, no vaccines against fish diseases are available in Uganda.

Most small-scale subsistence farmers have no anticipatory mechanisms or strategies available for disease management. Preparedness is largely informal and varies from farm to farm. Most farmers rely on some biosecurity practices and resistant varieties or breeds, obtained through the use of vaccination or selective breeding. Small-scale commercial farmers such as breeders (plant seed, fish, and poultry) have established some biosecurity strategies to manage diseases. With respect to large scale commercial farmers, a few have disease outbreak management mechanisms in place that are influenced by experience. Farmers also stock vaccines and medicines/drugs such as ampicillin and tetracycline ahead of time and fish farmers disinfect their culture systems and equipment with various materials, including lime and detergents, to eliminate pathogens.

1.3.5 Biosecurity as a means of infection prevention and control on farms

The possible means by which pathogens enter farms influence the biosecurity practices and include:

- ***Movement of infected soil or planting material:*** Nursery operators often collect topsoil from fields formerly infected with soil resident pathogens (Flood, 2009). Most of these operators do not sterilize the soil as required. Additionally, planting materials for fruit, coffee, banana, and ornamental trees and shrubs are moved with some soil in their small pots. They are sometimes transported hundreds of miles and thus can be agents of long-distance spread of certain pests and diseases or their pathogens.
- ***Movement of infected crop remains or residues:*** For example, coffee farm workers cut trees infected with the soil-borne and mechanically transmitted CWD for use as firewood, staking material for climbing beans, and fencing material. This wood is then dragged through the coffee fields, spreading CWD along the human paths (Hakiza et al., 2010). Mulching presents another biosecurity risk, again as exemplified by CWD, which was introduced to Mukono district through coffee husks obtained from affected farm in the Western region (Musoli et al., 2010).
- ***Mechanical transmission:*** Machetes/*pangas* and hoes used on infected plants can transmit disease-causing agents to other plants. Normal farming practices, such as weeding using hoes or slashers or machetes/*pangas*, also create wounds and thereby result in a high biosecurity risk. Mechanical transmission was seen with BXW when incidences of the disease increased significantly a month after hoe weeding (Kubiriba et al., 2016). In the livestock sector, mechanical transmission can occur through movement within or across farms via contaminated clothes and boots, equipment (e.g., syringes, drinkers), and the hands of farmers or animal health service providers (Muller, 1997). Moreover, tethering of animals and grading of fish can cause wounds, which can predispose them to infections by giving pathogens a means of entry
- ***Mixing of new animals of unknown disease status with other animals on the farm:*** Closed and isolation farming systems are important concepts for the implementation of a biosecurity regime for disease and pest control. A closed herd or flock is where an all-in/all-out concept, especially for poultry flocks, is practiced. The animals are not allowed to mix with others and no new animal is introduced. These systems include fencing off farmland and establishing proper housing structures. These concepts are not, however, applicable to the free range and communal grazing practices that are relied upon by most livestock farmers. They also are not applicable when farmers introduce planting materials and replacer animals from suspicious sources.

During the field visits, the following observations were made:

- ***Inadequate fencing and housing structures:*** Some farms did not have strong enough fences or housing structures to exclude intruders. This was attributed partly to a lack of funds for investment but also to social pressure from peers. Isolation involves keeping animals in secluded areas while inspectors/farmers are ascertaining those animals' disease status or allowing for their recovery from illness. Few farmers had isolation units for the incoming and sick animals.
- ***Unregulated movement of animals and people into farms:*** People, including visitors, workers, traders, and extension staff, present a huge biosecurity risk for farms. Indeed, outbreaks of diseases such as ASF, FMD, and Newcastle Disease have been closely associated with unchecked movement of persons, which was also reported by previous researchers (Chenais, Boqvist, et al., 2017). Workers and visitors from other farms hosting the same livestock species present a particular risk of disease transmission. A few farmers have established some unwritten biosecurity guidelines for workers and visitors. For example, some farms provide accommodation for their workers and give them instructions not to move around the community. Most farmers obtain replacer animals without considering their disease status even though some infections are asymptomatic. Although MAAIF has a list of certified poultry breeders and fish seed producers where farmers can access clean stock, many acquire new stock from sources with unreliable quality of inputs . A few farmers purchase animals in poor condition that they attribute to malnutrition but instead could be an indication that those animals are carriers of disease pathogens. Those farmers also do not consult animal health workers before they purchase questionable animals even though most have no isolation units.
- ***Farm setup and activities pose biosecurity risks:*** In housed systems, some structures are not easy to clean since they had earthen floors. The few watering and feeding points were associated with overcrowding of animals and birds, establishing favorable conditions for the spread of some diseases. Droppings and urine are not easily cleaned from structures with earthen floors and are sources of infections such as mastitis and diarrhea in cattle and coccidiosis in poultry. Even where concrete floors exist, they were not cleaned frequently enough, and some farmers simply used water with no disinfectant. Many farmers were unaware that manure can spread pathogens to people and animals and can contaminate bodies of water, which was also previously reported (Wanyama et al., 2021). Manure management consists mainly of heaping, which may not be sufficient to kill pathogens and attracts flies and wild birds that spread some diseases.
- ***Basic biosecurity implementation:*** A few farmers observed basic biosecurity practices and became islands of effective disease control among communities that had serious epidemics. This is consistent with previous research reports. However, farmers in the districts of Kabarole, Kamwenge, and Kasese rarely practiced

biosecurity measures. Visitors' hand-wash was used by 14% of farmers and boot or feet cleaning was practiced by 4%, but 79% introduced new cattle directly into the herd. During the 12 months preceding the interviews, Wolff et al. (2017) reported, 51% of farmers had cattle that died and 31% had noticed abortions among their cows. Interestingly, 72% were satisfied with the health status of their cattle during the same time period

- ***Stress predisposes plants and animals to some diseases:*** Stressors (environmental, physical, and nutritional) result in immunosuppression, making a hosts more susceptible to infectious diseases. For example, drought and nutritional stress is associated with severe infections of Black Sigatoka Disease of Bananas, which is airborne and causes yield loss by reducing photosynthetic area. Many banana farmers trying to increase the productivity of their plantations seek to manage the disease by improving nutrition and water supply, which can compensate for leaf area loss. In livestock and fish, stress similarly predisposed animals to respiratory and other disease, such as Salmonellosis and Fowl Pox (Asres & Amha, 2014). Farmers regularly monitor water quality parameters to minimize the incidence of fish disease, while supplying a balanced diets to animals is important in the management of nutritional stress. Providing water paddles in piggery units and shade trees in paddocks for cattle contribute to the management of heat stress.

Some of the key messages with regard to biosecurity that the situation analysis identified were:

- Good agronomy practices such as crop rotation, field sanitation, and the avoidance of recycling seed play an important role in managing and breaking pest and disease cycles (Uyemoto, 1983). Weed control eliminates alternate hosts for potential vectors (Wangai et al., 2012), and infected plant material should be removed from the field to reduce pathogen and vector populations. This material can be fed to livestock (although grain and cobs that are rotten should not be fed to humans or animals). Many farmers are unaware that these good agronomy practices are important for disease management and therefore do not diligently implement them.
- Perceived barriers for implementing biosecurity were financial and cultural. While farmers agreed that taking biosecurity measures had made their cattle healthier, they also noted that those measures caused them to incur extra costs. With respect to crops, very few farmers were able to control some diseases that are biosecurity sensitive, such as FOC1 and CWD, until resistant varieties were deployed. Whereas resistant varieties such as FOC1-resistant bananas initially were not acceptable to consumers, production of susceptible varieties, such as apple bananas, has drastically reduced in Uganda (Buregyeya et al., 2018) and, over time, the resistant bananas have come to dominate the market The land tenure system affects farmers'

ability to implement some biosecurity measures, such as construction of permanent structures, that cannot be easily undertaken on land over which they have little control.

- For farmers to more broadly implement basic biosecurity practices, they need knowledge, access to veterinary services, resources, and community involvement. Any sustainable biosecurity interventions must be feasible for the farmers, from a practical, social, and cultural aspect. Policymakers also need an understanding of the farmers' view of biosecurity and the diseases it is intended to prevent in order to inform their interventions. Unique scenarios, such as interactions between livestock and wildlife, must be evaluated to identify appropriate biosecurity practices.

1.3.6 Awareness and communication

Awareness about the need to control AMR, disease prevention regulations, and biosecurity practices is a key precondition for effective implementation of IPC, yet communication gaps on that issue among the various stakeholders exist. District production officers claimed that farmers' mindset with respect to disease management needs to be changed. Hence, effective communication to stakeholders, especially to farmers, in a language and using approaches that strike a chord with them, is key for successful deployment of IPC.

MAAIF and its partners have sometimes used traditional media, i.e., FM radio, newspapers, and television, to successfully reach millions of farmers and other stakeholders, especially during the peaks of outbreaks of major diseases and pests such as FMD, Avian Influenza, Maize Lethal Necrosis Disease (MLND), and locusts. Phone and internet connectivity is increasing among Ugandans, with almost 10 million individuals currently able to access those communication methods. MAAIF has undertaken some initiatives to leverage the e-platform to boost extension and communication service delivery, such as in the case of the recent locust invasion and outbreak of the Fall Army Worm. Stakeholders say that sustaining these campaigns is very costly and that the agriculture-related programs are not allocated enough airspace.

Much like with other IPC practices, communication tends to be reactive rather than proactive. Farmers and other stakeholders are not forewarned even of impending outbreaks. Information is not tailored to manage diseases spread by vectors and through planting materials at the start of rainy seasons. At the border entry points, hardly any communication targets passengers, tourists, plant and animal breeders, or businesspersons who may introduce plants, animals, or plant/animal products into Uganda from abroad. Veterinary professionals who are members of the Uganda Veterinary Association (UVA) are loosely connected through WhatsApp groups Vet Forum and Women Vets Forum, but disease control issues are rarely discussed on those

forums. Such groups are not organized enough to sufficiently support communication and extension for IPC

The most commonly used approach for promoting IPC practices is top down. Only 30% of farmers implemented IPC practices in order to control BXW in Uganda, although 85% of the community was aware of the problem (Tushemereuwe et al., 2007). This gap was addressed using participatory approaches of technology promotion, including community by-laws, demonstrations of effectiveness of practices, plant health clinics, and disease control campaigns (Kubiriba et al., 2016). However, those approaches have not been institutionalized for routine deployment.

1.3.7 Collaboration among various stakeholders

Control of infections requires the participation of all stakeholders, from the village level to policy makers at the central government level. Each stakeholder has a role to play to ensure the effectiveness and success of control programs. On-farm measures to prevent the spread of disease are undertaken by the farmer himself, ideally in conjunction with his immediate neighbors.

MAAIF is mandated to spearhead infection control through the four directorates, i.e., Crop Resources (DCR), Agricultural Extension Services (DAES), Animal Resources (DAR), and Fisheries Resources (DFR). MAAIF is supported to deliver its functions by its agencies such as NARO, the National Agricultural Advisory Services, Uganda Coffee Development Authority (UCDA), Dairy Development Authority (DDA), and local government at district and sub-county level. Research services are provided mainly through NARO, universities, and other international organizations such as the Consultative Group on International Agricultural Research and FAO. In some cases, a body is created by the government to oversee development of some sub-sectors, e.g., the UCDA for coffee and the DDA for dairy. Local government at district and sub-county levels, non-government organizations such as World Vision, input suppliers, and farmer organizations provide extension services, but their efforts are poorly coordinated to reach a common goal. For example, NARO reports end up in the Director General's (DG) office and university reports end up in the Vice-Chancellor's office and as publications in scientific journals, not reaching the National Plant Protection Officer for Crop Protection (NPPO/CP), the Commissioner Animal Health (CAH) and the director DFR in time for use in policy formulation, surveillance, and response. Where there has been successful control of major diseases and pests, such as locusts, effective collaboration between partners, with the involvement of constituted steering and technical committees/task forces, has been key.

1.3.8 Summary of the gaps identified in the situation analysis

The situation analysis identified gaps in the implementation of IPC-identified strategic areas, as presented in table 1.

Table 1: Summary of IPC-related gaps identified in the situation analysis

Strategic area	Current gaps
Capacity for IPC implementation	Only a few labs exist at the district level
	Labs are not well equipped and not accredited
	Lack of consumables
	Staffing at national and local government levels remains low, and existing staff lack skills
	Lack of inter-laboratory collaboration
	IPC not well mainstreamed into curricula of graduate and other training initiatives
	Diagnostic tools are unreliable
	Input supply actors are not skilled to sufficiently deliver IPC
Policy frameworks for IPC implementation	Lack of biosecurity and biosafety plans for agriculture sector
	Lack of guidelines supporting IPC implementation in crop sub-sector
	Guidelines supporting IPC implementation in fish sub-sector do not consider cages, tanks, and aquaponics
	Private extension service not regulated
	Integrated pest/vector management (IPM)/integrated disease management (IDM) not sufficiently covered in policy
	Lack of awareness at the local government and among farmers about IPC supportive policies
	Policies at national level not sufficiently implemented
	Compensation for lost revenue by farmers due to IPC implementation not taken care of in the policy framework
	Lack of policy to harmonize data sharing among departments and agencies
Surveillance and response systems	
Anticipatory approach for enhanced preparedness for response	Pest risk assessment (PRA) not institutionalized
	Pest registers/inventories not sufficiently updated to support IPC and animal and human pathogen guidance documents
	Pre-emptive infection control approaches not streamlined into IPC
	Resources not allocated for preparedness activities
	Many farmers do not execute any preparedness activities
	Lack of systematic health management plans at the farm level, such as no routine vaccination or deworming, poor farm record keeping
	Districts report outbreaks to the center, but initiation of response is non-existent or delayed

Strategic area	Current gaps
	Insufficient collaboration with neighboring countries
	No drills or rehearsal activities in anticipation
	Data capture scattered and insufficiently organized to support IPC
	National surveillance system coverage still low
	Depending on the sub-sector, AMR and AMUC surveillance activities are missing or inadequate
Implementation of IPC practices	Lack of on-farm biosecurity plans
	Smallholder farmers failing to execute IPC practices
	Many animals are reservoirs of parasites and pathogens
	Many farmers do not use improved, disease-resistant seeds/breeds
	No peer-driven participatory approaches for deployment of IPC and biosecurity practices
	A lot of counterfeit agricultural chemicals and seeds on the market
Awareness and communication	Weak extension service provision
	Messages not tailored to farmers' needs
	Awareness campaigns not well targeted
	Communities along the borders not well sensitized about transboundary disease spread
	Information and communications technology (ICT) efforts not coordinated enough to support IPC
	Risk management not popularized among farmers
	Technology promotion still largely top-down
	IPC deployment campaigns for total elimination target diseases and pests not covering all areas
Coordinated partnerships	No mechanisms for report sharing among agencies to support IPC response
	Technical/steering committees for management of outbreaks are ad hoc
	Delays in resource mobilization for rapid response to outbreaks

The above gaps, identified as part of a strengths, weaknesses, opportunities, and threats (SWOT) analysis (Appendix 1), informed the development of the IPC plan presented in the following sections of the report.

2.0 THE STRATEGIC FOCUS

This IPC plan is anchored on the following strategic objectives that cut across the crop, livestock, and fisheries sub-sectors.

2.1 Goal and Strategic Objectives of the IPC plan

The goal is to reduce the prevalence and impact of pests and diseases, as well as the occurrence of AMR in the livestock, fisheries, and crop sub-sectors, to achieve strengthened plant and animal health systems in Uganda.

2.1.1 Strategic Objectives

- Improve infrastructural and human capacity for IPC
- Strengthen supportive policy and regulatory framework for IPC
- Improve plant, livestock, and fish health through biosecurity
- Enhance surveillance and response for the control of pest and disease epidemics, as well as AMR/AMU
- Improve awareness creation and communication for IPC
- Foster multidisciplinary and multi-institutional collaborations to support IPC plan implementation

These strategic objectives harmonize with the IPC guidelines (MAAIF, 2020) that were developed earlier, with themes that included:

- Use of biosecurity measures to protect and promote animal, plant, and fish health
- Farm waste management and environmental health protection
- Disease surveillance and accurate diagnosis of infectious agents
- Rational use of antimicrobial agents and pesticides
- AMR and AMUC surveillance

3.0 STRATEGIC INTERVENTIONS

3.1 Improve infrastructural and human capacity for IPC

Improving capacity for IPC is a continuous process since the needs increase as production and trade intensify to meet the pressing requirements of the ever-expanding population. The plan advocates for greater collaboration among institutions with IPC-related mandates, such as NARO, universities, and farmer organizations. Some of these

institutions have laboratory infrastructure, skilled human resources, and modern diagnostic technologies that will effectively compliment the efforts of MAAIF.

The collaboration will be based on establishing a shared strategic approach to plant and animal health research, sustaining core capability, attracting new researchers, and developing a new cohort of plant and animal health professionals. Uganda urgently needs to improve the status of its laboratories so they can be accredited and internationally recognized for the services they already effectively offer, such as disease diagnostics. These efforts should be supported with rapid and reliable diagnostics for use at borders and internal key check points and on-farm. Skillset development initiatives also need to be developed to ensure that staff employed in plant, animal, and fish health are equipped with the appropriate skills and knowledge to discharge their duties with IPC at the core. Mainstreaming IPC into curricula of the universities, agricultural colleges, and farm schools will contribute sustainable skillset development. Extension service providers (both public and private), local government leaders, input suppliers, and traders should be targeted for continuous training regarding compliance with regulations and delivering appropriate and accurate information to their clients. Farmers and their workers should be targeted for training as major beneficiaries.

Interventions and activities to achieve the strategic objective will include:

3.1.1 Identify and harmonize utilization of the structures and capacity for a robust and sustainable plant and animal health and biosecurity system

- Profile facilities within different institutions (room space, equipment and related functionality, staff skillsets, available technology, willingness to share use)
- Harmonize and formalize facility-sharing framework to optimize synergy and sustainability in the implementation of IPC
- Establish functional quarantine or holding areas at border posts for effective disease surveillance and management

3.1.2 Assign special activities, e.g., diagnostics and training, to institutions with the competence

- High throughput diagnostics—enzyme-linked immunosorbent assay (ELISA), polymerase chain reaction (PCR), VITEK—established
- Acquisition or development of rapid detection devices (pocket diagnostics tools) for quick field tests and border control
- Identify institutions with potential to train staff in IPC
- Mainstream IPC into curricula for education and training of various stakeholders; develop guidelines/manuals

3.1.3 Coordinate the establishment of training initiatives to equip staff with the appropriate skills and knowledge

- Develop Memorandums of Understanding (MoUs) between MAAIF and Institutions with potential to train staff in IPC
- Conduct Training of Trainers course to develop a cadre of Trainers of Trainers (ToTs)
- Run short training courses for new staff and refresher courses for existing staff of both public and private service providers
- Recruit staff with the capacity and competence in biomedical engineering to reduce the cost of lab equipment maintenance

3.1.4 Establishment of training initiatives to equip input suppliers, farmers, and farmworkers to implement biosecurity measures and SPS regulations, and educate them regarding the benefits of insurance

- Advertise and have ToTs run short training courses for input suppliers, farmers, and farm workers

3.1.5 Accreditation of the laboratories through regular audits

- Identify relevant standards (e.g., ISO 15189:2007 Standards) and establish requirements for accreditation of labs
- Conduct technical audits of the labs
- Implement recommendations from audit
- Labs receive full accreditation

3.2. Strengthen the supportive policy framework for IPC

There is need to harmonize existing national plant and animal health-related regulatory framework with those advocated for by international bodies such as WOAHO/OIE, FAO/International Plant Protection Convention and WTO to strengthen the IPC Framework. The IPC plan will advocate for revising the Fish Policy Framework to support IPC. It will further consider decentralization of the regulatory framework to districts and communities to trigger participatory, bottom-up, peer-driven, community-based enforcement of IPC-related regulations. This approach will allow zonal inspectors with MAAIF to play only a backstop role addressing the few difficult enforcement cases and more effectively leave certification services to its clients. The plan recognizes the noble contribution of private extension service providers and addresses the quality of their service through registration and regulation. The plan also prioritizes IPM/IDM practices for plant and animal health management.

Under this objective, implementation of the plan will involve the following activities:

3.2.1 Review key policies for plant and fish health

- Review and improve the Fish Policy Framework
- Update the Plant Protection Act (2015)

3.2.2 Develop a policy or MoUs to strengthen effective IPC delivery

- Formulate a policy to harmonize data sharing in support of effective IPC delivery
- Institutionalize compensation for lost revenue by farmers due to IPC implementation
- Institutionalize IPM to minimize use of antimicrobials in plant and animal health management

3.2.3 Decentralize SPS policy enforcement to districts, sub-counties, and communities

- Restrict inter-district movement of plants and fish in target hotspots for diseases and pests
- Mobilize farming communities to enforce SPS policy
- Formulate and pilot implementation of community by-laws for pest and disease control in target hotspot villages
- Monitor and evaluate community-based inspection services delivery

3.3 Improve plant, livestock, and fish health through biosecurity

Biosecurity was identified as key for crop- and animal-health risk management where human activities are the drivers of disease spread. Closed and isolation systems are important concepts in the implementation of the biosecurity regime for disease and pest control.

The intervention and activities for achieving this objective are as follows:

3.3.1 Improve implementation of biosecurity practices at farm level

- Train farmers on good agronomic, animal, and fish health practices
- Facilitate farmers to develop biosecurity plans with recommended IPC practices
- Encourage participatory implementation of the farmers' biosecurity plans
- Arrange exposure visits with model IPC farms to scale up farm biosecurity
- Monitor farms on implementation of biosecurity management plans

3.4 Enhance surveillance and response for the control of pests and disease epidemics

Controlling disease is much more effective and cheaper using anticipatory approaches (before entry) than it is when relying on fire-fighting reactionary approaches after establishment.

The starting point is the development of up-to-date evidence-based systems to accurately identify and quantify the risks posed to crops, animals, and fish either before or just after outbreaks have occurred in the country. The pest risk assessment (PRA) should be used to continuously update the national health risk register, which helps to identify and prioritize the risks of pests and diseases. The IPC plan advocates for the deployment of pre-emptive infection control approaches. This effort can be facilitated by, for instance, undertaking mock (rehearsal) activities mirroring actions implemented elsewhere to control diseases similar to those that are endemic in Uganda. It also can be supported by reviewing foreign policies aimed at controlling similar diseases in order to adopt a suitable policy framework before it is needed.

At farm level, preparedness for pest and disease response can be improved by promoting contingency plans for routine practices such as vaccinations, deworming, and proper record keeping.

In addition to preparedness, surveillance of, and response to, existing pest and disease epidemics is vital for infection reduction programs, as their effectiveness depends on a knowledge of accurate infection rates. Incorporation of an effective surveillance program with regular feedback is essential. Under this IPC plan, surveillance data captured and reported by various actors will be streamlined to help the appropriate offices authorize timely response to outbreaks. The plan will also capitalize on the increasing network and smart-phone connectivity in Uganda to reach the general public and all key stakeholders. The MAAIF directorates will be responsible for the implementation of surveillance, in close collaboration with the infection control team.

The interventions and activities under preparedness or anticipatory strategies include:

3.4.1 Horizon scanning and PRA

- Develop and maintain an up-to-date pest and disease risk register
- Determine the risk of disease and conduct etiological and epidemiological data analysis
- Establish the economic importance—likely trade routes, volumes and value of trade, effects on the people and country

- Identify gaps in surveillance, contingency plans in place, likely response, needed capacity and expertise

3.4.2 Improve planning and record keeping for effective IPC implementation at farm level

- Develop contingency plan templates for production practices with health implications
- Develop health management plan templates
- Adopt farm record-keeping templates

3.4.3 Streamlining pre-emptive infection control approaches

- Simulate a control system before the spread to Uganda of disease/pest outbreaks reported in neighboring agro-ecological zones (AEZs) or countries
- Benchmark control practices from neighboring countries
- Collaboratively develop resistant varieties and breeds evaluated in countries with hotspots

3.4.4 Implement IPC practices on-farm

- Develop guidelines for IPC practices in the crop sub-sector
- Review existing guidelines for IPC practices in livestock and fisheries sub-sectors

The interventions and activities for effective surveillance and response for existing pest and disease epidemics include:

3.4.5 Decentralize and equip data capture structures with ICT-supported surveillance

- Liaise with chief administrative officers (CAOs) and the Office of the Prime Minister (OPM) to integrate surveillance data collection in the contracts and terms of reference (ToR) of sub-county production officers
- Establish database of sub-county/parish production officers (names, phone contacts) and farmer leaders of cooperatives
- Develop a data-capture system, including a functional central server
- Implement ICT data capture from the farming communities
- Carry out data audits to improve quality of data, automatically generate reports
- ICT staffing

3.4.6 Streamlining generation of information and capture and reporting among ministries, departments, and agencies (MDAs), the National Agricultural Research Systems (NARS), the private sector, and local government

- Establish jointly developed reporting portal
- Prioritize joint surveillance reporting in review processes to track its implementation
- Register and train input suppliers to equip them for regulation compliance and effective information capture and delivery

3.4.7 Ensure prudent use of drugs and chemicals and monitor AMR

Non-judicious use of chemicals and drugs in the prevention and control of pests and diseases, if not arrested, complicates IPC interventions. The planned activities below are designed to ensure prudent use of drugs and chemicals and monitor AMR.

- Train and encourage farmers to keep treatment records
- Undertake regular AMUC and pesticide-use data collection on farms
- Regularly collect AMR samples from farms and submit them to the national reference laboratory
- Integrate AMU/AMR into research agenda of NARS
- Equip the national reference laboratories for AMR analysis

3.5 Improve awareness creation and communication for IPC

Communication materials should be developed by teams that include representatives from extension service providers and leaders from target communities in order to help tailor the language and content to the intended recipients, especially farmers. It is preferable for content to be sourced from practicing farmers rather than research publications. Passengers, tourists, plant and animal breeders, and businesspersons who may introduce plants, animals, and plant/animal products into Uganda from abroad should be targeted.

For existing and established pests and diseases, communication campaigns should be conducted routinely with information tailored to manage diseases likely be spread by planting materials or vectors. The plan advocates for an e-platform to boost extension and communication service delivery, similar to one already described for data capture. MAAIF and partners will have to engage the insurance fraternity to popularize insurance packages tailored for agricultural production to enhance farmers' capacity to manage IPC-related risks. The plan also recognizes the effectiveness of farmer-to-farmer extension services. Farmer leaders will be organized and trained to effectively deliver IPC information to their peers, borrowing from the experience of Village Health Trainers in the

human health sector. The capacity built will help deliver the provision of extension service at parish and village levels, in support of the current parish development model.

The interventions and planned activities include:

3.5.1 Targeted communication using mass media during periods of high risk for disease and pest spread, such as the onset of rains

- Create awareness of, and hold an inaugural event for the top management of MAAIF on, the importance AMU and AMR
- Develop and disseminate IPC-related information that targets passengers, tourists, plant and animal breeders, and businesspersons at entry points
- Create awareness of high-risk periods for disease and pest spread
- Develop communication materials suitable to farmers, farm workers, and input suppliers

3.5.2 Leverage the improving phone and internet connectivity to aid IPC communication through ICT

- Load communication materials into ICT portal already developed for effective surveillance
- Use ICT systems for online training of extension staff
- Use ICT systems to showcase star-performing farmers and best biosecurity practices
- Use ICT systems to catalog certified suppliers of quality seed, breeds, and agro-chemicals
- Use ICT systems to monitor the adoption and impact of implementing IPC practices

3.5.3 Promotion of participatory approaches in extension—increasing inclusiveness and gender responsiveness

- Mobilize farmers into groups and cooperative societies by parish/ward to trigger and harmonize peer-driven implementation of IPC
- Conduct field days, bazaars, farm clinics, and food festivals to enable farmers and input suppliers to showcase best IPC practices and quality inputs

3.6 Foster multidisciplinary and multi-institutional collaborations for a One Health approach

Implementation of the IPC framework requires the participation and coordination of several institutions and disciplines at various levels—international, regional, national, and

local. Findings from the different institutions should also be reported to the commissioner for crop protection, commissioner for crop inspection and certification services, CAH, and DFR in time for their use in policy formulation, surveillance, and response. Where there has been successful control of major diseases and pests, effective collaboration between partners has been key, with the involvement of relevant steering and technical committees.

For example, when Avian and Human Influenza broke out in Wakiso, Masaka, and Kalangala in domestic and wild birds in 2016 and 2017, a One Health Multisectoral Coordination Committee was activated to oversee preparedness and control efforts. Surveillance intensified, biosecurity measures increased, and movement controls and enhanced culling, cleaning, disinfection, and carcass disposal procedures were implemented. Information materials were distributed to farmers to raise awareness, and the outbreak was successfully controlled (Nantima et al., 2019). Hence, IPC steering and technical committees are needed to regularly guide IPC implementation. The IPC Technical Committee will report to the existing NAP-AMR Committee, which will play the role of the Steering Committee and will mainstream the IPC plan into the NAP-AMR framework.

For this strategic objective, the following interventions and activities will enhance implementation of the IPC framework:

3.6.1 Enhancing the functioning of existing networks

- Appoint focal persons of IPC framework from implementing agencies/departments to forge closer relationships—
- Hold joint planning and review meetings among implementing agencies/departments
- Liaise with OPM to ensure closer collaboration between MAAIF and local government for effective IPC service delivery to farming communities

3.6.2 Institutional frameworks for effective implementation of agricultural IPC

- Strengthen the NAMRsC, which will serve as the steering committee of the IPC plan
- Establish the National Agricultural IPC technical working committee (NAIPC-TWC), which will be a technical task force for the coordination and implementation of the IPC plan and will work in close collaboration with the existing infection prevention and control technical working committee for human health
- Establish District IPC Committees

4.0 IMPLEMENTATION ARRANGEMENTS

The mandates of many committees and several departments come under the umbrella of IPC practices. Adopting some members from existing committees and co-opting a few others from the relevant MAAIF departments, research organizations, and universities will facilitate effective coordination and implementation of the IPC framework.

The IPC framework implementation should be accommodated under the NAP-AMR with the National AMR Sub-Committee (NAMRSC) as the Steering Committee. A technical task force for national agricultural IPC coordination, i.e., the National Agriculture Infection Prevention and Control Technical Working Committee (NAIPC-TWC), will be set up to oversee the day-to-day implementation of the framework and report to the Steering Committee. NAIPC-TWC will be multisectoral and will provide policy direction and strategic planning, ensure accountability, provide an enabling environment and the resources required for effective implementation of the IPC plan, and ensure political support at the highest level. The NAIPC-TWC will link to the grassroot networks through district IPC task teams comprising local government political and administrative wings, government and non-government extension officers, and farmers' and traders' organizations where they exist. Such organizations will be formed where they do not currently exist and will be responsible for coordination of IPC implementation at the local government (LG) level.

4.1 Steering Committee

The membership of the existing NAMRSC for the NAP-AMR, with some adaptation, will be the Steering Committee of the IPC for the agricultural sector, and its ToR will largely remain the same.

4.2 Technical task force for NAIPC-TWC

The technical task force shall comprise:

- Principal inspectors (8): From key departments of MAAIF—two representatives from each directorate, i.e., DAR, DCR, DFR, DAES
- Researchers (4): From the National Livestock Resources Research Institute, National Fisheries Resources Research Institute, National Crop Resources Research Institute, and National Agriculture Research Laboratories
- Universities (2): Agriculture and veterinary schools or colleges
- Trader and exporter associations (2)
- Representation of local government (2)
- Chairperson: Member of NAIPC-TWC but with no voting rights, to be elected

- Farmer organizations (3)
- Civil society organization (3)
- Input suppliers (3)

4.3 District IPC teams

The district IPC teams shall comprise:

- Technical team made up of DPO, DVO, DAO, DFO or their preferred representatives
- Political representatives—District Chairperson, Secretary for Production
- Administrative representatives—CAO, Resident District Commissioner
- Farmers’ representative—representatives from three cooperatives, where they exist
- Representatives from two non-governmental organization representatives that are actively involved in pest and disease management
- Traders (3)

The DPO will be the secretary of the district IPC teams.

4.4 ToR of the NAIPC-TWC

- Receive and synthesize district reports for submission to NAMRSC
- Integrate guidance from the NAMRSC and NAP-AMR into implementation plans
- Manage partnerships—local, regional, and international
- Play a direct supervisory role for the various activities by district task forces and other organizations involved in IPC implementation, according to the monitoring and evaluation (M&E) framework
- Liaise with MAAIF to mobilize resources to ensure effective implementation of the IPC plan

The NAIPC-TWC will periodically review and come up with training content by subsector.

4.5 ToR of the District IPC teams

- Receive and synthesize sub-county reports for submission to the NAIPC-TWC
- Integrate guidance from the NAIPC-TWC into implementation plans
- Play a direct supervisory role for the various activities by sub-county staff and other organizations involved in IPC implementation

- Liaise with MAAIF to ensure sufficient human resource and smooth flow of IPC-related information to and from the local governments

5.0 THE IPC PLAN IMPLEMENTATION MECHANISM

For effective implementation of the IPC framework, the strategic objectives, interventions, and activities are highlighted in table 2. Annex 1 shows the logical framework while annex 2 shows costing for implementation of the plan. Table 2 also presents the timelines and lead implementing institutions.

Table 2: The IPC Plan—Strategic objectives, interventions, and activities

Strategic Objectives, Interventions, and Activities		Year 1				Year 2				Year 3				Lead Institution	
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
Strategic Objective 1: Improve infrastructural and human capacity for IPC															
<i>Intervention 1.1: Identify and harmonize utilization of the structures and capacity for a robust and sustainable plant and animal health and biosecurity system</i>															
Activity 1.1.1	Profile facilities with different institutions (room space, equipment and related functionality, staff skillsets, available technology, willingness to share use)														MAAIF
Activity 1.1.2	Harmonize and formalize facility-sharing framework to optimize synergy and sustainability in the implementation of IPC														MAAIF
Activity 1.1.3	Establish functional quarantine or holding areas at border posts for effective disease surveillance and management														MAAIF
<i>Intervention 1.2: Assign special activities, e.g., diagnostics and training, to institutions with the competence</i>															
Activity 1.2.1	Assess laboratories for high-throughput diagnostic capacity, e.g., ELISA, PCR, VITEK (equipment and consumables)														MAAIF
Activity 1.2.2	Development of rapid detection devices (pocket diagnostics tools) for quick field tests and border controls														NARO
	Acquisition of rapid detection devices														MAAIF
Activity 1.2.3	Assess institutions with potential to train staff in IPC														MAAIF

Strategic Objectives, Interventions, and Activities		Year 1				Year 2				Year 3				Lead Institution
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Activity 1.2.4	Mainstream IPC into curricula for education and training of various stakeholders; development of guidelines/manuals													MAAIF/National Council for Higher Education (NCHE)/Ministry of Education (MoE)
Intervention 1.3: Coordinate the establishment of training initiatives to equip staff with the appropriate skills and knowledge														
Activity 1.3.1	Develop MoUs between MAAIF and institutions with potential to train staff in IPC													MAAIF
Activity 1.3.2	Conduct Training-of-Trainers course													MAAIF/NCHE/MoE
Activity 1.3.3	Run short training courses for new staff and refresher courses for old staff for both public and private service providers													MAAIF
Activity 1.3.4	Advertise and run short training courses for input suppliers (by trained staff)													MAAIF/District Local Governments (DLGs)
Activity 1.3.5	Advertise and run short training courses for farmers and farm workers (by trained staff)													MAAIF/DLGs
Intervention 1.4: Accreditation of the laboratories through regular audits														
Activity 1.4.1	Identify relevant standards (e.g., ISO 15189:2007 Standards) and establish requirements for accreditation of labs													MAAIF
Activity 1.4.2	Conduct technical audits of the labs													MAAIF/Consultant
Activity 1.4.3	Labs implement recommendations													MAAIF/NARS
Activity 1.4.4	Labs are fully accredited													MAAIF/NARS

Strategic Objectives, Interventions, and Activities		Year 1				Year 2				Year 3				Lead Institution
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Activity 1.4.5	Develop a framework contract for provision of biomedical engineering services for lab equipment maintenance				■	■	■	■	■	■	■	■	■	MAAIF
Activity 1.4.6	Fill the HR capacity gaps					■	■	■	■	■	■	■	■	MAAIF/Ministry of Public Service (MoPS)/DLGs
Strategic Objective 2: Strengthen supportive policy framework for IPC														
<i>Intervention 2.1: Review key policies for plant and fish health</i>														
Activity 2.1.1	Review and improve the fish policy framework			■	■	■	■							MAAIF
Activity 2.1.2	Update the Plant Protection Act (2015)			■	■	■	■							MAAIF
<i>Intervention 2.2: Develop a policy or MoUs to strengthen effective IPC delivery</i>														
Activity 2.2.1	Formulate a policy to harmonize data sharing in support of effective IPC delivery		■	■	■	■	■							MAAIF
Activity 2.2.2	Institutionalize compensation for lost revenue by farmers due to IPC implementation									■	■	■	■	MAAIF
Activity 2.2.3	Institutionalize IPM to minimize use of antimicrobials in plant and animal health management					■	■	■	■	■	■	■	■	MAAIF
<i>Intervention 2.3: Decentralize SPS policy enforcement to districts, sub-counties, and communities</i>														
Activity 2.3.1	Restrict inter-district (regional) movement of plants and fish in target hotspots for diseases and pests		■	■	■	■	■	■	■	■	■	■	■	MAAIF
Activity 2.3.2	Mobilize farming communities to enforce SPS policy				■	■	■	■	■	■	■	■	■	MAAIF/DLGs

Strategic Objectives, Interventions, and Activities		Year 1				Year 2				Year 3				Lead Institution
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Activity 2.3.3	Formulate and pilot implementation of community by-laws for pest and disease control in target hotspot villages													MAAIF/DLGs
Activity 2.3.4	Monitor and evaluate community-based inspection services delivery													MAAIF/DLGs
Strategic Objective 3: Improve plant, livestock, and fish health through biosecurity at farm level														
<i>Intervention 3.1: Improve implementation of biosecurity practices at farm level</i>														
Activity 3.1.1	Train farmers on good agronomic, animal, and fish health practices													DLGs
Activity 3.1.2	Facilitate farmers to develop biosecurity plans with recommended IPC practices													DLGs
Activity 3.1.3	Participatory implementation of the farmers' biosecurity plans													DLGs
Activity 3.1.4	Arrange exposure visits with model IPC farms to scale up farm biosecurity													DLGs/Farmers
Activity 3.1.5	Monitor farms on implementation of biosecurity management plans													MAAIF/DLGs
Strategic Objective 4: Enhance surveillance and response to pest and disease epidemics														
<i>Intervention 4.1: Horizon scanning and PRA</i>														
Activity 4.1.1	Develop and maintain an up-to-date pest and disease risk register													MAAIF

Strategic Objectives, Interventions, and Activities		Year 1				Year 2				Year 3				Lead Institution
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Activity 4.1.2	Determine the risk of disease: etiological and epidemiological data analysis													MAAIF
Activity 4.1.3	Establish the economic importance—likely trade routes, volumes and value of trade, effects on the people and country													MAAIF
Activity 4.1.4	Identify gaps in surveillance, contingency plans in place, likely response, needed capacity and expertise													MAAIF
Intervention 4.2: Improve planning and record keeping for effective IPC implementation at farm level														
Activity 4.2.1	Develop contingency plan templates for production practices with health implications													MAAIF/DLGs
Activity 4.2.2	Develop health management plan templates													MAAIF/DLGs
Activity 4.2.3	Adopt farm record-keeping templates													DLGs
Intervention 4.3: Streamlining pre-emptive infection control approaches														
Activity 4.3.1	Simulate a control system before introduction of disease/pest outbreaks reported in neighboring AEZs or countries													MAAIF
Activity 4.3.2	Benchmark control practices from neighboring countries													MAAIF/NARS
Activity 4.3.3	Collaboratively develop resistant varieties and breeds evaluated in countries with hotspots													NARS

Strategic Objectives, Interventions, and Activities		Year 1				Year 2				Year 3				Lead Institution
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Intervention 4.4: Implement IPC practices on-farm														
Activity 4.4.1	Develop guidelines for IPC practices in the crop sub-sector (five priority crops)													MAAIF
Activity 4.4.2	Review existing guidelines for IPC practices in livestock and fisheries sector													MAAIF
Intervention 4.5: Decentralize and equip data capture structures with ICT-supported surveillance														
Activity 4.5.1	Liaise with CAOs and OPM to integrate surveillance data collection in the contracts and ToRs of sub-county production officers													MAAIF/DLGs
Activity 4.5.2	Establish database of sub-county/parish production officers (POs) (names, phone contacts) and farmer leaders of cooperatives													DLGs
Activity 4.5.3	Develop a data capture system including a functional central server: (a) An ICT-supported data-capture system linked to all POs in 4.5.2, streamlined to include IPC													MAAIF
	(b) Number of POs trained in data capture per AEZ in each of the sub-sectors													MAAIF
	(c) Focal person to manage electronic platform appointed for each AEZ													MAAIF
Activity 4.5.4	Implement ICT data capture from the farming communities													MAAIF
Activity 4.5.5	Carry out data audits to improve quality of data, automatically generate reports													MAAIF

Strategic Objectives, Interventions, and Activities		Year 1				Year 2				Year 3				Lead Institution
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Activity 4.5.6	ICT staffing													MAAIF
Intervention 4.6: Streamlining generation of information and capture and reporting among MDAs, NARS, the private sector, and local government														
Activity 4.6.1	Develop processes for joint reporting mechanism in line with international regulatory bodies													MAAIF
Activity 4.6.2	Review and prioritize the processes for the joint surveillance reporting mechanisms													MAAIF
Activity 4.6.3	Establish a functional laboratory network													MAAIF/NARS
Activity 4.6.4	Registration of input suppliers in the four regions; To train input suppliers for regulation compliance and effective information capture and delivery													MAAIF
Intervention 4.7: To ensure prudent use of drugs and chemicals and monitor AMR														
Activity 4.7.1	Train and encourage farmers to keep treatment records (by AEZ)													MAAIF
Activity 4.7.2	Undertake regular AMUC and pesticide-use data collection on farms													MAAIF/NARS
Activity 4.7.3	Regularly collect AMR samples from farms and submit them to the national reference laboratory (AEZ–target hotspots or enterprises with high chemical usage)													MAAIF/NARS
Activity 4.7.4.	Support integration of AMU/AMR into research agenda of NARS													MAAIF/NARS
Activity 4.7.5	Equip the national and regional reference laboratories for AMR analysis													MAAIF/NARS

Strategic Objectives, Interventions, and Activities		Year 1				Year 2				Year 3				Lead Institution
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Strategic Objective 5: Improve awareness creation and communication for infection prevention and control														
<i>Intervention 5.1: Targeted communication—Use mass media for targeting periods of high risk of disease and pest spread, like at the onset of rains</i>														
Activity 5.1.1	Awareness creation/inaugural event for the implementing persons (top management of MAAIF, NARS and OPM, as well as regional/LGs) on importance of IPC as well as AMU and AMR													MAAIF
Activity 5.1.2	Develop and disseminate IPC-related information that targets passengers, tourists, plant and animal breeders and businesspersons at entry points													MAAIF
Activity 5.1.3	Awareness creation targeting periods of high risk of disease and pest spread													MAAIF
Activity 5.1.4.	Communication materials suitable to farmers, farm workers and input suppliers—development and deployment													MAAIF/LGs
<i>Intervention 5.2: Leverage the improving phone and internet connectivity to aid IPC communication through ICT</i>														
Activity 5.2.1	Load communication materials into ICT— portal already developed for effective surveillance													MAAIF
Activity 5.2.2	Use ICT systems for online training of extension staff													MAAIF
Activity 5.2.3	Use ICT systems for showcasing star-performing farmers and best biosecurity practices													MAAIF
Activity 5.2.4	Use ICT systems cataloguing certified suppliers of quality seed and breeds and agro-chemicals													MAAIF
Activity 5.2.5	Use ICT systems for monitoring adoption and impact of implementing IPC practices													MAAIF

Strategic Objectives, Interventions, and Activities		Year 1				Year 2				Year 3				Lead Institution
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
<i>Intervention 5.3: Promotion of participatory approaches in extension—increasing inclusiveness and gender responsiveness</i>														
Activity 5.3.1	Mobilize farmers into model groups and cooperative societies by Parish/Wards in collaboration with the Ministry of Trade, Industry, and Cooperatives (MTIC) to trigger and harmonize peer-driven implementation of IPC													MTIC with MAAIF and LGs
Activity 5.3.2	Conduct field days, bazaars, farm clinics, and food festivals to enable farmers, input suppliers to showcase best IPC practices and quality inputs													MAAIF/LGs
Strategic Objective 6: Foster multidisciplinary and multi-institutional collaborations to support One Health approach to IPC														
<i>Intervention 6.1: Enhancing the functioning of existing networks</i>														
Activity 6.1.1	Appoint focal persons of IPC framework from implementing agencies/departments to forge closer relationship—one biosecurity													MDAs and Tertiary Educational Institutions
Activity 6.1.2	Joint planning and review meetings among implementing agencies/departments													MAAIF
Activity 6.1.3.	Liaise with relevant MDAs and private sector to ensure effective IPC service delivery to farming communities													MAAIF
<i>Intervention 6.2: Institutional frameworks for effective implementation of agricultural IPC</i>														
Activity 6.2.1	Establish the Agricultural IPC Technical Subcommittee—Steering Committee													MAAIF
Activity 6.2.2	National IPC Committee													MAAIF

Strategic Objectives, Interventions, and Activities		Year 1				Year 2				Year 3				Lead Institution
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Activity 6.2.3	District IPC Committees													LGs
Activity 6.2.4	Mobilize resources to ensure effective implementation of the IPC plan with guidance from NAP-AMR Committee													MAAIF/NARS

6.0 Monitoring framework for the IPC Plan and its implementation mechanism

The M&E plan presented in table 3 provides a framework for tracking progress in the implementation of the IPC plan for the agricultural sector. It affords the stakeholders an initial foundation upon which to ground assessment of the success or failure of the implementation. The M&E plan's goal is aligned with the NAP-AMR, which is the national framework for the management of AMR and linked to the global One Health initiative. For the M&E system to be effectively supportive of MAAIF's objective to ensure crop, livestock, and fish health, it should provide timely and accurate data to MAAIF and its partners to inform performance reviews, policy, and periodic revisions to national strategic and operational plans. The M&E system stipulates the main goal of the IPC framework, as well as the outcome, key outputs, and activities.

Objectives of the M&E plan

1. Provide a framework for tracking demonstrable progress of the IPC plan for the agricultural sector
2. Help the Steering Committee assess the performance of the IPC plan using evidence-based decision-making
3. Improve compliance with broader MAAIF mandates
4. Facilitate continuous learning by IPC plan implementing partners

The matrix below follows a standard programmatic M&E format, including basic resources required for implementation of the IPC plan, the process involved, resulting outputs, outcomes, and the desired long-term impact.

The framework is consistent with NAP-AMR and WHO formats so the success or failure of implementation of the IPC plan for agriculture at the international level can be more easily compared.

Table 3: The IPC Monitoring Framework

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
				Year 1	Year 2	Year 3
<i>Intervention 1.1: Identify and harmonize utilization of the structures, capacity for a robust and sustainable plant and animal health and biosecurity system</i>						
Activity 1.1.1	Profile facilities with different institutions (room space, equipment and related functionality, staff skillsets, available technology, willingness to share use)	Consultancy— An inventory of laboratories services, equipment, and human resource capacity in existing crop and fisheries facilities documented in the nine AEZs	MAAIF	One inventory	—	—
		Gaps in existing facilities documented in the nine AEZs	MAAIF	One Needs assessment report		
Activity 1.1.2	Harmonize and formalize facility-sharing framework for optimize synergy and sustainability in the implementation of IPC	MoUs developed to share facilities and human resources across at least five labs in MAAIF, Universities, and NARO	MAAIF	Five MoUs	—	—

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
				Description	Year 1	Year 2
Activity 1.1.3	Establish functional quarantine or holding areas at border posts for effective disease surveillance and management	Holding grounds/quarantine structures established at no fewer than five of the most risky border posts by 2025	MAAIF	One quarantine structure	Two quarantine structures	Two quarantine structures
<i>Intervention 1.2: Assign special activities, e.g., diagnostics and training, to institutions with the competence</i>						
Activity 1.2.1	Assess laboratories for high throughput diagnostic capacity, e.g., ELISA, PCR, VITEK (equipment and consumables)	Diagnostic capabilities and biosafety levels of at least eight laboratories across the nine AEZs	MAAIF	1 report		
Activity 1.2.2	Acquisition or development of rapid detection devices (pocket diagnostics tools) for quick field tests and border controls	Rapid diagnostic kits developed or availed for no fewer than five of the most contagious and economically important diseases in each agricultural sub-sector and their efficiency evaluated	NARO		Rapid diagnostic kits for three diseases per sub-sector	Rapid diagnostic kits for two diseases per sub-sector

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
				Description	Year 1	Year 2
		Sensitive and rapid diagnostics deployed at five border posts, local governments, and farmers' fields	MAAIF	Diagnostic kits (200 tests) for the five most contagious diseases per sub-sector to five border posts	Diagnostic kits (200 tests) for the five most contagious diseases per sub-sector to border posts and at least 10 districts in two AEZs	Diagnostic kits (200 tests) for the five most contagious diseases per sub-sector to border posts and at least five districts in each AEZ
Activity 1.2.3	Assess institutions with potential to train staff in IPC	Profile of IPC training capacity of agricultural institutions, including the Department of Business Technical Vocational Education and Training (BTVET) (three universities, three colleges, and three BTVETs)	MAAIF	One catalogue		
Activity 1.2.4	Mainstream IPC into curricula for education and training of various stakeholders; development of guidelines/manuals	A curriculum review committee established; six review meetings;	MAAIF/NCHE /MoE	One committee, four meeting reports	Two committee meeting reports	

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
				Description	Year 1	Year 2
		Three Training manuals for each stakeholder group (farmers, extension officers, input suppliers)	MAAIF	Training manuals for the three categories of stakeholders (farmers, extension officers, input suppliers)		
		Revised agriculture-related curriculum for each level (primary, secondary, and tertiary) to include IPC and biosecurity	MAAIF/with NCHE/MoE	One draft curricula for each level	Approved curricula	
		Audited course unit on IPC and farm biosecurity	MAAIF	Online audited course on IPC and farm biosecurity on MAAIF website		
<i>Intervention 1.3: Coordinate the establishment of training initiatives to equip staff with the appropriate skills and knowledge</i>						
Activity 1.3.1	Develop MoUs between MAAIF and institutions with potential to train staff in IPC	MoU between MAAIF and at least three training Institutions	MAAIF	Three MoUs		
Activity 1.3.2	Conduct training-of-trainers course	Three training-of-trainers courses; at least 10 trained per region	MAAIF		Two training courses	One training course

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
				Description	Year 1	Year 2
Activity 1.3.3	Run short training courses for new staff and refresher courses for old staff, both public and private service providers	Each ToT to deliver a short training course. At least 500 staff trained by the ToTs over the three years	DLGs		20 short training courses by ToTs	20 short training courses by ToTs
Activity 1.3.4	Advertise and run short training courses for input suppliers (by trained staff)	One course per region. At least 20 input suppliers trained per region	DLGs		Two courses	Two courses
Activity 1.3.5	Advertise and run short training courses for farmers and farm workers (by trained staff)	Each trained staff to train 80 farmers. At least 40,000 farmers/farm workers trained within three years	DLGs		250 trainings by staff	250 trainings by staff
<i>Intervention 1.4: Accreditation of the laboratories through regular audits to satisfy accreditation requirements</i>						
Activity 1.4.1	Identify relevant standards (e.g., ISO 15189:2007 Standards) and establish requirements for accreditation of labs	Consultancy from internationally recognized accreditation body	MAAIF	Consultant contract signed		

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
				Year 1	Year 2	Year 3
Activity 1.4.2	Conduct technical audits of the labs	Document gaps to address for at least five labs with diagnostic capabilities	MAAIF/ Consultant	One report		
Activity 1.4.3	Labs implement recommendations	One lab per subsector supported for accreditation and showing improving Stepwise Laboratory Quality Improvement Process Towards Accreditation (SLIPTA) scores	MAAIF/ NARS		One lab	Two labs
Activity 1.4.4	Labs are fully accredited	Accreditation of at least three labs at MAAIF/Universities/NARO by end of 2025	MAAIF/ NARS			Three labs accredited
Activity 1.4.5	Develop a framework contract for provision of biomedical engineering services for lab equipment maintenance	At least one biomedical engineering company procured	MAAIF	Contract signed and implemented for three years	Contract signed and implemented for three years	Contract signed and implemented for three years

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
				Description	Year 1	Year 2
Activity 1.4.6	Fill the HR capacity gaps	75% of establishments filled at MAAIF - recruitment of 104 staff, including lab personnel	MAAIF/ MoPS		72 recruited for the three sub-sectors	72 recruited for the three sub-sectors
		To recruit three IPC-related staff per district/sub-county level in three years (450 recruited country-wide)	DLGs/MoPS		250 recruited for the three sub-sectors	200 recruited for the three sub-sectors
<i>Intervention 2.1: Review key policies for plant and fish health</i>						
Activity 2.1.1	Reviewing and improving the fish policy framework	Existing policy draft improved for inclusion of IPC-related legislations	MAAIF	Revised draft fish policy	Fish policy submitted for approval	
Activity 2.1.2	Update Plant Protection Act (2015)	Harmonized roles of Commissioners of Crop Protection and Crop Inspection service	MAAIF	Revised Plant Protection Act	Revised Plant Protection Act submitted for approval	
<i>Intervention 2.2: Develop a policy or MoUs to strengthen effective IPC delivery</i>						
Activity 2.2.1	Formulate a policy to harmonize data sharing in support of effective IPC delivery	Task force formulated and monthly meetings held	MAAIF	Draft on data-sharing policy and guidelines; 12 meetings/minutes	Monthly meetings for six months (meeting reports)	

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
Description				Year 1	Year 2	Year 3
		MoU on data sharing among MAAIF agencies, departments, and universities	MAAIF		MoU on data sharing among NARS and stakeholders	
Activity 2.2.2	Institutionalize compensation for lost revenue by farmers due to IPC implementation	Guidelines for compensation developed	MAAIF			Document with guidelines
Activity 2.2.3	Institutionalize IPM to minimize use of antimicrobials in plant and animal health management	Guidelines to integrate IPM	MAAIF		Draft guidelines	Approved guidelines
Intervention 2.3: Decentralize SPS policy enforcement to districts, sub-counties, and communities						
Activity 2.3.1	Restrict inter-district (regional) movement of plants and fish in target hotspots for diseases and pests	Two checkpoints for crops and fish in each of the four regions	MAAIF	Two checkpoints for crops and fish in Central region	Four checkpoints for crops and fish in Eastern and Northern regions	Two checkpoints for crops and fish in Western region
Activity 2.3.2	Mobilize farming communities to enforce SPS policy	Peer-driven SPS enforcement piloted by village teams in five districts in one AEZ	MAAIF	Village team in one district	Village team in two districts	Village team in two districts

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
				Description	Year 1	Year 2
Activity 2.3.3	Formulate and pilot implementation of community by-laws for pest and disease control in target hotspot villages	Community by-laws integrated into pest and disease control programs per agricultural sub-sector piloted in five districts in one AEZ	MAAIF/DLGs	Community by-laws in one district	Community by-laws in two districts	Community by-laws in two districts
Activity 2.3.4	Monitor and evaluate community-based inspection services delivery	Peer-driven M&E in support of farmers' implementation of IPC per agricultural sub-sector piloted in five districts in one AEZ	MAAIF/DLGs	Community by-laws in one district	Community by-laws in three districts	Community by-laws in five districts
Strategic Objective 3: Improve plant, livestock, and fish health through biosecurity at farm level						
<i>Intervention 3.1: Improve implementation of biosecurity practices at farm level</i>						
Activity 3.1.1	Train farmers on good agronomic, animal, and fish health practices	500 trainings for 40,000 farmers (nuclear) trained on farm biosecurity in five districts per AEZ	DLGs	100 trainings	200 trainings	200 trainings
Activity 3.1.2	Facilitate farmers to develop biosecurity plans with recommended IPC practices	200 trainings to develop biosecurity plans for at least 16,000 farmers	DLGs		100 training sessions	100 training sessions

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
				Year 1	Year 2	Year 3
Activity 3.1.3	Participatory implementation of the farmers' biosecurity plans	4000 farmers implementing the on-farm biosecurity plans	Farmer		1500 farms	2500 farms
Activity 3.1.4	Arrange exposure visits with model IPC farms to scale up farm biosecurity	Two visits per AEZ. At least five farms implementing biosecurity plans involved as hosts for training other farmers in each AEZ	DLGs		Six visits	12 visits
		Each of the model IPC farms to train about 200 farmers per year per AEZ (twice a year)	DLGs/farmer		30 trainings	60 trainings
Activity 3.1.5	Monitor farms on implementation of biosecurity management plans	Monitoring, evaluation and learning (MEL) events for each of the AEZ	MAAIF/DLGs		Three MEL events	Six MEL events
Strategic Objective 4: Enhance surveillance and response to pest and disease epidemics						
<i>Intervention 4.1: Horizon scanning and PRA</i>						
Activity 4.1.1	Develop and maintain an up-to-date pest and disease risk register	Inventory of pests/vector and diseases in the country per year	MAAIF	One inventory	One updated inventory	One updated inventory

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
				Description	Year 1	Year 2
Activity 4.1.2	Determine the risk of disease: etiological and epidemiological data analysis	Information on spread dynamics for five priority diseases per sub-sector	MAAIF	One report	One report	One report
Activity 4.1.3	Establish the economic importance—likely trade routes, volumes, and value of trade, effects on the people and country	Information on market-related or people-related spread; economic significance	MAAIF		One report	One report
Activity 4.1.4	Identify gaps in surveillance, contingency plans in place, likely response, needed capacity and expertise	Information on gaps in existing pest and disease surveillance and contingency plan at MAAIF	MAAIF	One report	One report	One report
<i>Intervention 4.2: Improve planning and record keeping for effective IPC implementation at farm level</i>						
Activity 4.2.1	Develop contingency plan templates for production practices with health implications	Farmer-friendly templates for production records for each sub-sector	MAAIF/DLGs	Production records templates for two sub-sectors	Production records template for one sub-sector	

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
				Year 1	Year 2	Year 3
Activity 4.2.2	Develop health management plan templates	Farmer-friendly templates for health management records	MAAIF/DLGs	Health management plan templates for three priority diseases per sector	Health management plan templates for two priority diseases per sector	
Activity 4.2.3	Adopt farm record-keeping templates	Farmers trained on use of the record-keeping templates. One training in each of the five districts per AEZ	DLGs		200 trainings on record keeping	300 trainings on record keeping
Intervention 4.3: Streamlining pre-emptive infection control approaches						
Activity 4.3.1	Simulate a control system before introduction of disease/pest outbreaks reported in neighboring AEZs or countries	Biosecurity practices required for prevention of three priority (transboundary) diseases per sub-sector are in place	MAAIF	SOPs for biosecurity practices for one transboundary animal disease per sub-sector	SOPs for biosecurity practices for one transboundary animal disease per sub-sector	SOPs for biosecurity practices for one transboundary animal disease per sub-sector
		Biosecurity inputs required for prevention of entry of the three diseases above per sector mobilized	MAAIF	Inputs procured	Inputs procured	Inputs procured
		Human resource requirement for biosecurity practices mobilized	MAAIF	Human resource mobilized	Human resource mobilized	Human resource mobilized

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
				Description	Year 1	Year 2
		Mock implementation of biosecurity practices on existing similar pathogen for one disease per sub-sector	MAAIF	Report on disease control rehearsal	Report on disease control rehearsal	Report on disease control rehearsal
Activity 4.3.2	Benchmark control practices from neighboring countries	One trip/sub-sector/year. Ten MDA staff acquiring disease control skills from countries experiencing the disease problem.	MAAIF/ NARS	One trip per year per sub-sector	One trip per year per sub-sector	One trip per year per sub-sector
Activity 4.3.3	Collaboratively develop resistant varieties and breeds evaluated in countries with hotspots	Resistant varieties or breeds to one major disease per sub-sector in target countries and released in Uganda	NARS	Trials	Trials	Two resistant varieties/breeds per sub-sector
Intervention 4.4: Implement IPC practices on-farm						
Activity 4.4.1	Develop guidelines for IPC practices in the crop sub-sector (five priority crops)	IPC guidelines for crop farmers, 1000 booklets	MAAIF	1000 copies of IPC guidelines for the crop sector		

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
				Description	Year 1	Year 2
Activity 4.4.2	Review existing guidelines for IPC practices in the livestock and fisheries sub-sectors	Revised IPC guidelines for the livestock and fish farmers, 1000 booklets for each sub-sector	MAAIF	1000 copies for each of the revised IPC guidelines for Fish and livestock sector		
<i>Intervention 4.5: Decentralize and equip data-capture structures with ICT- supported surveillance</i>						
Activity 4.5.1	Liaise with CAOs and OPM to integrate surveillance data collection in the Contracts and ToRs of Sub-County Production Officers	Revised ToRs of local government production officers to include the mandatory submission of surveillance data to MAAIF	MAAIF/DLGs	Revised ToRs - document		
Activity 4.5.2	Establish database of Sub-County/Parish Production Officers (Names, Phone contacts) and farmer leaders of Cooperatives	Up-to-date inventory of production officers and farmer leaders	DLGs	Updated database		

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
				Description	Year 1	Year 2
Activity 4.5.3	Develop a data-capture system including a functional central server: (a) An ICT-supported data-capture system linked to all POs in 4.5.2. streamlined to include IPC	An ICT-supported data-capture system linked to all POs in 4.5.2. streamlined to include IPC	MAAIF	A central server with data-capture system		
	(b) Number of POs trained in data capture per AEZ in each of the sub-sectors	At least 30 POs selected from 5 pilot districts trained in data capture per AEZ in each of the sub-sectors	MAAIF	1 training in each AEZ		
	(c) Focal person to manage electronic platform appointed for each AEZ	Focal person to manage electronic platform appointed for each AEZ	MAAIF	1 focal person per AEZ		
Activity 4.5.4	Implement ICT data capture from the farming communities	ICT hardware in place. Functional software, and active database	MAAIF	ICT hardware, functional software and active database for each sub-sector		

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
				Description	Year 1	Year 2
Activity 4.5.5	Carry out data audits to improve quality of data, automatically generate reports	Good quality data	MAAIF	Data quality check systems within the software		
Activity 4.5.6	ICT staffing	Recruitment plan and number of ICT staff recruited per AEZ	MAAIF	One ICT staff per AEZ in place	One ICT staff per AEZ in place	One ICT staff per AEZ in place
Intervention 4.6: Streamlining generation of information and capture and reporting among MDAs, NARS, the private sector, and local government						
Activity 4.6.1	Develop processes for joint reporting mechanism in line with international regulatory bodies	Reporting portal, documented processes for reporting mechanism	MAAIF	Jointly agreed upon reporting portal		
Activity 4.6.2	Review and prioritize the processes for the joint surveillance reporting mechanisms	Biannual sectoral planning meetings to track the interactive reporting	MAAIF	Two meetings; document on status of joint reporting	Two meetings; document on status of joint reporting	Two meetings; document on status of joint reporting
Activity 4.6.3	Establish a functional laboratory network	List of laboratories by their categories; joint meetings, sample referral documents	MAAIF/ NARS	Annual laboratory reports	Annual laboratory reports	Annual laboratory reports
Activity 4.6.4	Registration of input suppliers in the four regions to re-tool input suppliers for	An inventory and map of input suppliers	MAAIF	Inventory of input suppliers and their locations		

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
Description				Year 1	Year 2	Year 3
	regulation compliance and effective information capture and delivery	Training manual with focus on regulatory compliance, data capture and reporting for input suppliers and key traders; eight training workshops, each with at least 20 participants	MAAIF	Training manual	Two Training workshops each in Central and Western regions	Two Training workshops each in Eastern and Northern regions
<i>Intervention 4.7: To ensure prudent use of drugs and chemicals and monitor AMR</i>						
Activity 4.7.1	Train and encourage farmers to keep treatment records (by AEZ)	Training manual with focus on chemical and drug use, treatment records	MAAIF	Training manual; two training workshops in each of the three AEZs	Two training workshops in each of the three AEZs	Two training workshops in each of the three AEZs
Activity 4.7.2	Undertake regular AMUC and pesticide-use data collection on farms	Five districts in each AEZ collecting AMUC and pesticide-use data for each sub-sector	MAAIF/ NARS	Surveys in nine AEZs for the crop sub-sector	Surveys in nine AEZs for livestock sub-sector	Surveys in nine AEZs for fisheries sub-sector

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
				Year 1	Year 2	Year 3
Activity 4.7.3	Regularly collect AMR samples from farms and submit them to the national reference laboratory (AEZ–target hotspots or enterprises with high chemical usage)	Five districts in each AEZ collecting AMR data in each sub-sector	MAAIF/ NARS	Surveys in nine AEZs for the crop sub-sector	Surveys in nine AEZs for livestock sub-sector	Surveys in nine AEZs for fisheries sub-sector
Activity 4.7.4	Support integration of AMU/AMR into research agenda of NARS	Workplans of NARS including projects on AMU/AMR	MAAIF/ NARS	Workplans of NARS with AMU/AMR	Workplans of NARS with AMU/AMR	Workplans of NARS with AMU/AMR
Activity 4.7.5	Equip the national and regional reference laboratories for AMR analysis	Functional AMR analysis platforms in national reference labs for each sub-sector	MAAIF/ NARS	Three labs with AMR analysis platforms	Additional two labs with AMR analysis platforms	Additional five labs with AMR analysis platforms
Strategic Objective 5: Improve awareness creation and communication for infection prevention and control						
<i>Intervention 5.1: Targeted communication—Use mass media for targeting periods of high risk of disease and pest spread, like at the onset of rains</i>						
Activity 5.1.1	Awareness creation/inaugural event for the implementing persons (top management of MAAIF, NARS &	An event/inaugural on IPC as well as AMU/AMR in agricultural sector–national level	MAAIF	One sensitization workshop		

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
				Description	Year 1	Year 2
	OPM, and regional/LGs) on importance of IPC as well as AMU and AMR	An event/inaugural on IPC as well as AMU/AMR in agricultural sector—regional level	MAAIF	One sensitization workshop per region		
Activity 5.1.2	Develop and disseminate IPC-related information that targets passengers, tourists, plant and animal breeders, and businesspersons at entry points	Communication materials related to IPC in different languages (French, English, Swahili) to target travelers at entry points	MAAIF	IPC communication materials developed, interpreted, and distributed	IPC communication materials distributed	
Activity 5.1.3	Awareness creation targeting periods of high risk of disease and pest spread	Awareness campaigns targeting the rainy and dry seasons for specific diseases; reduced disease/pest incidence associated with the target period	MAAIF	Four awareness campaigns held	Four awareness campaigns held	Four awareness campaigns held

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
Description				Year 1	Year 2	Year 3
Activity 5.1.4	Communication materials suitable to farmers, farm workers, and input suppliers	Development of farmer-friendly communication materials related to IPC in at least eight different local languages (Runyakitara, Luo, Swahili, Luganda, Itesot, "Karamajong," etc.) to target farmers; regional based radio and television talk shows	MAAIF/LGs	Communication material in eight different languages		
		Deployment of communication materials	MAAIF/LGs		Nine awareness campaigns-nationwide	Nine awareness campaigns-nationwide
<i>Intervention 5.2: Leverage the improving phone and internet connectivity to aid IPC communication through ICT</i>						
Activity 5.2.1	Load communication materials into ICT portal already developed for effective surveillance	ICT system with active IPC extension platform: IPC-related communication content	MAAIF	Active IPC extension platform updated with communication content	Active IPC extension platform continuously updated with communication content	Active IPC extension platform continuously updated with communication content

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
				Description	Year 1	Year 2
Activity 5.2.2	Use ICT systems for online training of extension staff	ICT systems with active IPC extension platform: online training plans and modules. All staff trained in the five selected districts per AEZ	MAAIF	Online training via the ICT system (with option of active interaction)	Online training via the ICT system (with option of active interaction)	Online training via the ICT system (with option of active interaction)
Activity 5.2.3	Use ICT systems for showcasing star-performing farmers and best biosecurity practices	ICT systems with active IPC platform: showcasing champions and best biosecurity practices, impact/adoption studies for biosecurity; deliberate promotions on MAAIF website and other linked platforms	MAAIF	Success stories in IPC and farm biosecurity	Updated success stories in IPC and farm biosecurity	Updated success stories in IPC and farm biosecurity
Activity 5.2.4	Use ICT systems cataloguing certified suppliers of quality seeds, breeds, and agro-chemicals	e-catalogue of certified suppliers of quality seeds, breeds, and agro-chemicals	MAAIF	e-catalogue of certified suppliers	Updated e-catalogue of certified suppliers	Updated e-catalogue of certified suppliers

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
				Year 1	Year 2	Year 3
Activity 5.2.5	Use ICT systems for monitoring adoption and impact of implementing IPC practices	Electronic Monitoring, Learning, and Evaluation (e-MLE) system for monitoring adoption and impact of implementing IPC	MAAIF	e-MLE system	Updated e-MLE system	Updated e-MLE system
<i>Intervention 5.3: Promotion of participatory approaches in extension – increasing inclusiveness and gender responsiveness</i>						
Activity 5.3.1	Mobilize farmers into model groups and cooperative societies by parish/ward in collaboration with the MTIC to trigger and harmonize peer-driven implementation of IPC	Functional farmer cooperatives/groups at sub-county level per AEZ	MTIC with MAAIF & LGs	Two farmer cooperatives/groups in three AEZs	Two farmer cooperatives/groups in three additional AEZs	Two farmer cooperatives/groups in three additional AEZs

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
				Description	Year 1	Year 2
Activity 5.3.2	Conduct field days, bazaars, farm clinics, and food festivals to enable farmers, input suppliers to showcase best IPC practices and quality inputs	One grassroots event in each region for IPC promotion among the farming communities (including women and youth) as well as related stakeholders	MAAIF/LGs	One grassroots event for IPC promotion in each region	One grassroots event for IPC promotion in each region	One grassroots event for IPC promotion in each region
Strategic Objective 6: Foster multidisciplinary and multi-institutional collaborations to support One Health approach to IPC						
<i>Intervention 6.1: Enhancing the functioning of existing networks</i>						
Activity 6.1.1	Appoint focal persons of IPC framework from implementing agencies/departments to forge closer relationship—one biosecurity	One focal person for each MAAIF directorate and agency, university/college	MDAs and tertiary educational institutions	Focal person from each relevant institution		
Activity 6.1.2	Joint planning and review meetings among implementing agencies/departments	Quarterly joint meetings	MAAIF	4 meetings by focal persons	4 meetings by focal persons	4 meetings by focal persons

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
				Description	Year 1	Year 2
Activity 6.1.3	Liaise with relevant MDAs and private sector to ensure effective IPC service delivery to farming communities	MoUs between MAAIF and local government and other institutions	MAAIF	MoUs among MDAs/NARS	MoUs with additional stakeholders	MoUs with additional stakeholders
Intervention 6.2: Institutional frameworks for effective implementation of agricultural IPC						
Activity 6.2.1	Establish the National Agricultural IPC TWC	Multidisciplinary , multi-stakeholder National IPC Committee meetings	MAAIF	Quarterly Steering Committee meetings	Quarterly TWC meetings	Quarterly TWC meetings
Activity 6.2.2	National IPC Committee	Multidisciplinary , multi-stakeholder National IPC Committee meeting	MAAIF	National IPC (Agricultural) Committee; One committee meeting	One National IPC Committee meeting	One National IPC Committee meeting
Activity 6.2.3	District IPC Committees	Multidisciplinary , multi-stakeholder district IPC committee meetings at five districts per AEZ, two meetings per district	LGs	Two meetings per district	Two meetings per district	Two meetings per district

Strategic Interventions and Activities		Measurable Indicators of Achievements/ Targets	Lead Institution	Annualized Targets		
				Year 1	Year 2	Year 3
Activity 6.2.4	Mobilize resources to ensure effective implementation of the IPC plan with guidance from NAP-AMR Committee	Development grant proposals; at least one per year for any two sub-sectors	MAAIF/ NARS	Two grant proposals	Three grant proposals	Four grant proposals

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Annexes

Annex 1: Logical Framework for the IPC Framework implementation in the Agricultural sector

Description		Measurable Indicators of Achievements/ Targets	Sources/Mean of Verification	Assumptions and Risks
Overall Objective	To reduce prevalence and impact of pests/vectors, diseases, and occurrence of AMR in the livestock, fisheries, and crop sub-sectors in Uganda	1. Reduced frequency (by 20%) of occurrence and economic impact of diseases, pests/vectors	MAAIF/OIE reports	Assumptions: <ul style="list-style-type: none"> Stable political environment No human disease pandemics Successful resource mobilization by MAAIF Synergies and complementation by relevant stakeholders—institutions, MDAs, private sector, and farmers Regional cooperation to manage transboundary diseases Risks: <ul style="list-style-type: none"> Inadequate budget allocation to MAAIF affects implementation of strategies
		2. Reduced amounts (by 20%) of antimicrobials used in agriculture sector	MAAIF/NDA reports	
		3. Reduced occurrence of AMR (by 20%) in agriculture sector	MAAIF/OIE/FAO/WHO reports	
Specific objective	To provide guidance to farmers, the agricultural technical personnel, local government, and selected players in the agricultural value chain about IPC implementation in order minimize antimicrobial use and occurrence of AMR at farm level	60% of various players in the agricultural sector adopted the IPC practices	MAAIF/local government/NPA reports	Assumptions: <ul style="list-style-type: none"> Stable political and security situation in Uganda and the neighboring countries Cooperation of all stakeholders in implementation of IPC Availability of financial support Risks: <ul style="list-style-type: none"> Lack of will and/or delayed integration of IPC framework into MAAIF and local governments' action plans and budgets Uncontrolled movement of biological materials by internally displaced persons and refugees

Description		Measurable Indicators of Achievements/ Targets	Sources/Mean of Verification	Assumptions and Risks
Strategic Objective 1	Improve infrastructural and human capacity for IPC	75% of the MAAIF staffing establishments filled	MoU established/MAAIF reports	Assumptions: <ul style="list-style-type: none"> Government lifts the ban on staff recruitment in public service Experts in IPC-related competences are available to train MAAF and local government personnel Well-trained workforce to improve disease and AMR surveillance/diagnosis The public-private partnerships are enforced
		Functional infrastructure for disease surveillance at MAAIF/NARS in place	Inspection reports	
		Numbers and types of equipment and reagents		
		50% of skilling gaps at MAAIF and at LGs filled by 2025	MAAIF reports, accreditation reports, or training certificates	
Intervention 1.1: Identify and harmonize utilization of the structures, capacity for a robust and sustainable plant and animal health and biosecurity system				
Activity 1.1.1	Profile facilities with different institutions (room space, equipment and related functionality, staff skillsets, available technology, willingness to share use)	Consultancy—Inventory of laboratory services, equipment, and human resource capacity in existing crop and fisheries facilities documented in the nine AEZs	Consultant reports for the nine AEZs	Fund availability; political stability
		Plant/animal health community workers recognized in the local government in five selected districts in each AEZ	District reports, registers, ToRs	
		Gaps in existing facilities documented in the nine AEZ	Needs assessment report on gaps	
Activity 1.1.2	Harmonize and formalize facility-sharing framework to optimize synergy and sustainability in the implementation of IPC	MoUs developed to share facilities and human resources across at least five labs in MAAIF, universities and NARO	MoUs established/MAAIF reports/reports from relevant institutions	"Silos" are effectively broken;
Activity 1.1.3	Establish functional quarantine or holding areas at border posts	Holding grounds/quarantine structures established at	Physical structures or dedicated areas, MAAIF reports	Fund availability; buy-in by the private sector

Description		Measurable Indicators of Achievements/ Targets	Sources/Mean of Verification	Assumptions and Risks
	for effective disease surveillance and management	no fewer than five of the most risky priority border posts by 2025		
Intervention 1.2: Assign special activities, e.g., diagnostics and training, to institutions with the competence				
Activity 1.2.1	Assess laboratories for high throughput diagnostic capacity, e.g., ELISA, PCR, VITEK (equipment and consumables)	Diagnostic capabilities and biosafety levels of at least eight laboratories across the nine AEZ	Catalogue of diagnostic capacity of laboratories	High cost and disruptions of power
Activity 1.2.2	Acquisition or development of rapid detection devices (pocket diagnostics tools) for quick field tests and border controls	Rapid diagnostic kits developed or availed for at least five most contagious and economically important diseases in each agricultural sub-sector and their efficiency evaluated	Rapid diagnostic kits availed, evaluation reports at MAAIF	Global inflation remains relatively stable; favorable priorities of funding agencies
		Sensitive and rapid diagnostics deployed at five border posts, local governments and farmers' fields	Field reports	
Activity 1.2.3	Assess institutions with potential to train staff in IPC	Profile of IPC training capacity of agricultural institutions including the BTVET (three universities, three colleges and three BTVETs)	Catalogue of training capacity of private and public institutions	Fund availability
Activity 1.2.4	Mainstream IPC into curricula for education and training of various stakeholders; development of guidelines/manuals	Review committee established; six review meetings	Review committee and membership; meeting reports	Fund availability
		Three Training manuals for each stakeholder group (farmers, extension officers)	Training manuals	
		Revised agriculture-related curriculum for each level (primary,	Approved curricula	

Description		Measurable Indicators of Achievements/ Targets	Sources/Mean of Verification	Assumptions and Risks
		secondary and tertiary) to include IPC and biosecurity		
		Audited course unit on IPC and farm biosecurity		
Intervention 1.3: Coordinate the establishment of training initiatives to equip staff, farmers, and input suppliers with the appropriate skills and knowledge				
Activity 1.3.1	Develop MoUs between MAAIF and institutions with potential to train staff in IPC	MoU between MAAIF and at least 3 training Institutions	MoUs/MAAIF reports	Fund availability
Activity 1.3.2	Conduct training-of-trainers course	Three training-of-trainers courses	Training reports	Fund availability
		At least 10 staff trained per region	Training reports; attendance lists	Fund availability
Activity 1.3.3	Run short training courses for new staff and refresher courses for old staff, both public and private service providers	Each ToT to deliver a short training course; at least 500 staff trained by the ToTs over the three years	Training reports and attendance list	Fund availability
Activity 1.3.4	Advertise and run short training courses for input suppliers (by trained staff)	One training course per region, at least 20 of input suppliers per region	Training manual; training reports	Willingness of the trainees
Activity 1.3.5	Advertise and run short training courses for farmers and farm workers (by trained staff)	Each trained staff to train 80 farmers; at least 40,000 farmers/farm workers trained within three years	Training manual; training reports	Willingness of the trainees
Intervention 1.4: Accreditation of the laboratories through regular audits to satisfy accreditation requirements				
Activity 1.4.1	Identify relevant standards (e.g. ISO 15189:2007 Standards) and establish requirements for accreditation of labs	Consultancy from internationally recognized accreditation body	MoU, consultancy report	Fund availability

Description		Measurable Indicators of Achievements/ Targets	Sources/Mean of Verification	Assumptions and Risks
Activity 1.4.2	Conduct technical audits of the labs	Document gaps to address for at least five labs with diagnostic capabilities	Reports	Fund availability
Activity 1.4.3	Labs implement recommendations	One lab per subsector supported for accreditation and showing improving SLIPTA scores	SLIPTA document	Fund availability
Activity 1.4.4	Labs are fully accredited	Accreditation of at least three labs at MAAIF/Universities/NAR O by end of 2025	Accreditation certificates for the target labs	Fund availability
Activity 1.4.5	Develop a framework contract for provision of biomedical engineering services for lab equipment maintenance	At least one biomedical engineering company procured	MAAIF—Public Procurement and Disposal of Public Assets Authority report; signed contract	Availability of local biomedical engineering skillsets
Activity 1.4.6	Fill the HR capacity gaps	75% of establishments filled at MAAIF— recruitment of 104 staff including lab personnel	Payroll updated with new staff; HR staff lists	Fund availability
		To recruit three IPC-related staff per district/sub-county level in three years (450 recruited country-wide)	Payroll updated with new staff; HR staff lists	
Strategic Objective 2: Strengthen supportive policy framework for IPC				
Intervention 2.1: Review key policies for plant and fish health				
Activity 2.1.1	Reviewing and improving the fish policy framework	Existing policy draft improved for inclusion of IPC-related legislations	Meeting reports, revised policy draft document	Expedited processes for policy development
Activity 2.1.2	Update Plant Protection Act (2015)	Harmonized roles of commissioners of crop protection and crop inspection services	Meeting reports, revised act	Expedited processes for policy development
Intervention 2.2: Develop a policy or MoUs to strengthen effective IPC delivery				
Activity 2.2.1	Formulate a policy to harmonize data	Task force formulated	Report, policy brief	
		MoU on data sharing among MAAIF agencies,	MoU	Willingness of institutions to share information; ethical use of data and confidentiality

Description		Measurable Indicators of Achievements/ Targets	Sources/Mean of Verification	Assumptions and Risks
	sharing in support of effective IPC delivery	departments and universities		
Activity 2.2.2	Institutionalize compensation for lost revenue by farmers due to IPC implementation	Guidelines for compensation developed	Approved guidelines	Insurance fraternity integrates IPC into their portfolios
Activity 2.2.3	Institutionalize IPM to minimize use of antimicrobials in plant and animal health management	Guidelines to integrate IPM	Approved guidelines	Availability of alternatives to antimicrobial agents; alternative business opportunities for dealers in pesticides and antibiotics; farmers' willingness to change their practices
Intervention 2.3: Decentralize SPS policy enforcement to districts, sub-counties and communities				
Activity 2.3.1	Restrict inter-district movement of plants and fish in target hotspots for diseases and pests	Two check points for crops and fish in each of the four regions	Inspection reports by MAAIF and districts	Funds availability; commitment of local government leadership
Activity 2.3.2	Mobilize farming communities to enforce SPS policy	Peer-driven SPS enforcement piloted by village teams in five districts in one AEZ	SPS enforcement reports by farmers and districts	Good support by community leaders and government structures
Activity 2.3.3	Formulate and pilot implementation of community by-laws for pest and disease control in target hotspot villages	Community by-laws integrated into pest and disease control programs per agricultural sub-sector piloted in five districts in one AEZ	Community by-laws	Good support by community leaders and government structures
Activity 2.3.4	Monitor and evaluate community-based inspection services delivery	Peer-driven M&E in support of farmers' implementation of IPC per agricultural sub-sector piloted in at least one AEZ	Farmers' peer groups formed, reports	Funds availability
Strategic Objective 3: Improve plant, livestock, and fish health through biosecurity				
Intervention 3.1: Improve implementation of biosecurity practices at farm level				
Activity 3.1.1	Train farmers on good agronomic, animal, and fish health practices	500 trainings for 40,000 farmers (nuclear) trained on farm biosecurity in five districts per AEZ	Training reports by districts	Fund availability; security in the selected districts

Description		Measurable Indicators of Achievements/ Targets	Sources/Mean of Verification	Assumptions and Risks
Activity 3.1.2	Facilitate farmers to develop biosecurity plans with recommended IPC practices	200 trainings to develop biosecurity plans for at least 16,000 farmers	District reports, farm records	
Activity 3.1.3	Participatory implementation of the farmers' biosecurity plans	4000 farmers implementing the on-farm biosecurity plans	District reports, farm records	
Activity 3.1.4	Arrange exposure visits with model IPC farms to scale up farm biosecurity	Two visits per AEZ; at least five farms implementing biosecurity plans involved as hosts for training other farmers in each AEZ	Farm records, training reports	
		Each of the model IPC farmers to train about 200 farmers per year per AEZ (twice a year)	Farm records, district reports	
Activity 3.1.5	Monitor farms on implementation of biosecurity management plans	MEL events for each of the AEZs	MEL reports by MAAIF	
Strategic Objective 4: Enhance surveillance and response to pest and disease epidemics				
Intervention 4.1: Horizon scanning and PRA				
Activity 4.1.1	Develop and maintain an up-to-date pest and disease risk register	Inventory of pests/vectors and diseases in the country	Updated pest/vector and disease register	Effectiveness of surveillance and reporting systems improve fast
Activity 4.1.2	Determine the risk of disease: etiological and epidemiological data analysis	Information on spread dynamics for five priority diseases per sub-sector	Pest/disease risk analysis report	Availability of funds
Activity 4.1.3	Establish the economic importance—likely trade routes, volumes and value of trade, effects on the people and country	Information on market-related or people-related spread; economic significance	Pest/disease risk analysis report	Availability of funds

Description		Measurable Indicators of Achievements/ Targets	Sources/Mean of Verification	Assumptions and Risks
Activity 4.1.4	Identify gaps in surveillance, contingency plans in place, likely response, needed capacity and expertise	Information on gaps in existing pest and disease surveillance and contingency plan at MAAIF	MAAIF reports, updated surveillance and contingency plans	Availability of funds
Intervention 4.2: Improve planning and record keeping for effective IPC implementation at farm level				
Activity 4.2.1	Develop contingency plan templates for production practices with health implications in relation to the five priority diseases/pests or vectors per sub-sector	Farmer-friendly templates for production records for each sub-sector	Systematic farm production records	Fund availability
Activity 4.2.2	Develop health management plan templates	Farmer-friendly templates for health management records	Systematic farm health management records	Fund availability
Activity 4.2.3	Adopt farm record-keeping templates	Farmers trained on use of the record-keeping templates; one training in each of the five districts per AEZ	Training reports at sub-county level, district records	Fund availability
Intervention 4.3: Streamlining pre-emptive infection control approaches				
Activity 4.3.1	Simulate a control system before introduction of disease/pest outbreaks reported in neighboring AEZs or countries	Biosecurity practices required for prevention of two priority (transboundary) diseases per sub-sector are in place	Biosecurity protocols	Pre-emptive approach to disease response is prioritized
		Biosecurity inputs required for prevention of entry of the three diseases per sector mobilized	Inventory of inputs and procurement plans	Pre-emptive approach to disease response is prioritized
		Human resource requirement for	Skilled teams assembled	Pre-emptive approach to disease response is prioritized

Description		Measurable Indicators of Achievements/ Targets	Sources/Mean of Verification	Assumptions and Risks
		biosecurity practices mobilized		
		Mock implementation of biosecurity practices on existing similar pathogen for one disease per sub-sector	Report on preparatory control activities	Pre-emptive approach to disease response is prioritized
Activity 4.3.2	Benchmark control practices from neighboring countries	One trip/sub-sector/year; 10 MDA staff acquiring disease control skills from countries experiencing the disease problem	Report from the visits	Pre-emptive approach to disease response is prioritized
Activity 4.3.3	Collaboratively develop resistant varieties and breeds evaluated in countries with hotspots	Resistant varieties or breeds to one major disease per sub-sector in target countries and released in Uganda	Research and development reports, materials deposited at the genetic center	Pre-emptive approach to disease response is prioritized
Intervention 4.4: Implement IPC practices on-farm				
Activity 4.4.1	Develop guidelines for IPC practices in the crop sub-sector	IPC guidelines for crop farmers, 1000 booklets	Approved guidelines on crop sub-sector	Fund availability
Activity 4.4.2	Review existing guidelines for IPC practices in livestock and fisheries sub-sector	Revised IPC guidelines for the livestock and fish farmers, 1000 booklets	Approved revised guidelines on livestock and fisheries sub-sectors	Fund availability
Intervention 4.5: Decentralize and equip data-capture structures with ICT-supported surveillance				
Activity 4.5.1	Liaise with CAOs and OPM to integrate surveillance data collection in the contracts and ToRs of sub- county production officers	Revised ToRs of local government production officers to include the mandatory submission of surveillance data to MAAIF	Human resource manual with revised ToRs of local government production officers	Effective collaboration between MAAIF and local government
Activity 4.5.2	Establish database of sub- county/parish production officers (names, phone contacts) and farmer	Up-to-date inventory of production officers and farmer leaders	Database of PO and farmer leaders	Funding availability

Description		Measurable Indicators of Achievements/ Targets	Sources/Mean of Verification	Assumptions and Risks
	leaders of cooperatives			
Activity 4.5.3	Develop a data capture system, including a functional central server	An ICT-supported data-capture system linked to all POs in 4.5.2. streamlined to include IPC	Reports: NPPO (crops), CAH (livestock and fish)	Community-based IPC activities effectively supported
		At least 30 POs selected from five pilot districts trained in data capture per AEZ in each of the sub-sectors	Training reports at sub-county level, district records	Community-based IPC activities effectively supported
		Focal person to manage electronic platform appointed for each AEZ	Reports: NPPO (crops), CAH (livestock and fish)	Community-based IPC activities effectively supported
Activity 4.5.4	Implement ICT data capture from the farming communities	ICT—Hardware in place, functional software and active database	Surveillance reports—target districts	Community-based IPC activities effectively supported
Activity 4.5.5	Carry out data audits to improve quality of data, automatically generate reports	Good quality data	Data sets on the server	Effective data quality checks within the system
Activity 4.5.6	ICT staffing	Recruitment plan and number of ICT staff recruited per AEZ	HR reports	Fund availability
Intervention 4.6: Streamlining generation of information and capture and reporting among MDAs, NARS, the private sector, and local government				
Activity 4.6.1	Develop processes for joint reporting mechanism in line with international regulatory bodies	Reporting portal	MAAIF reports	Ethical use of data from different institutions
Activity 4.6.2	Review and prioritize the processes for the joint surveillance reporting mechanisms	Biannual sectoral planning meetings to track the interactive reporting	MAAIF reports	Funding availability
Activity 4.6.3	Establish a functional laboratory network	List of laboratories by their categories, joint meetings, sample referral documents	MAAIF reports, institutional reports, sample analysis records	Willingness of labs to network; related MAAIF strategy exists

Description		Measurable Indicators of Achievements/ Targets	Sources/Mean of Verification	Assumptions and Risks
Activity 4.6.4	Registration and training of input suppliers for regulation compliance and effective information capture and delivery	An inventory and map of input suppliers	MAAIF reports, district reports	Funding availability
		Training manual with focus on regulatory compliance, data capture and reporting for input suppliers and key traders; training 20 traders per region	MAAIF reports, district reports, training manual	Funding availability
Intervention 4.7: To ensure prudent use of drugs and chemicals and monitor AMR				
Activity 4.7.1	Train and encourage farmers to keep treatment records	Training manual with focus on chemical and drug use, treatment records	Training and disease control reports at districts and sub-counties	
Activity 4.7.2	Undertake regular AMUC and pesticide-use data collection on farms	Five districts in each AEZ collecting AMUC and pesticide-use data for each sub-sector	Reports of districts, NARO, universities, MAAIF, NDA, UNBS	Fund availability; the national AMR/AMUC surveillance framework is implemented fast in fish and crop sub-sector
Activity 4.7.3	Regularly collect AMR samples from farms and submit them to the national reference laboratory	Five districts in each AEZ collecting AMR data in each sub-sector	Reports of districts, NARO, universities, MAAIF, NDA, UNBS	Fund availability; the national AMR/AMUC surveillance framework is implemented fast in fish and crop sub-sector
Activity 4.7.4.	Support integration of AMU/AMR into research agenda of NARS	Workplans of NARS including projects on AMU/AMR	Reports and/or publications of NARO, universities, MAAIF, NDA, UNBS;	Funding agencies prioritize AMR research in the three sub-sectors
Activity 4.7.5	Equip the national and regional reference laboratories for AMR analysis	Functional AMR analysis platforms in national reference labs for each sub-sector	Reports of NARO, universities, MAAIF, NDA, UNBS	Funding agencies prioritize AMR research in the three sub-sectors
Strategic Objective 5: Improve awareness creation and communication for infection prevention and control				
Intervention 5.1: Targeted communication—Use mass media for targeting periods of high risk of disease and pest spread, like at the onset of rains				
Activity 5.1.1	Awareness creation/inaugural event for the top management of MAAIF on importance AMU and AMR	An event/inaugural on AMU/AMR in agricultural sector	Proceedings of the event	Fund availability

Description		Measurable Indicators of Achievements/ Targets	Sources/Mean of Verification	Assumptions and Risks
Activity 5.1.2	Develop and disseminate IPC-related information that targets passengers, tourists, plant and animal breeders, and businesspersons at entry points	Communication materials related to IPC in different languages (French, English, Swahili) to target travelers at entry points	MAAIF reports, communication materials	Fund availability
Activity 5.1.3	Awareness creation targeting periods of high risk of disease and pest spread	Awareness campaigns targeting the rainy and dry seasons for specific diseases, reduced disease/pest incidence associated with the target period	Media company recordings, MAAIF reports, district reports	Fund availability
Activity 5.1.4.	Communication materials suitable to farmers, farm workers, and input suppliers	Farmer-friendly communication materials related to IPC in at least eight different local languages (Runyakitara, Luo, Swahili, Luganda, Itesot, "Karamajong," etc.) target farmers, number of IPC compliant farmers	Media company recordings, communication materials, MAAIF reports, district reports	Fund availability
<i>Intervention 5.2: Leverage the improving phone and internet connectivity to aid IPC communication through ICT</i>				
Activity 5.2.1	Load communication materials into ICT—portal already developed for effective surveillance	ICT—system with active IPC extension platform: IPC-related communication content	MAAIF—ICT portal, MAAIF reports	Fund availability
Activity 5.2.2	Use ICT systems for online training of extension staff	ICT—systems with active IPC extension platform: on-line training plans and modules; all staff trained in the five selected districts per AEZ	MAAIF—ICT portal, MAAIF training reports; on-line IPC-related course content	All staff have cell phones; phone connectivity continues to improve in the rural areas
Activity 5.2.3	Use ICT systems for showcasing star-performing farmers	ICT—systems with active IPC platform: showcasing champions and best	MAAIF—ICT portal, reports, district reports	Government and private sectors incentivize use of ICT; farmers' willingness to use ICT; farmers

Description		Measurable Indicators of Achievements/ Targets	Sources/Mean of Verification	Assumptions and Risks
	and best biosecurity practices	biosecurity practices, impact/adoption studies for biosecurity; deliberate promotions on MAAIF website and other linked platforms		will increasingly access the information available on ICT platform
Activity 5.2.4	Use ICT systems cataloguing certified suppliers of quality seeds, breeds, and agro-chemicals	e-catalogue of certified suppliers of quality seeds, breeds, and agro-chemicals	MAAIF–ICT platform	Fund availability
Activity 5.2.5	Use ICT systems for monitoring adoption and impact of implementing IPC practices	e-MLE system for monitoring adoption and impact of implementing IPC	MAAIF reports, district reports	All staff have cell phones; phone connectivity continues to improve in the rural areas
Intervention 5.3: Promotion of participatory approaches in extension—increasing inclusiveness and gender responsiveness				
Activity 5.3.1	Mobilize farmers into model groups and cooperative societies by parish/wards to trigger and harmonize peer-driven implementation of IPC	Functional farmer cooperatives/groups at sub-county level	District reports; MTIC reports	Effective collaboration between MAAIF and MTIC
Activity 5.3.2	Conduct field days, bazaars, farm clinics, and food festivals to enable farmers, input suppliers to showcase best IPC practices and quality inputs	One grassroots event in each region for IPC promotion among the farming communities (including women and youth) as well as related stakeholders	District reports, event proceedings	Fund availability
Strategic Objective 6: Foster multidisciplinary and multi-institutional collaborations to support One Health approach to IPC				
Intervention 6.1: Enhancing the functioning of existing networks				
Activity 6.1.1	Appoint focal persons of IPC framework from implementing agencies/departments to forge closer	One focal person for each MAAIF directorate and agency, university/college	MAAIF and institutional reports	

Description		Measurable Indicators of Achievements/ Targets	Sources/Mean of Verification	Assumptions and Risks
	relationship—one biosecurity			
Activity 6.1.2	Joint planning and review meetings among implementing agencies/ departments	Quarterly joint meetings	Minutes, MAAIF reports	Fund availability
Activity 6.1.3.	Liaise with relevant MDAs and private sector to ensure effective IPC service delivery to farming communities	MoUs between MAAIF and local government and other institutions	MoUs, MAAIF and other institutions' reports	Closer collaboration between MAAIF and local government
<i>Intervention 6.2: Institutional frameworks for effective implementation of Agricultural IPC</i>				
Activity 6.2.1	Establish the Agricultural IPC Technical Subcommittee—Steering Committee	Steering Committee, Agricultural IPC Technical Subcommittee, meetings—annual	MAAIF reports	MAAIF prioritizing AMR management and IPC implementation
Activity 6.2.2	National IPC Committee	Multidisciplinary, multi-stakeholder National IPC Committee, meetings	MAAIF reports	MAAIF prioritizing AMR management and IPC implementation
Activity 6.2.3	District IPC committees	Multidisciplinary, multi-stakeholder district IPC committees, meeting; five districts per AEZ, two meetings per district	MAAIF reports, local government reports	MAAIF and local governments prioritizing AMR management and IPC implementation
Activity 6.2.4	Mobilize resources to ensure effective implementation of the IPC plan with guidance from NAP-AMR Committee	Development grant proposals; at least one per year for any two sub-sectors	MDAs/NARS grants and research projects in the different sub-sectors	National Research Agenda integrates AMR mitigation strategies

Annex 2: Costed budget for IPC framework implementation for the agricultural sector

Strategic Interventions and Activities		Unit Cost	Qty	Amount Ugandan Shilling (UGX) ('000)			Total
				Year 1	Year 2	Year 3	
Strategic Objective 1: Improve infrastructural and human capacity for IPC							
<i>Intervention 1.1: Identify and harmonize utilization of the structures, capacity for a robust and sustainable plant and animal health and biosecurity system</i>							
Activity 1.1.1	Profile facilities with different institutions (room space, equipment and related functionality, staff skillsets, available technology, willingness to share use)	37,000	1	37,000	-	-	37,000
Activity 1.1.2	Harmonize and formalize facility-sharing framework for optimize synergy and sustainability in the implementation of IPC	4,500	4	18,000	-	-	18,000
Activity 1.1.3	Establish functional quarantine or holding areas at border posts for effective disease surveillance and management	120,000.00	5	120,000	240,000	240,000	600,000
<i>Intervention 1.2: Assign special activities, e.g., diagnostics and training, to institutions with the competence</i>							
Activity 1.2.1	Assess laboratories for high throughput diagnostic capacity, e.g., ELISA, PCR, VITEK (equipment and consumables)	5,940,000	1	5,940,000	-	-	5,940,000
Activity 1.2.2	Acquisition or development of rapid detection devices (pocket diagnostics tools) for quick field tests and border controls	1,000,000	15	-	9,000,000	6,000,000	15,000,000
		50,000	2000	25,000,000	50,000,000	25,000,000	100,000,000
Activity 1.2.3	Assess institutions with potential to train staff in IPC	10,800	1	10,800	-	-	10,800

Strategic Interventions and Activities		Unit Cost	Qty	Amount Ugandan Shilling (UGX) ('000)			Total
	Description			Year 1	Year 2	Year 3	
Activity 1.2.4	Mainstream IPC into curricula for education and training of various stakeholders; development of guidelines/manuals	720,000	3	-	1,440,000	720,000	2,160,000
<i>Intervention 1.3: Coordinate the establishment of training initiatives to equip staff with the appropriate skills and knowledge</i>							
Activity 1.3.1	Develop MoUs between MAAIF and institutions with potential to train staff in IPC	4,500	3	13,500	-	-	13,500
Activity 1.3.2	Conduct training-of-trainers course	30,000	3		60,000	30,000	90,000
Activity 1.3.3	Run short training courses for new staff and refresher courses for old staff, both public and private service providers	15,000	40		300,000	300,000	600,000
Activity 1.3.4	Advertise and run short training courses for input suppliers (by trained staff)	20,000	4		40,000	40,000	80,000
Activity 1.3.5	Advertise and run short training courses for farmers and farm workers (by trained staff)	3,000	500		750,000	750,000	1,500,000
<i>Intervention 1.4: Accreditation of the laboratories through regular audits to satisfy accreditation requirements</i>							
Activity 1.4.1	Identify relevant standards (e.g. ISO 15189:2007 Standards) and establish requirements for accreditation of labs	432,000	3	1,296,000	-	-	1,296,000
Activity 1.4.2	Conduct technical audits of the labs						-
Activity 1.4.3	Labs implement recommendations	900,000	3		900,000	1,800,000	2,700,000
Activity 1.4.4	Labs are fully accredited	36,000	3			108,000	108,000

Strategic Interventions and Activities		Unit Cost	Qty	Amount Ugandan Shilling (UGX) ('000)			Total
	Description			Year 1	Year 2	Year 3	
Activity 1.4.5	Develop a framework contract for provision of biomedical engineering services for lab equipment maintenance	162,000	3	162,000	162,000	162,000	486,000
Activity 1.4.6	Fill the HR capacity gaps	54000	554	-	14,958,000	14,958,000	29,916,000
Sub-total				32,597,300	77,850,000	50,108,000	160,555,300
Strategic Objective 2: Strengthen supportive policy framework for IPC							
<i>Intervention 2.1: Review key policies for plant and fish health</i>							
Activity 2.1.1	Reviewing and improving the fish policy framework	133,200	1	66,600	66,600	-	133,200
Activity 2.1.2	Update Plant Protection Act (2015)	97,200	1	48,600	48,600	-	97,200
<i>Intervention 2.2: Develop a policy or MoUs to strengthen effective IPC delivery</i>							
Activity 2.2.1	Formulate a policy to harmonize data sharing in support of effective IPC delivery	115,200	1	86,400	28,800	-	115,200
Activity 2.2.2	Institutionalize compensation for lost revenue by farmers due to IPC implementation	126,000	1	-	-	126,000	126,000
Activity 2.2.3	Institutionalize IPM to minimize use of antimicrobials in plant and animal health management	176,400	1	-	88,200	88,200	176,400
<i>Intervention 2.3: Decentralize SPS policy enforcement to districts, sub-counties, and communities</i>							
Activity 2.3.1	Restrict inter-district (regional) movement of plants and fish in target hotspots for diseases and pests	16,200	8	32,400	64,800	32,400	129,600
Activity 2.3.2	Mobilize farming communities to enforce SPS policy	20,880	5	20,880	41,760	41,760	104,400

Strategic Interventions and Activities		Unit Cost	Qty	Amount Ugandan Shilling (UGX) ('000)			Total
	Description			Year 1	Year 2	Year 3	
Activity 2.3.3	Formulate and pilot implementation of community by-laws for pest and disease control in target hotspot villages	67,680	5	67,680	135,360	135,360	338,400
Activity 2.3.4	Monitor and evaluate community-based inspection services delivery	12,600	8	12,600	37,800	63,000	113,400
Strategic Objective 3: Improve plant, livestock, and fish health through biosecurity at farm level							
<i>Intervention 3.1: Improve implementation of biosecurity practices at farm level</i>							
Activity 3.1.1	Train farmers on good agronomic, animal, and fish health practices	3,000	500	300,000	600,000	600,000	1,500,000
Activity 3.1.2	Facilitate farmers to develop biosecurity plans with recommended IPC practices	3,000	200	120,000	240,000	240,000	600,000
Activity 3.1.3	Participatory implementation of the farmers' biosecurity plans	500	4000		750,000	1,250,000	2,000,000
Activity 3.1.4	Arrange exposure visits with model IPC farms to scale up farm biosecurity	15,000	18	-	90,000	180,000	270,000
		15,000	90	-	450,000	900,000	1,350,000
Activity 3.1.5	Monitor farms on implementation of biosecurity management plans	12,000	9	-	36,000	72,000	108,000
Sub-total				420,000	2,166,000	3,242,000	5,828,000
Strategic Objective 4: Enhance surveillance and response to pest and disease epidemics							
<i>Intervention 4.1: Horizon scanning and PRA</i>							

Strategic Interventions and Activities		Unit Cost	Qty	Amount Ugandan Shilling (UGX) ('000)			Total
	Description			Year 1	Year 2	Year 3	
Activity 4.1.1	Develop and maintain an up-to-date pest and disease risk register	12,000	3	12,000	12,000	12,000	36,000
Activity 4.1.2	Determine the risk of disease: etiological and epidemiological data analysis	100,000	3	100,000	100,000	100,000	300,000
Activity 4.1.3	Establish the economic importance—likely trade routes, volumes and value of trade, effects on the people and country	180,000	2	-	180,000	180,000	360,000
Activity 4.1.4	Identify gaps in surveillance, contingency plans in place, likely response, needed capacity and expertise	18,000	3	18,000	18,000	18,000	54,000
<i>Intervention 4.2: Improve planning and record keeping for effective IPC implementation at farm level</i>							
Activity 4.2.1	Develop contingency plan templates for production practices with health implications	5,000	15	50,000	25,000	-	75,000
Activity 4.2.2	Develop health management plan templates	5,000	15	50,000	25,000	-	75,000
Activity 4.2.3	Adopt farm record-keeping templates	3,000	500	-	600,000	900,000	1,500,000
<i>Intervention 4.3: Streamlining pre-emptive infection control approaches</i>							
Activity 4.3.1	Simulate a control system before introduction of disease/pest outbreaks reported in neighboring AEZs or countries	30,000	Lumpsum	30,000	30,000	30,000	90,000
	Biosecurity inputs required for prevention of entry of the two diseases per sector mobilized	150,000	Lumpsum	50,000	50,000	50,000	150,000
	Human resource requirement for biosecurity practices mobilized	300	720	72,000	72,000	72,000	216,000

Strategic Interventions and Activities		Unit Cost	Qty	Amount Ugandan Shilling (UGX) ('000)			Total
	Description			Year 1	Year 2	Year 3	
	Mock implementation of biosecurity practices on existing similar pathogen for one disease per sub-sector	60,000	Lumpsum	20,000	20,000	20,000	60,000
Activity 4.3.2	One trip per sub-sector per year to benchmark control practices from neighboring countries	72,000	3	72,000	72,000	72,000	216,000
Activity 4.3.3	Collaboratively develop resistant varieties and breeds evaluated in countries with hotspots	825,000	Lumpsum	300,000	300,000	225,000	825,000
Intervention 4.4: Implement IPC practices on-farm							
Activity 4.4.1	Develop guidelines for IPC practices in the crop sub-sector (five priority crops)	648,000	Lumpsum	648,000	-	-	648,000
Activity 4.4.2	Review existing guidelines for IPC practices in livestock and fisheries sector	288,000	Lumpsum	288,000	-	-	288,000
Intervention 4.5: Decentralize and equip data capture structures with ICT- supported surveillance							
Activity 4.5.1	Liaise with CAOs and OPM to integrate surveillance data collection in the contracts and ToRs of sub-county production officers	14,400	1	14,400	-	-	14,400
Activity 4.5.2	Establish database of sub-county/parish production officers (names, phone contacts) and farmer leaders of cooperatives	18,000	1	18,000	-	-	18,000
Activity 4.5.3	Develop a data capture system including a functional central server: (a) An ICT-supported data-capture system linked to all POs in 4.5.2., streamlined to include IPC	28,000	9	252,000	-	-	252,000
	(b) Number of POs trained in data capture per AEZ in each of the sub-sectors	32,000	9	288,000	-	-	288,000

Strategic Interventions and Activities		Unit Cost	Qty	Amount Ugandan Shilling (UGX) ('000)			Total
	Description			Year 1	Year 2	Year 3	
	(c) Focal person to manage electronic platform appointed for each AEZ	3,000	9	27,000	-	-	27,000
Activity 4.5.4	Implement ICT data capture from the farming communities	100,000	3	300,000	-	-	300,000
Activity 4.5.5	Carry out data audits to improve quality of data, automatically generate reports	2,000	3	2,000	2,000	2,000	6,000
Activity 4.5.6	ICT staffing	108,000	9	324,000	324,000	324,000	972,000
Intervention 4.6: Streamlining generation of information and capture and reporting among MDAs, NARS, the private sector, and local government							
Activity 4.6.1	Develop processes for joint reporting mechanism in line with international regulatory bodies	54,000	1	54,000	-	-	54,000
Activity 4.6.2	Review and prioritize the processes for the joint surveillance reporting mechanisms	64,800	2	-	64,800	64,800	129,600
Activity 4.6.3	Establish a functional laboratory network	20,000	3	20,000	20,000	20,000	60,000
Activity 4.6.4	Registration of input suppliers in the four regions; To retrain input suppliers for regulation compliance and effective information capture and delivery	25,000	4	100,000	-	-	100,000
		55,000	9	55,000	220,000	220,000	495,000
Intervention 4.7: To ensure prudent use of drugs and chemicals and monitor AMR							
Activity 4.7.1	Train and encourage farmers to keep treatment records (by AEZ)	30,000	19	210,000	180,000	180,000	570,000
Activity 4.7.2	Undertake regular AMUC and pesticide-use data collection on farms in the nine AEZ for each sub-sector (five districts per AEZ)	72,000	27	648,000	648,000	648,000	1,944,000

Strategic Interventions and Activities		Unit Cost	Qty	Amount Ugandan Shilling (UGX) ('000)			Total
	Description			Year 1	Year 2	Year 3	
Activity 4.7.3	Regularly collect AMR samples from farms and submit them to the national reference laboratory (AEZ–target hotspots or enterprises with high chemical usage)	72,000	27	648,000	648,000	648,000	1,944,000
Activity 4.7.4	Support integration of AMU/AMR into research agenda of NARS	50,000	3	50,000	50,000	50,000	150,000
Activity 4.7.5	Equip the national and regional reference laboratories for AMR analysis	90,000	10	270,000	180,000	450,000	900,000
Sub-total				4,990,400	3,840,800	4,285,800	13,117,000
Strategic Objective 5: Improve awareness creation and communication for infection prevention and control							
<i>Intervention 5.1: Targeted communication—Use mass media for targeting periods of high risk of disease and pest spread, like at the onset of rains</i>							
Activity 5.1.1	Awareness creation/inaugural event for the implementing agencies at national level (top management of MAAIF, NARS, and OPM) on importance of IPC as well as AMU and AMR	200,000	1	200,000	-	-	200,000
	Awareness creation/inaugural event for the implementing agencies at regional/LGs level on importance of IPC as well as AMU and AMR	100,000	4	400,000			400,000
Activity 5.1.2	Develop and disseminate IPC-related information that targets passengers, tourists, plant and animal breeders, and businesspersons at entry points	108,000	1.5	108,000	27,000	27,000	162,000

Strategic Interventions and Activities		Unit Cost	Qty	Amount Ugandan Shilling (UGX) ('000)			Total
	Description			Year 1	Year 2	Year 3	
Activity 5.1.3	Awareness creation targeting periods of high risk of disease and pest spread; two campaigns for each of the two seasons per year	108,000	12	432,000	432,000	432,000	1,296,000
Activity 5.1.4	Development of farmer-friendly communication materials related to IPC in at least eight different local languages (Runyakitara, Luo, Swahili, Luganda, Itesot, "Karamajong," etc.) target farmers, regional based radio and television talk shows	126,000	1	126,000			
	Campaigns—deployment of communication materials in nine sub regions basing on languages of communications	126,000	9		1,134,000	1,134,000	2,268,000
Intervention 5.2: Leverage the improving phone and internet connectivity to aid IPC communication through ICT							
Activity 5.2.1	Load communication materials into ICT—portal already developed for effective surveillance	10,800	3	10,800	10,800	10,800	32,400
Activity 5.2.2	Use ICT systems for online training of extension staff—continuously	25,200	3	25,200	25,200	25,200	75,600
Activity 5.2.3	Use ICT systems for showcasing star-performing farmers and best biosecurity practices	7,200	3	7,200	7,200	7,200	21,600
Activity 5.2.4	Use ICT systems cataloguing certified suppliers of quality seeds, breeds, and agro-chemicals	5,400	3	5,400	5,400	5,400	16,200
Activity 5.2.5	Use ICT systems for monitoring adoption and impact of implementing IPC practices	18,000	3	18,000	18,000	18,000	54,000
Intervention 5.3: Promotion of participatory approaches in extension—increasing inclusiveness and gender responsiveness							
Activity 5.3.1	Mobilize farmers into model groups and cooperative societies by parish/ward in collaboration with the MTIC to	64,800	18	388,800	388,800	388,800	1,166,400

Strategic Interventions and Activities		Unit Cost	Qty	Amount Ugandan Shilling (UGX) ('000)			Total
	Description			Year 1	Year 2	Year 3	
	trigger and harmonize peer-driven implementation of IPC, per AEZ						
Activity 5.3.2	Conduct field days, bazaars, farm clinics, and food festivals to enable farmers, input suppliers to showcase best IPC practices and quality inputs	70,000	12	280,000	280,000	280,000	840,000
Sub-total				2,001,400	2,328,400	2,328,400	6,532,200
Strategic Objective 6: Foster multidisciplinary and multi-institutional collaborations to support One Health approach to IPC							
<i>Intervention 6.1: Enhancing the functioning of existing networks</i>							
Activity 6.1.1	Appoint focal persons of IPC framework from implementing agencies/departments to forge closer relationship—one biosecurity	2,000	1	2,000	-	-	2,000
Activity 6.1.2	Joint planning and review meetings between implementing agencies/departments	14,400	6	28,800	28,800	28,800	86,400
Activity 6.1.3.	Liaise with relevant MDAs and private sector to ensure effective IPC service delivery to farming communities	2,000	3	2,000	2,000	2,000	6,000
<i>Intervention 6.2: Institutional frameworks for effective implementation of agricultural IPC</i>							
Activity 6.2.1	Establish the Agricultural IPC Technical Subcommittee—Steering Committee	12,000	3	12,000	12,000	12,000	36,000
Activity 6.2.2	National IPC Committee	20,000	3	20,000	20,000	20,000	60,000
Activity 6.2.3	District IPC Committees	3,000	90	270,000	270,000	270,000	810,000

Strategic Interventions and Activities		Unit Cost	Qty	Amount Ugandan Shilling (UGX) ('000)			Total
	Description			Year 1	Year 2	Year 3	
Activity 6.2.4	Mobilize resources to ensure effective implementation of the IPC plan with guidance from NAP-AMR Committee	5,000	9	10,000	15,000	20,000	45,000
Sub-total				344,800	347,800	352,800	1,045,400
Grand-total				20,344,530	43,522,460	30,401,860	94,205,850
Grand-total (USD)				5,651	12,090	8,445	26,168

Appendixes

Appendix 1: SWOT analysis for the IPC plan for the agricultural sector in Uganda

	Strengths	Weaknesses	Opportunities	Threats
Capacity for IPC implementation	<ol style="list-style-type: none"> 1. Presence of skilled human resource, e.g., zonal inspectors, border inspectors, researchers in universities and NARS; district production officers 2. Existence of laboratory facilities, e.g., MAAIF, NARO, universities, private labs 3. Existence of some accredited MoH and research labs 4. On-going efforts in selected regional veterinary laboratories 5. Agriculture training programs with IPC-related content 6. On-going training of agro-input suppliers 	<ol style="list-style-type: none"> 1. Staff numbers not enough 2. Limited skilled personnel 3. Unreliable supply of laboratory consumables 4. Poor maintenance of lab equipment 5. Ministry employment structure has few slots for laboratory personnel 6. Labs are not well equipped and not accredited 7. Labs working in silos 8. IPC not well mainstreamed into curricula of relevant training programs and other training initiatives 9. Input supply actors not skilled to sufficiently deliver IPC, though they frequently interface with farmers 10. District task forces not vibrant in IPC issues 11. Refuge influxes where people come with their animals without any screening for their health status 	<ol style="list-style-type: none"> 1. Collaboration with international organizations such as CABI, FAO 2. Collaboration with governmental agencies such as OPM and local government, and organizations, including with NGOs 3. MAAIF top management support 4. Existing AMR/AMCU implementation structure 5. Guidelines for lab accreditation exist, which should be followed to drive the process 	<ol style="list-style-type: none"> 1. Dependency on donor or development partners' funding; if their priorities change, the capacity building recommendations will not be implemented 2. No local lab accreditation body that is internationally recognized!

	Strengths	Weaknesses	Opportunities	Threats
Regulatory frameworks, laws and policies	1. Laws/Acts and policies relevant to IPC implementation exist	1. Policies at the national level not sufficiently implemented 2. Outdated laws—not aligned with IPC implementation 3. Lack of policy to harmonize data sharing among departments and agencies 4. Lack of policy for compensation for lost revenue by farmers in IPC implementation 5. Assumption that scientists have capacity to avail information arising out of their research findings to inform policy	1. There are partners willing to support the review process	1. Takes long to review the policy—sometimes over five years
	2. Written guidelines for IPC implementation in livestock and in fishponds exist	1. Guidelines supporting IPC implementation in fish does not consider cages, tanks, and aquaponics 2. No guidelines for IPC implementation in crop production	1. Know-how for development of guidelines exist	
Surveillance	1. Existence of a dedicated import regulation and quarantine unit to conduct PRAs and develop update pest registers and inventories	1. Pest registers/inventories not sufficiently updated to support IPC and animal and human pathogen guidance documents	1. Templates for PRA, pest registers and inventories available with international organizations involved in IPC implementation	1. Fast rate of appearance of emerging pests and disease pathogens 2. Natural calamities such as floods, drought, and wars
	2. Surveillance implemented by many stakeholders	2. Uncoordinated pest surveillance activities 3. Low prioritization of pre-emptive activities in MAAIF development agenda and national budgetary plans do not cater for these activities	2. Improved technology to support pest and disease surveillance	
	3. Most agriculture staff at subcounty with smart phones	4. National surveillance system coverage still low	4. Increasing internet and phone connectivity	
	4. Success stories of pre-emptive approaches used to develop maize varieties resistant to maize lethal necrosis in Kenya with the International Maize and	5. Use of pre-emptive infection control approaches rarely adopted within the agricultural sector 6. Dependency on donor support	5. Willing international collaborators	

	Strengths	Weaknesses	Opportunities	Threats
	Wheat Improvement Center			
	5. AMR and AMUC surveillance methods available with human health and at some extent in the livestock sector	7. Inadequate AMR and AMUC surveillance activities	6. Global one-health initiatives	
Response to pest and disease outbreaks	<ol style="list-style-type: none"> Working IPC practices available Current research efforts into alternatives to antibiotic use; isolation of vaccine candidates and development of vaccines from local microbial strains 	<ol style="list-style-type: none"> Lack of on-farm biosecurity plans appropriate to the local farmers Poor mindset by most farmers Mainly basic research with no tangible outputs Lack of or inadequate vaccines for some immunizable diseases Privatization of veterinary services without empowering farmers to demand for quality services 	<ol style="list-style-type: none"> A few farmers with successful biosecurity regimes Existing advocacy groups can be utilized for public engagement to enlighten farmers Ministry of Science and Technology Innovations embracing pathogen-economy and supporting commercialization of research products 	<ol style="list-style-type: none"> Vaccines non-existent for some diseases such as ASF International recognition of locally produced disease control agents and acceptability of agricultural exports
	3. Release of resistant varieties by NARO, NAGRIC, and partners increasing	6. Use of improved disease resistant seed/breed by many farmers still low	4. Various stakeholders support or promote use of improved seed/breeds	
	4. Some farmer cooperatives, e.g., dairy and coffee farmer cooperatives, exist	7. No peer-driven participatory approaches for deployment of IPC and biosecurity practices	5. Government agenda supportive of developing the farmer cooperative movement	
	5. Legal regimes for regulation of supply system of seeds and chemicals	8. A lot of counterfeit agricultural chemicals and seeds on the market	6. Growing efforts to streamline input supply systems, e.g., licensing of seed companies with NARO; certification of poultry and fish breeders as well as importers	
Communication and extension	1. Information about implementable IPC practices available	<ol style="list-style-type: none"> Messages not tailored to farmers' needs Cost-benefit of particular IPC practices of interest to farmers not available Lack of or unimplemented extension education plan under 	1. Increasing FM radio coverage in the country	

	Strengths	Weaknesses	Opportunities	Threats
		DAES to extract data generated by scientists for delivery to farmers		
	2. Some awareness campaigns have been successful, e.g., Locust control, Army Fowl Worm control	4. Awareness campaigns not well targeted		
	3. Some successful experience with participatory approaches for deployment of IPC, e.g., in flower export, BXW control; pig farmers surviving ASF outbreaks	5. Limited peer-driven participatory approaches for deployment of IPC and biosecurity practices	2. Global drive to support participatory extension approaches	
	4. Some efforts of using ICT to improve communication, e.g., Grameen Foundation	6. ICT efforts to coordinated enough to support extension service delivery	3. Increasing internet and phone connectivity	
	5. Upcoming insurance packages covering agriculture production	7. Risk management not popularized among farmers	4. Insurance increasing coverage	
Coordinated partnerships	1. Existing MAAIF departments and agencies	1. No mechanisms for report sharing among agencies to support IPC response 2. Decentralization and local government policies affect synergy necessary for disease control practices 3. Not appreciating that disease prevention and control is a national, not regional, issue	1. Re-rationalization of agencies by government may streamline reporting	
	2. Successful control of pests and disease aided by technical/steering committees, e.g., MLND, CBSD, Avian Influenza	1. Technical/steering committees for management of outbreaks are ad hoc	1. Recognition of effective collaboration in upcoming action plans related to IPC implement	

Appendix 2: List of contributors

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