

Peste des petits ruminants (PPR) in
Uganda Assessment of animal health
systems and coordination
mechanisms

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Assessment of animal health systems and coordination mechanisms

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We express our gratitude to the 15 participants including district veterinary officers, members of the National PPR Control and Eradication Committee, farmers and key stakeholders' organizations that were consulted during the study that resulted in this report.

Preface

Uganda has approximately 20 million goats and sheep significantly contributing to the livelihoods, survival and welfare of many communities. Peste des petits ruminants (PPR), caused by a morbillivirus, is one of the most important diseases affecting goat and sheep health and production in Uganda and eastern Africa countries. The first outbreak in Uganda was recorded in 2007 within Karamoja districts and the disease has since spread countrywide. Its control is affected by a variety of constraints, including:

- Poor disease identification, surveillance and reporting systems, especially in remote areas;
- Lack of enough vaccines, vaccination strategy and distribution systems
- Unregulated animal movements
- Wide range of host reservoirs, including wildlife
- Inadequate policy instruments and poor coordination mechanisms at local, regional and international levels.

This study will generate data to inform strategy for the promotion of positive behaviour concerning PPR control and provide an enabling environment for communities to initiate and sustain positive behaviour on PPR control and surveillance practices. PPR is on the list of diseases notifiable to the World Organisation for Animal Health (OIE). According to the Terrestrial Animal Health Code, member countries, including Uganda, are obliged to report cases and outbreaks to the OIE. Consequently, member countries developed the five-year PPR Global Eradication Program (PPR GEP) with the aim of working with partners to strengthen implementation models and to reactivate and build on the partnerships forged by the successful Global Rinderpest Eradication Program (GREP). The Global Strategy for Control and Eradication of PPR (2015) guides on the processes and procedures to ensure disease freedom by 2030. Each country developed a National PPR Control Strategy to harmonize interventions among different players, which is progressively assessed by the PPR monitoring and assessment tool (PMAT). The path towards a progressive stepwise approach for the prevention and control of PPR in Uganda started in 2015 following the drafting of the National Strategy (endorsed in August 2020) and formation of a National Steering Committee. A partnership and investment conference held in Brussels, Belgium, in September 2018 called for the political will and the inclusion of different partners in control efforts, but this is still far from reality.

Until today, the Agricultural sector in Uganda faces major obstacles to streamline the implementation of key PPR strategic and tactical control measures. This study will inform the strategy for the promotion of positive behaviour in relation to PPR control. Animal health service delivery system in Uganda is decentralized but still predominantly public sector driven with variable coordination, reporting and control mechanisms.

This study established that for Uganda to achieve its targets for PPR eradication and control by 2030, there is need to fast track the dissemination of the National PPR control and eradication strategy, strengthen the national PPR coordination office and garner the political will and resources to control the disease. The country is desirous to setup the required animal health delivery systems, but multiple animal disease outbreaks in small ruminants and other livestock overwhelm the system, interventions coming long after the incursions and not achieving sustainable benefits.

Abbreviations and acronyms

ASSP	Agricultural Sector Strategic Plan
AU	African Union
AU-IBAR	African Union–Inter-African Bureau for Animal Resources
BMZ	Federal Ministry for Economic Cooperation and Development
BSE	Bovine spongiform encephalopathy
BUILD	Boosting Uganda's Investment in Livestock Development
CAADP	Comprehensive Africa Agriculture Development Program
CAH	Commissioner Animal Health
CAHW	Community animal health worker
CBBPs	Community–based breeding programs
CBPP	Contagious bovine pleuropneumonia
CCHF	Crimean-Congo hemorrhagic fever
CCPP	Contagious caprine pleuropneumonia
CDC	Centres for Disease Control
CEC	Control and Eradication Committee
CNDPF	Comprehensive National Development Planning and Framework
COCTU	Coordinating Office for Control of Trypanosomiasis in Uganda
CDOUGA	Cotton Development Organization
COVAB	Makerere University College of Veterinary Medicine, Animal Resources and Biosecurity
CRS	Catholic Relief Services
CSO	Civil Society Organization

CTPH	Conservation Through Public Health
CVO	Chief Veterinary Officer
DANIDA	Danish International Development Agency
DDA	Dairy Development Authority
DIVA	Differentiation of Infected from Vaccinated
DLGPs	District Local Government Development Plans
DLGs	District Local Governments
DVO	District Veterinary Officer
EAC	East African Community
ECF	East Coast fever
ELISA	Enzyme Linked Immunosorbent Assay
EMA-i	Empress-i Event Mobile Application
EU	European Union
EUFMD	European Union Commission for the control of FMD
FAO	Food and Agriculture Organization of the United Nations
FIP	Framework Implementation Plan
FMD	Foot-and-mouth disease
GALVmed	Global Alliance for Livestock Veterinary Medicines
GCES	PPR Global Control and Eradication Strategy
GDP	Gross domestic product
GF-TADs	Global Framework for progressive control of Transboundary Animal Diseases
GREP	Global Rinderpest Eradication Program
IGAD	Intergovernmental Authority on Development
IGAD	Intergovernmental Authority on Development
ILRI	International Livestock Research Institute
IP	Innovation platform
KCCA	Kampala City Council Authority

KVNP	Kidepo Valley National Park
LG	Local Government
LGCs	Local Government Councils
LiDeSA	Livestock Development Strategy for Africa
LLG	Lower Local Governments
LMIC	Low- and middle-income country
LMNP	Lake Mburo National Park
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MCI	M.C.I. Santé Animale (Multi Chemical Industry)
MDG's	Millennium Development Goals
MFNP	Murchison Falls National Park
MoH	Ministry of Health
NAADS	National Agricultural Advisory Services
NADDEC	National Animal Disease Diagnostics and Epidemiology Centre
NAGRC&DB	National Animal Genetic Resources Centre and Data Bank
NALIRRI	National Livestock Resources Research Institute
NARO	National Agricultural Research Organization
NDA	National Drug Authority
NDP	National Development Plan
NEPAD	New Partnership for Africa Development
NGO	Non-governmental organization
NPA	National Planning Authority
NRM	National Resistance Movement
OIE	World Organisation for Animal Health
PACE	Pan African Program for Control of Epizootics
PARC	Pan African Rinderpest Campaign
PCR	Polymerase Chain Reaction

PEAP	Poverty Eradication Action Plan
PIMS	Public Investment Management System
PMAT	PPR Progressive Monitoring and Assessment Tool
PPR	Peste des petits ruminants
PPR-GEP	PPR Global Eradication Program
PPRV	Pest des petits ruminants virus
PVS	Performance of veterinary services
PZDs	Priority Zoonotic Diseases
QENP	Queen Elizabeth National Park
QMS	Quality Management System
RT-PCR	Real Time Polymerase Chain Reaction
RVF	Rift Valley fever
SDG	Sustainable Development Goal
SET	Surveillance Evaluation Tool
SIDA	Swedish International Development Cooperation Agency
SOP	Standard Operating Procedure
SOP	Standard Operating Procedure
STREP	Situational Reports
TADs	Transboundary Animal Diseases
TCP	Technical Cooperation Project
TOR	Terms of Reference
UBTEB	Uganda Business and Technical Examinations Board
UCDA	Uganda Coffee Development Authority
UGX	Uganda shillings
UKAID	United Kingdom AID
UNAHN	Uganda National Animal Health Network
USAID	United States Agency for International Development

UVA	Uganda Veterinary Association
UVB	Uganda Veterinary Board
UVPPA	Uganda Veterinary Paraprofessionals Association
UWA	Uganda Wildlife Authority
VACNADA	Vaccines for control of neglected animal diseases in Africa
VSF-G	Vétérinaires Sans Frontières, Germany

Executive summary

Uganda reported the first outbreak of peste des petits ruminants (PPR), also known as goat plague, in 2007 within the Karamoja region, a pastoralist area in northern Uganda bordering Kenya. Since then, the disease has spread to the rest of the country, hence raising questions on the control measures. It is highly contagious, mortality and morbidity rates averaging 80% and 90%, respectively, in native goat and sheep populations. Uganda joined the rest of the world during the FAO and OIE international conference to agree on the PPR Global Control and Eradication Strategy (GCES), Abidjan (31 March to 2 April 2015), aiming at PPR being the next disease to eradicate by 2030. This builds on implementation models and partnerships forged by the successful Global Rinderpest Eradication Program (GREP).

Uganda developed the PPR National Control and Eradication Strategy (September 2015) to harmonize interventions among different players and facilitate progress measurement using the PPR monitoring and assessment tool (PMAT). The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) constituted the National PPR Control Committee and Focal Point in March 2017.

This consultancy aimed at gathering and synthesizing information on the animal health service delivery system and coordination mechanisms in Uganda to inform livestock development planning options for surveillance, response and policy reforms and specifically emphasize PPR control in line with the Global Eradication and Control Strategy (GCES). This assessment report is a product of mixed approaches including a desk review of literature, animal disease data, PMAT self-assessment questionnaire and documents, supplemented by stakeholder consultations and analysis such as key informant interviews and legal review.

All the 15 participants (100%) consulted in this study, including district veterinary officers, some members of the National PPR Control and Eradication Committee, farmers and key stakeholder organizations, revealed that PPR is a priority problem. Six out of 15 participants (40%) indicated that it was not feasible for Uganda to eradicate PPR by 2030 as per GCES. PMAT self-assessment of national veterinary services indicated that out of 34 outcome indicators, Uganda achieved 2.9% fully, 38.2% partly, 47.1% not yet and 11.8% not applicable. There is a declining trend in passive animal disease reporting from 60% in 2011 to 27.6% in 2020, attributed to limited central budget support and fewer donor-supported projects to enable technocrats to collect information and effectively report on animal diseases. There is a positive trend in setting up 43 public veterinary laboratories throughout the country at different ratings:

- Three—very high—can perform referral diagnostic services using a combination of standard diagnostic techniques
- One—high/has high potential to become a referral laboratory
- Nine—moderate/can perform several diagnostic techniques with a good level of proficiency
- Eight—low/can perform basic laboratory tests, sample processing and storage but exhibit limited scale of operation and
- Twenty-two—very low/laboratory space allocated but lack most of the requirements to perform services.

However, it is only the National Animal Disease Diagnostics and Epidemiology Centre (NADDEC) that can test for PPR. Thirty out of 43 laboratories (70%) recently recruited laboratory technologists, indicating a general increase in staffing levels. Two emerging laboratories are farmer supported through the Uganda Meat Producers Cooperative Union (UMPCU). The country has over 393 veterinarians and 1,132 paraveterinarians within the public animal health services. The government has developed guidelines for continuous professional development training for veterinarians and paraprofessionals. Under the National Development Plan III, the government has emphasized the need for public–private partnerships in service delivery as a way of increasing efficiency and equity of service delivery. There are no clear institutional mechanisms of full participation of private sector animal health service providers in the control of PPR or other transboundary animal diseases. Non-governmental organizations and other development agencies supported the training and equipping of Community Animal Health Workers (CAHWs) only in the Karamoja region with the resultant increase in PPR reporting using mobile phone animal disease technology of EMA-i (2016–2020) compared to other regions. However, the Uganda Veterinary Board does not recognize CAHWs as competent animal health service providers apart from special situations like insecurity or hard-to-reach areas.

This study underscores the need for the public sector to provide opportunities for the private sector to thrive and drive the economy. The priority of a vaccination program is to prevent the disease rather than vaccinate following outbreaks. The current approach is termed 'political vaccination' given the need to respond with some few doses of vaccines whenever outbreaks occur. This often comes long after the outbreak, given the lengthy fund requisition and procurement approval processes that last over 8 weeks. Farmers and other key stakeholders must be empowered to participate in deriving priorities of the sector. The effective control program for PPR or other priority diseases is dependent on key stakeholder participation and involvement, including gender considerations, at national and subnational levels. Apparently, the national PPR committee is neither empowered nor influential. The public is not yet aware of GCES hence no political will to generate the necessary resources. There is a need to fast-track dissemination of the National PPR Control and Eradication Strategy to professionals, farmers or other stakeholders as well as development of a cabinet memo, policy paper and general guidelines required for control and eradication of PPR by 2030. This will be achieved through harmonization of activities regionally and integration with other sectors like wildlife while linking with markets to ensure competitiveness and profitability. The Animal Diseases Act No. 26 (amendment 2006), needs to be updated to take care of the requirements for effective chain of command in line with OIE requirements, resource requirements and the level of effectiveness to control and eradicate PPR disease and others.

Introduction

1.1 Background

Livestock contribution to the real gross domestic product (GDP) in Uganda was expected to increase from 13% in 2018/2019 to 14% in 2024/2025 (NDP III 2020) pre-COVID 19 era. This is in line with Uganda's vision 2040 to transform Uganda into a modern and prosperous country in 30 years (NPA 2013) and the pursuit of sustainable development goals (SDGs) as a universal call to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030 (UNDP 2015). Livestock is an important component in nutrition, food security, income generation, agriculture production, soil fertilization, pastoral and smallholder livelihoods and in the alleviation of hunger and poverty. In subsistence livestock production systems and their associated value chains, millions of people, especially women and their families, depend on small ruminants to generate nutrition and revenue for their daily life (FAO 2009; FAO/OIE 2015).

Uganda has approximately 20.6 million goats and sheep (Table 1) (MAAIF 2020); the population of goats is almost four times higher than that of sheep. Small ruminants are increasingly becoming more popular for boosting incomes in rural households. They can easily be sold to generate quick income to meet basic needs and are hence termed cash accounts. Goats and sheep require less space for grazing and are less prone to parasites and pathogens compared to cattle.

Table 1. Livestock population estimates for Uganda

Year/livestock type	2018
Cattle	14,572,000
Goats	16,048,000
Sheep	4,584,000
Pigs	4,245,000
Chicken/poultry	48,901,000

Note: Poultry figures include chicken, ducks, turkey, geese, Guinea fowl and other domestic birds.

Source: MAAIF and Uganda Bureau of Statistics (2020).

The government has emphasized improved small ruminant production through a number of projects and programs, including:

- National agricultural advisory services
- Agricultural extension grant
- MAAIF goat export breeding and production project in Sembabule
- Routine MAAIF programs

To this extent, goat meat is considered superior and thus expensive; 1 kg costing >USD 4, compared to pork USD 3.5 and beef USD 3 in different parts of the country. This has attracted government agencies, private sector, NGOs and

CSOs to setup projects to promote goat farming based on affirmative action (targeting especially the women and youth), restocking programs and to some extent increased animal movements, hence contributing to disease spread. MAAIF developed the goat export breeding and production project consolidated on successes of the strategic investments program (2003-2007) and to pilot investment proposals under the meat master plan (1998). Table 2 shows the projections of meat framework implementation plan 2014–2020. Approximately 46,035 t of goat meat are expected from goats by the end of 2020.

Table 2. Meat framework implementation plan five year targets (MAAIF 2015)

Commodity/year (t)	2014	2015/16	2016/17	2017/18	2018/19	2019/20
Beef	202,929	211,046	219,488	228,268	237,398	246,894
Goat meat	37,838	39,352	40,926	42,563	44,265	46,036
Pork	22,138	23,024	23,944	24,902	25,898	26,934
Chicken eggs	71,402	74,258	77,228	80,318	83,530	86,871
Chicken meat	46,313	48,166	50,092	52,096	54,180	56,347

The Framework Implementation Plan for Meat (Meat FIP) has prioritized beef, goat meat/mutton, pork, chicken meat and eggs, among others (Table 2). Implementation of the Meat FIP aimed at ensuring rational allocation of government resources towards the strategic/priority commodities listed on top of government support to agriculture technology agribusiness and advisory services. MAAIF is mandated to create an enabling environment for the development of the meat industry by formulating effective laws, regulations and policies that can sufficiently and sustainably steer the industry towards the national goal of accelerated economic growth.

Small ruminants are a priority enterprise to provide small-scale farmers with a clear opportunity for improving income in Uganda. Such enterprises can contribute significantly to reduce poverty through meat, offtake and goat products like milk, skins and manure. Goat farming improves the nutritional and food security status. Multiple goat grazing systems exist in Uganda depending on several factors including culture, tradition, land size and the number of goats (NAADS 2005). Common grazing systems include:

- Semi-intensive
- Extensive grazing/browsing
- Tethering
- Zero grazing

Most farmers practice mixed farming with many considerations including breeds, production systems, housing, diseases, management practices, waste management, meat processing and marketing of goats and goat products. Zero grazing of goats is not common but picking up in some urban and peri-urban areas like Masaka, Mbale, Kampala, Mukono and Wakiso. Extensive production systems are common within the pastoral and agropastoral communities like Karamoja, Sembabule, Nakaseke, Nakasongola, Kyankwanzi, Kiruhura and Mbarara. Tethering system is widespread in the country and limited to households with few goats or sheep. Indigenous breeds are more common where there is limited input for improved livestock production.

Impact of infectious diseases of small ruminants can severely affect and disrupt community livelihoods and regional and international trade in live animals and their products, causing significant financial constraints. In low- and middle-income countries (LMICs), these diseases undermine access to quality nutritional products, food security and economic development, at the level of village smallholders and the entire production chain.

PPR is one of the major epidemics that significantly threatened small ruminant population in Uganda following the first outbreak in 2007 (MAAIF 2020) by causing deaths of about 500 thousand animals (worth USD 15 million) and loss of milk worth (2.1 million litres). It is a widespread, virulent and devastating disease of small ruminants. It has a significant economic impact on food security and livelihoods. PPR is therefore considered one of the most damaging of all animal diseases in Africa, the Middle East and Asia and it is also one of the priority diseases indicated in the FAO-OIE Global Framework for the Progressive Control of Transboundary Animal Diseases (GF-TADs1) Global level 5 Year Action Plan (2013-2017).

Its control is affected by a variety of constraints (MAAIF 2020) that include:

- a. Poor disease identification, surveillance and reporting systems, especially in remote areas;
- b. Lack of vaccines and among the different genotypes developed, absence of an efficient thermostable vaccine;
- c. Unregulated animal movement;
- d. Wide range of host reservoirs, including wildlife;
- e. Inadequate responsive policy instruments and coordination mechanisms at local, regional and international levels and
- f. Changing epidemiological circumstances, animal and livestock husbandry and trading patterns.

Consequently, different countries developed the five year PPR Global Eradication Program (PPR GEP) to work with partners to strengthen implementation models and to reactivate and build on the partnerships forged by the successful Global Rinderpest Eradication Program (GREP). The global strategy for control and eradication of PPR (2015) guides on the processes and procedures to ensure disease freedom by 2030. Each country developed the PPR national strategy to harmonize interventions among different players, which is progressively assessed by the PPR monitoring and assessment tool (PMAT). The national strategy for the control and eradication of PPR in Uganda was drafted in 2015 and a national PPR control committee formed. A partnership and investment conference held in Brussels, Belgium in September 2018 paved the way for political will and the inclusion of different partners in control efforts. However, it remains a challenge to affect the implementation of key activities for tactical and strategic control measures in each country.

This study will generate data to inform strategy for the promotion of positive behaviour concerning PPR control and provide an enabling environment for communities to initiate and sustain PPR surveillance and control practices.

1.2 BUILD program

Vétérinaires Sans Frontières Germany (VSF-G), through a consortium of several partners led by the International Livestock Research Institute (ILRI), is implementing the Boosting Uganda's Investment in Livestock Development (BUILD) project. One of BUILD project components focuses on the control of PPR, which aims to improve the national and community surveillance capacity to enable the provision of effective and efficient animal health services for enhanced PPR control in Uganda. To achieve this, the project has adopted to undertake a desk review of the animal health systems and coordination mechanisms to (i) assess adequacy, effectiveness and efficiency of the national animal health services (ii) identify capacity gaps of stakeholders towards coordinating, harmonizing, supporting and integrating roles and (iii) develop a policy brief (good practice paper) to enhance government efforts towards controlling PPR.

The desk review will be an addition to the PVS evaluations and the PVS gap analysis, as well as the outcomes of other assessments compiled under the baseline information collation on livestock and animal health policies, coordination and their analyses.

1.3 Problem statement

Despite Uganda's pledge to commit to the Abidjan conference declaration (April 2015) in joining the rest of the world to work towards PPR freedom by 2030, progress to date (September 2020) has stagnated at Stage 2 (control Stage). It is characterized by increasing outbreaks in districts from seven Karamoja districts in 2007 to over 50 districts (ILRI/MAAIF 2019).

The national animal disease control system faces various challenges that include the weak national surveillance system, weak preparedness and response systems, poor stakeholder involvement and inadequate legal framework, which includes archaic policies and laws (ILRI/MAAIF 2019). Progression from control Stage (2) to eradication Stage (3) cannot be achieved without assessment of the animal health system and coordination mechanisms, including financial, technical and political requirements (OIE, PVS gap analysis report 2011). Much as MAAIF has setup its vision as a competitive, profitable and sustainable agricultural sector, the biggest bottleneck is to adjust its budgetary requirements, approximately threefold (ASPER 2019), to achieve the recommended target of 10% allocation as per recommendations of the Maputo declaration in 2014 (AU 2014).

1.4 Objectives

The overall objective of the consultancy is to make and provide for, an improved and efficient animal disease control and coordination system, including policy and a regulatory framework.

The specific objectives of the consultancy are to:

- i. gather information concerning the animal health system and service delivery in Uganda and synthesize this information into data that will inform livestock development planning
- ii. propose strategies for strengthening animal health service delivery and coordination mechanisms for improved PPR disease control and farmer engagements
- iii. develop a framework for PPR surveillance and response considering the information gathered from the study and propose it to the national PPR control and eradication committee or senior management at MAAIF
- iv. present the economic benefits of investment in PPR control at institutional and farmer levels
- v. develop and present a policy brief on PPR control considering the findings of the study to both the project team and national stakeholders. The policy brief will gather the necessary impetus for improved animal health and coordination mechanisms.

2 Literature review on peste des petits ruminants(PPR), animal health systems and coordination mechanisms in Uganda

2.1 General information of PPR

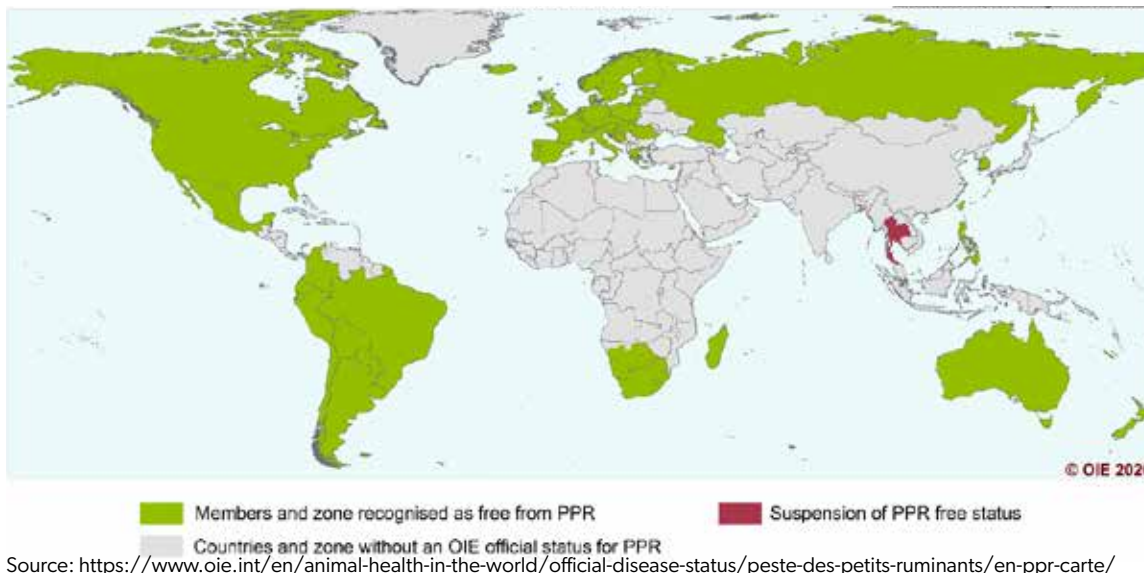
Peste des petits ruminants (PPR), also known as goat and sheep plague, is a highly contagious viral disease that primarily affects goats and sheep with significant social and economic impacts as it can kill between 30 and 70% of infected animals. It was first identified in Côte d'Ivoire in Africa in 1942 (Gargadennec and Lalanne 1942) but has since spread to over 70 countries in Africa, the Middle and near East, Central and East Asia (Banyard et al. 2010; Niedbalski 2020; OIE 2020) Figure 1. PPR was initially confused as a variant of rinderpest virus, but later studies established that it was genetically and antigenically distinct (Gibbs et al. 1979; Diallo et al. 1989a). It is caused by a virus belonging to the genus *Morbillivirus*. This is the same genus encompassing rinderpest, canine distemper, phocid distemper and measles viruses. Affected animals often present with high fever and depression, along with eye and nose discharges. Animals cannot eat, as the mouth gets covered with painful erosive lesions and the animals suffer from severe pneumonia and diarrhoea, often leading to death. It is predominantly a disease of goats and sheep (Baron 2011) but cattle undergo subclinical reactions while viraemia has been noticed in pigs and virus detected in camels (Roger et al. 2001; Khalafalla et al. 2010; Kwiatek et al. 2011). There is increasing evidence that PPR affects wild artiodactyls, including buffaloes and antelopes in East Africa, hence should be considered for serosurveillance for control programs in livestock (Aguilar et al. 2020). Goats are more affected than sheep and young animals are predisposed.

The World Organisation for Animal Health (Office International des Epizooties, OIE) recognizes the disease as notifiable due to associated high mortality and morbidity rates and the speed with which it spreads. The virus is secreted in tears, nasal discharge, cough secretions and faecal matter. It can be shed in animals before clinical signs appear, hence easily spread through movements of infected animals. It is characterized by sudden onset of fever, nasal discharges and diarrhoea in sheep and goats. PPR spread at an alarming rate and now threatens over 80% of the world's 2.1 billion sheep and goats population in more than 70 countries in Africa, Asia, Europe and the Middle East. The average cost of a goat is USD 54, yet the cost of a dose of PPR vaccine is about USD 0.25 per dose administered to one animal, including human resources and transport. It is estimated that once a goat or sheep is vaccinated, immunity can last up to two years which is the average lifespan of small ruminants.

The problem of PPR became significant in the 1990s, following increased surveillance activities of the global rinderpest eradication program (GREP) and wider spread of the disease to previously PPR-free countries. The presence of infection restricts international trade in livestock and livestock products from infected countries. It is usually associated with severe ongoing

losses where conditions exist that support epidemic spread among susceptible breeds, such as the incursions of infection into 'marginal' zones for the persistence of infection such as humid zones of West Africa (Cabi reports 2020). Under such conditions, there is a high social impact of the disease, since small ruminants often represent a readily convertible currency in smallholder agriculture. Control by vaccination is merited in many endemic countries and the benefit-to-cost ratio is usually high. An attenuated strain (PPR NIG/75/1) of PPRV for use as a vaccine was developed in the late 1980s (Diallo et al. 1989b) and is in wide use. Following the global eradication of rinderpest in 2011, PPR remained one of the most important diseases with severe social and economic impacts warranting immediate international attention (Baron et al. 2011).

Figure 1. Global status of peste des petits ruminants (May 2020).



Following the successful eradication of rinderpest, the OIE and the Food and Agriculture Organization of the United Nations (FAO), targeted PPR for eradication by 2030 (FAO–OIE 2015). The OIE and the FAO developed the global control and eradication strategy of PPR under the global framework for the progressive control of transboundary animal diseases (GF-TADs). The similarity between PPRV and RPV allows for the lessons learned from rinderpest eradication to be used in the PPR eradication strategy. Eradicating PPR would have a profound impact on the lives of some 300 million poor rural households around the globe, many of which are subsistence farmers, landless villagers and pastoralists (Albina et al. 2013; Kumar et al. 2014; Baron et al. 2017; Njeumi et al. 2020).

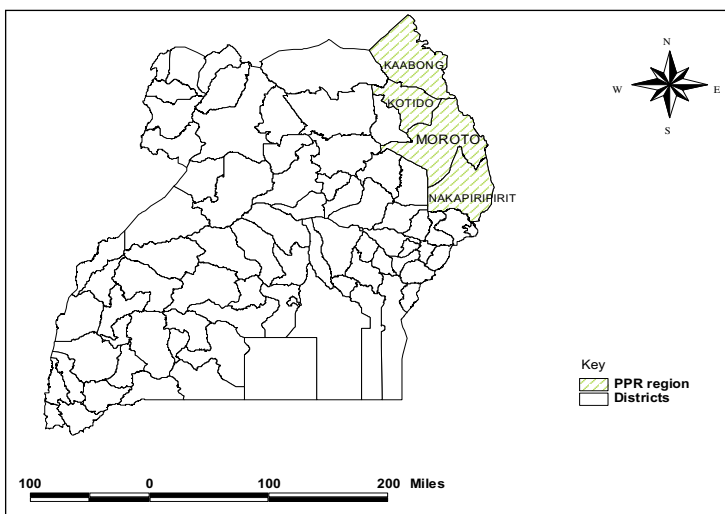
The benefits of eradicating PPR far outweigh the costs. Financing the initial 5 year program was costed at USD 996 million, a fraction of the annual global losses caused by PPR, estimated at USD 1.4 to 2.1 billion PPR adversely affects the livelihoods, food security and employment of communities worldwide, particularly women and youth. The disease worsens the poverty situation and malnutrition, leading to pastoral and farmer migrations in search of alternative livelihoods. The required investment will contribute to achieving sustainable development goals on zero hunger (SDG 2), health and wellbeing (SDG 3), reducing poverty (SDG 1) and inequality (SDG 10) and contributing to national growth and employment (SDG 8).

2.2 The history and spread of PPR in Uganda (2007–2020)

The first outbreak of PPR was confirmed in the Karamoja region in July 2007 (Mulindwa et al. 2011). The districts that were initially affected included Moroto, Kotido, Kaabong, Nakapiripirit and Amudat. The 2007–2008 outbreaks were responsible for the death of 0.5 million small ruminants whose estimated value was USD 15 million and a drop in milk production of 2.1 million litres in small ruminants (MAAIF 2020). The disease disrupted food consumption, food

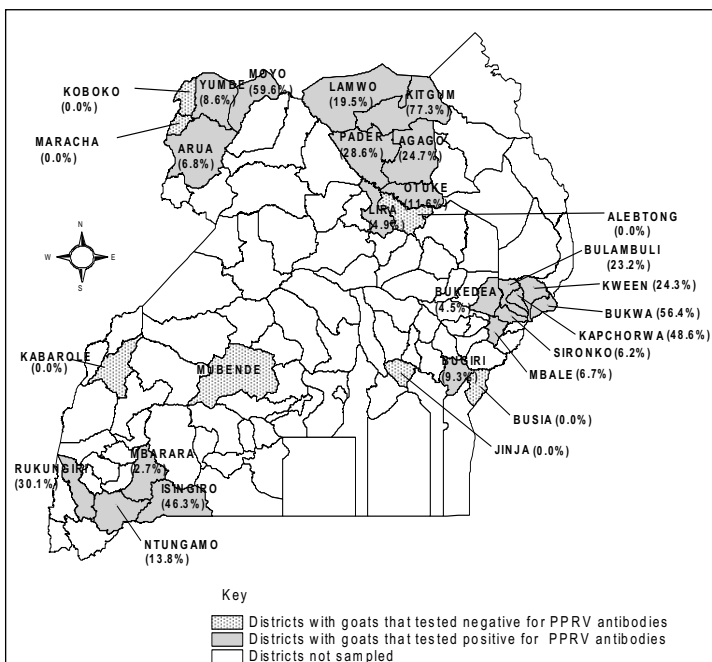
availability and income sources and in the process affected food security, particularly of the poor and marginalized sections of the society. Similar outbreaks were shortly reported in Kenya and later in Tanzania thereby alluding that crossborder animal movements were key in disease transmission across eastern Africa. The period 2007–2009 was characterized by regional and national efforts to stimulate coordinated response to understand and prioritize PPR control. National laboratories and epidemiology centres acquired the necessary capacities to test and confirm outbreaks locally, with support from international reference centres. Selective interventions were carried out in the eastern Africa region, including sensitization, vaccination and capacity building. The initial efforts were useful in reducing the spread and impact of the disease but not eliminating it. As a result, the disease spread much further beyond the original foci, covering the whole of eastern Africa including Uganda, Kenya, Tanzania, Sudan, Rwanda, Ethiopia and Burundi by 2010. A serosurveillance study in 2011 revealed that PPR had spread beyond the original foci in Karamoja region to the rest of the country much as no outbreaks were reported (Figures 2, 3 and 4).

Figure 2. Map of Uganda showing the relative distribution of PPR in Karamoja in 2007.



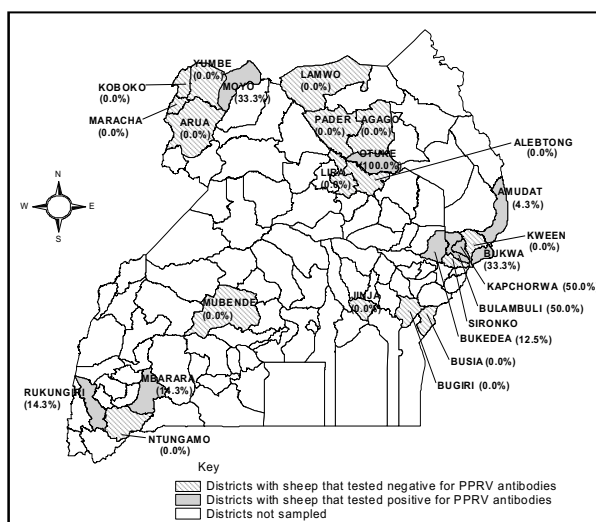
Source: NADDEC (2010).

Figure 3. Map of Uganda showing the relative distribution of antibodies against PPR virus in goats in 2011.



Source: NADDEC (2011).

Figure 4. Map of Uganda showing the relative distribution of antibodies against PPR virus in sheep in 2011.



Source: NADDEC (2011).

2.3 The factors responsible for PPR spread in Uganda

Several studies have been undertaken on PPR epidemiology and control in Uganda (Ruhweza et al. 2010; Luka and Mwiine 2011; Mulindwa et al. 2011; Sande et al. 2011; Luka et al. 2012; Nakayima et al. 2018). Some studies have also elucidated challenges for PPR control in Uganda (Abebe 2016; Pogoreltaseva 2019; ILRI/MAAIF 2020).

Predisposition to PPR in Uganda is due to multiple factors that include:

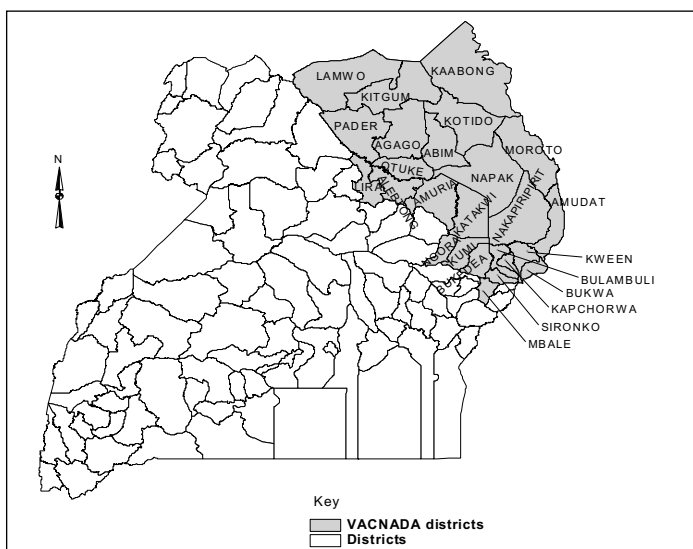
- Weak veterinary service governance system due to decentralization, porous borders, inadequate stakeholder involvement, political influence, internal institutional weaknesses, ineffective policies, insecurity in some areas, fragmented or inconsistent service delivery, poor coordination between the districts and the centre, outdated laws, weak laws and poor enforcement.
- Infrastructural shortcomings due to inaccessible roads, lack of quarantine infrastructure, poor livestock identification and traceability systems.
- Inadequate technical capacity including poor disease identification, delayed reporting of the disease, understaffing (field, laboratory and epidemiology services), weak response systems and the multiplicity of susceptible hosts, including wildlife.
- Social upheavals including the negative cultural influences on the treatment and control of animal diseases, ignorance of disease control standards, risky animal husbandry practices, crossborder trade, livestock rustling, migrations, transhumance and pastoralism.
- Economic shortcomings including lack of resources to buy laboratory testing kits and reagents, inadequate facilitation for surveillance, inadequate amount of vaccines (to prevent or halt the spread of the disease), a vicious cycle of poverty due to lack of profitable markets for animals and animal products, insufficient resources to buy cold chain materials and failure to commercialize the small ruminants based on the short 'life cycle' of small ruminants (sold for cash or slaughtered for cultural reasons and food).

Some of these challenges were highlighted during rinderpest control and lessons pointed out for effective PPR control and eradication (Roeder et al. 2013; Nour 2020). Challenges are more pronounced in geographically remote and more complex pastoral and agropastoral areas like Karamoja (Abebe 2016). The situation is worsened by effects of decentralization and to some extent privatization of veterinary services leading to a dysfunctional single chain of

command. A number of factors contributed to PPR spread within Karamoja (Luka et al. 2011; Mulindwa et al. 2011); outside Karamoja to northern and eastern districts (Ruhweza et al. 2010; Sande et al. 2011; Luka et al. 2012) and later to the southwestern region (Nakayima et al. 2018). Molecular characterization of the PPR virus from Karamoja (2007–2008) revealed PPR virus lineages 1, 2 and 4 indicating a heterogeneous source and a possibility of multiple crossborder introductions into Uganda. This even further augments findings of Wamwayi et al. (1995) who detected PPRV antibodies in Karamoja and Kenya in 1995 much earlier before the 2007 devastating PPR outbreak in Uganda that decimated over 500 thousand goats and sheep (MAAIF reports 2009). Much as vaccinations against PPR virus kept the spread of the disease in check. There were challenges of getting the required 80% seroconversion and herd protection (Luka and Mwiine 2011), Figure 5. The 2011 extensive vaccinations in 25 districts in the north, northeast and eastern regions of Uganda achieved a total of 1,831,514 animals (30.4% coverage) while employing vaccines from Bio-industries Centre (JOVAC, Jordan) and Veterinary Serum and Vaccine Research Institute (VSVRIM Egypt), Appendix 13. However, this targeted vaccination of key hotspots in different districts (MAAIF/AU-IBAR 2012). Spiegel and Havas (2018) underscored several factors responsible for increased spread of PPR in the East African region, including the refugee movements, drought, trade, pastoral movements, civil unrest and increased animal movements. Recent studies on PPR in Karamoja revealed that PPR is still a common problem, important and widely distributed with specific hotspots, virus pools and crossborder links (Nkamwesiga et al. 2019). The role of wildlife in the epidemiology of PPR in Uganda is not yet studied. However, preliminary analysis of historical samples revealed that buffaloes in different national parks had some levels of exposure (NADDEC, unpublished): Lake Mburo National Park (3/29), Queen Elizabeth National Park (QENP 1/22), Murchison Falls National Park (3MFNP 9/77) and Kidepo Valley National Park (KVNP 0/6). Impala in LMNP (0/22) tested negative. There is no evidence that as much as PPRV has been isolated in wild ungulates; they can pose a significant risk as reservoirs for PPRV for domestic animals (Munir 2013). Recent studies have indeed demonstrated widespread antibodies in wild animals within the Albertine Rift and Nile basin in East Africa (Aguilar et al. 2020). It has therefore been emphasized that PPR eradication and conservation efforts should enhance collaboration and coordination, including surveillance activities among wild animals and integration within the national PPR control and eradication strategy (Fine et al. 2020).

In 2011, antibodies against PPR virus were detected in different regions (eastern, southwestern, west Nile and northern Uganda), far beyond the Karamoja region where the disease was initially confirmed in 2007. The government of Uganda extended vaccination to cover 23 districts surrounding Karamoja in 2011 in northern, northeastern and eastern parts of the country (see Figure 3).

Figure 5. PPR vaccination districts in 2011.



Source: NADDEC (2011).

Since 2007, the government maintained PPR vaccinations in different parts of the country dependent on the availability of vaccines, vaccination logistics and disease situation. Significant challenges exist with PPR vaccination logistical

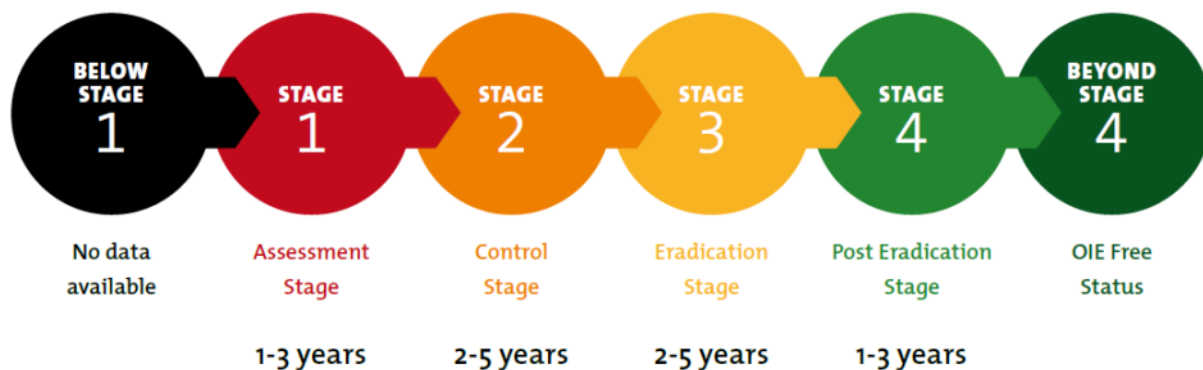
arrangements at the district level, in addition to the complexities of procurement in Uganda (MAAIF/AU-IBAR 2012; Acosta et al. 2019).

2.4 PPR global control and eradication strategy (GCES)

A global strategy to control and eradicate PPR was endorsed by countries during Abidjan (Côte d'Ivoire) international meeting hosted by FAO and OIE in April 2015, with a vision to have a PPR free world by 2030.

Global efforts were further heightened following the establishment of a joint PPR secretariat in March 2016 (FAO and OIE 2016). In October 2017, a high level meeting between the European Union Commissioner for International Cooperation and Development and the Director Generals of FAO and OIE agreed to launch the global campaign to eradicate PPR. The three organizations agreed to organize a PPR global conference in Brussels with the aim of rallying stakeholders to PPR Global Eradication Program (PPR-GEP 2018–2030). Schematic diagram showing the progressive stepwise approach for PPR control and eradication by 2030 (Figure 6).

Figure 6. The progressive stepwise approach for the prevention and control of PPR.



Source: OIE and FAO (2015).

Implementation is ongoing and different countries have developed national control and eradication strategy based on their needs, capacities and aspirations. PPR-GEP was reviewed in 2019. The second five year PPR GEP is expected to be launched by 2022. All countries are expected to stop vaccinations by 2028 paving the way for global assessment by 2030.

2.5 National PPR control and eradication strategy

In September 2015, Uganda developed its national PPR control and eradication strategy in line with FAO and OIE global PPR control and eradication strategy as per resolutions of international conference in Abidjan (31 March–2 April 2015), the IGAD regional PPR progressive control and eradication strategy and the AU-IBAR pan-African PPR control strategy. PPR is the next disease to eradicate after rinderpest, which was eradicated in 2011. A stepwise approach detailed the necessities, including surveillance, diagnostics, staffing, vaccination and infrastructure, to contribute to PPR control and eradication by 2030. Farmers and other stakeholders in the private sector must be involved at all times. Other important small ruminant diseases like CCPP, goat and sheep pox, helminthosis, tick-borne diseases and Rift Valley fever must be an integral part of the control processes. Consideration to understanding the role of wild animals in the epidemiology of

PPR thereby facilitating one health approach and multi-disciplinary workforce. For all this to work effectively, functional veterinary services must be in place.

Table 3. Uganda's roadmap for stepwise approach for control of PPR

Years	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Uganda	1	1	2	2	2	3	3	3	4	4	4	free	free	Free

Self-assessment placed the country at Stage 2 of GCES (FAO and OIE 2014), Table 3. In August 2020, the MAAIF endorsed the national PPR control and eradication strategy (MAAIF 2020). The strategy initially targeted managing the disease by mass vaccinations within the northeastern part of the country classified as the hotspot. It laid out measures for continuous active and passive surveillance to identify new outbreaks and hotspots formulate and implement SOP for outbreak investigation, PPR responsive mechanisms (MAAIF 2020). Laboratory confirmation of outbreaks was to benefit from the use of rapid field tests to identify positives coupled with laboratory confirmation using ELISA and PCR techniques. Preventing outbreaks in low-risk areas rely on the application of stringent animal movement controls and ring vaccinations. Regional approaches, including cross-border collaboration and harmonization of PPR disease control activities at the unique ecosystem level. The national PPR control and eradication strategy will require 177,811,172,000 Uganda shilling (UGX) or USD 46,792,414 (USD 1 = UGX 3,679.2617 at 25 May 2022). Approximately 25 million doses of PPR vaccines are required over a 5 year period.

2.6 Guiding principles for the national PPR control and eradication strategy 2020/21–2024/25

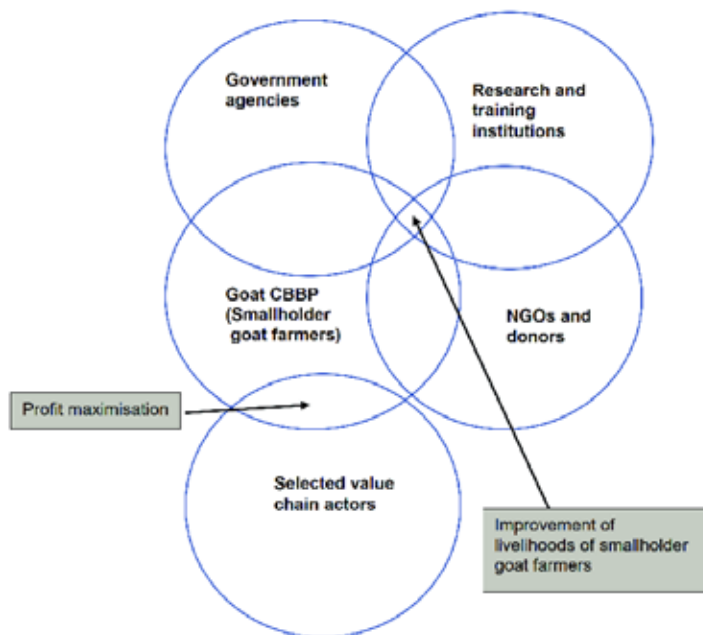
The national strategy on the control of PPR will operate according to the following underlying principles:

- a. Address the disease at source—to control the introduction of the disease to areas that are PPR free and those that are potentially at risk.
- b. Risk-based approach—to consider all risk factors separately and collectively and devise mitigation measures.
- c. Effective stakeholders' involvement—to ensure full participation and engagement of all stakeholders.
- d. Effective communication—aimed at obtaining a strong and effective involvement of farmers and other actors.
- e. Effective service delivery system—to reach out to all producers, particularly for vaccination.
- f. Improving animal health—to protect animal and human life.
- g. Shared costs—according to the situation along with the control and eradication pathway.
- h. Mutual partnerships—governance and implementation to build on existing structures and to forge and strengthen new partnerships with development partners, civil society, the private sector and the private veterinarians.
- i. Use of incentives—to encourage livestock keeper participation and incentives shall include elements such as the combination of PPR vaccinations with control activities against other small ruminant diseases of economic importance to animal keepers.
- j. Farmer-centred—most activities will be carried out at the individual farmer level.

2.7 Lessons on PPR control in other parts of Africa

Successful livestock production thrives on the ability of different actors to work together by pooling financial resources and technical expertise for the establishment and sustainability of community-based breeding programs (CBBPs) see Figure 7. Synergies are required across government agencies, research and training institutions, selected value chain actors, NGOs, donors and smallholder farmers. This leads to maximized profit and improved livelihoods of smallholder farmers. Successful animal disease control program must involve the different stakeholders in planning, implementation and evaluation of activities at all levels.

Figure 7. Interplay of state and non-state actors to optimize benefits along the goat production value chains in Malawi and Uganda.

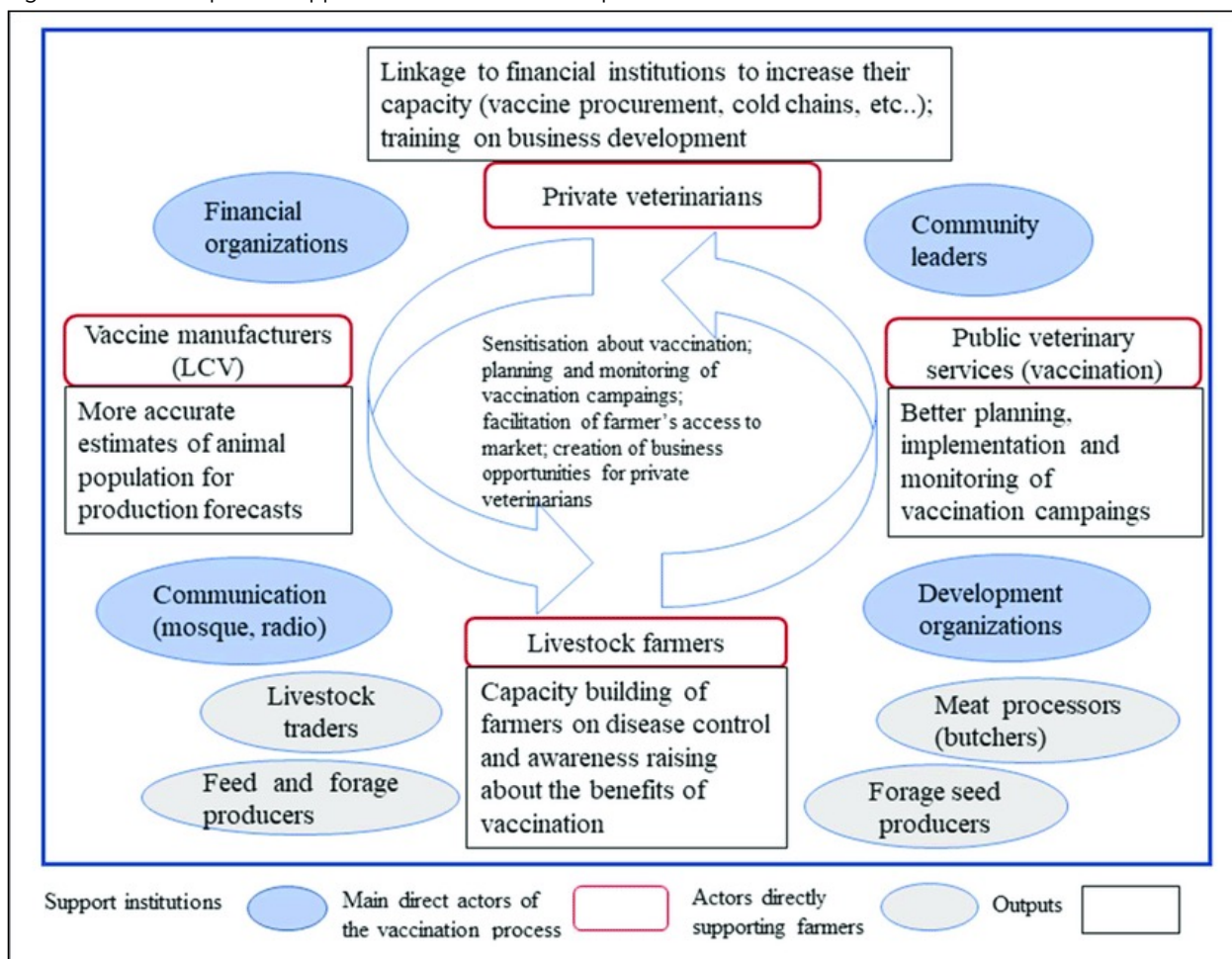


Source: Kaumbata et al. (2020).

An effective PPR control program must identify the optimal linkages across various stakeholders within the small ruminant value chains. It was demonstrated in Mali that vaccination innovation platforms (IPs) successfully led to increased farmer participation and the demand to scale-out vaccination coverage (Dione et al. 2019) (see Figure 8). A private business model supported by a solid policy framework is required if successful PPR control by vaccination approach is to be achieved. Even when the vaccine is free, some farmers may be hesitant to present their animals for vaccination. The urge to vaccinate animals increases with emergencies during outbreaks. However, this is neither effective nor sustainable as it increases disease proliferation and spread to wider areas.

An IP is a space for learning and change (Schut et al. 2017). It is a group of individuals representing organizations with different backgrounds and interests: farmers, traders, food processors, researchers, government officials and other stakeholders. Farmers, agribusiness and service providers must adapt and change continuously to match the market dynamics changing environments, political situations and variable resources. Innovation is about putting new ideas to a certain location into practice and in this way, changing the situation of those living in this area for better (Posthumus and Wongtschowski 2014).

Figure 8. Innovation platform approach to facilitate vaccine uptake in Mali.



Source: Dione et al. (2019).

2.8 Animal health service delivery in Karamoja

Karamoja region presents unique opportunities for livestock production in Uganda because it has the highest number of cattle, goats and sheep compared to other regions (National Livestock Census 2008). It is the only region in the country where conventional livestock production systems do not necessarily apply due to being predominantly pastoral, semi-arid, culturally diverse and often characterized by cross-border conflicts (Schloeder 2018). In the Karamoja subregion, the public and private sector have been unable to provide adequate veterinary services. The private sector developed mostly in Kampala and other large cities, while remote areas, such as Karamoja, were not seen as profitable. The private sector associated these areas with lack of infrastructure, high mobility production systems, limited local cash economy and heavy reliance by pastoralists on traditional means of disease control and prevention. Furthermore, Karamoja's socio-political instability has made it less attractive to the private sector players. This gap has been partially filled by Community Animal Health Workers (CAHWs); the first were trained in the early 1990s by the government. Some projects supported CAHWs with starter kits of drugs (e.g. training conducted by FAO) and with the establishment of drug shops owned and managed by CAHW associations (FAO 2013). The formal veterinary profession in Uganda rejected and criticized CAHWs and NGOs, notwithstanding their key role in remote and impoverished areas. Through the years, dialogue has eased this friction, but CAHWs are still not recognized in the Veterinary Surgeon's Act and the National Drug Authority Statute implies that CAHWs are tolerated but not legal (Abebe 2016).

According to Bugeza et al. (2017), livestock keepers are satisfied with CAHWs' performance and they find that they are the most readily accessible animal health services providers, even if there is room for improvement. Nonetheless, Abebe (2016) found that there are concerns regarding CAHWs' lack of motivation and technical competence. The latter probably stemming from a mismatch between their literacy level and the type of training provided. Similar findings were evidenced by a PPR site assessment conducted between 2017 and 2018 (Coffin-Schmitt 2018).

The main players involved in animal health and veterinary service delivery in Karamoja are:

- the government
- district veterinary officers (DVOs) at the district/local government level
- the MAAIF, the National Drug Administration (NDA) and research and academic institutions such as the National Agricultural Research Organization and the College of Veterinary Medicine, Animal Resources and Biosecurity at Makerere University at the central level
- non-governmental organizations (NGOs), around 14 working with livestock and
- private sector actors, including private veterinary pharmacies, owned or supervised by veterinarians, drug shops owned and managed by animal health assistants or technicians, CAHW associations or cooperatives (there are around 31), CAHWs, traditional healers; and 'backpack' or mobile drug traders who sell drugs in livestock markets), including the livestock owners themselves. Much as the Uganda Veterinary Association (UVA), Uganda Veterinary Board (UVB), National Drug Authority (NDA) and the Ministry of Agriculture Animal Industry and Fisheries (MAAIF), have a role to play in ensuring control and implementation of veterinary services in Karamoja, a lot remains to be desired due to lack of or thinness of staff on the ground.

There are few government veterinary staff in Karamoja and most of the trainings happening in the subregion involve CAHWs (Abebe 2016). According to FAO, there are 8 veterinary doctors and 7 paraveterinarians employed by the government and FAO has trained 600 CAHW's (FAO 2013). Overall, all service providers and livestock keepers are not satisfied with the volume and quality of vaccines and medicine available in Karamoja. The most important barriers drug shops face are low financial capital and high transport costs (Abebe 2016). Majority of animal disease reporting at the community level is undertaken by farmers, CAHWs, extension officers (certificate or diploma) and other players. Most veterinarians report from subcounty level to districts. However, due to increased use of mobile reporting systems, including direct calls, farmers may report directly to districts or MAAIF, but this may cause misreporting and compromise to the single chain of command for National Veterinary Services.

It is difficult to assess the veterinary service coverage in Karamoja due to lack of consolidated data. Vaccinations are largely applied by government veterinarians in response to outbreaks, instead of being part of preventive measures (Abebe 2016). Therefore, important transboundary diseases, such as FMD, CBPP and PPR, even if subjected to vaccination campaigns, still have a significant negative impact in the area. A study undertaken at four sites in the subregion aiming at evaluating vaccine coverage using changes in disease impact as a proxy, evidenced the following diseases as having high impacts, thus, implying a gap in the effectiveness of veterinary services: in cattle, trypanosomiasis, tick infestation and its related diseases, especially babesiosis, anaplasmosis and ECF; in small ruminants, PPR, tick infestation and its related diseases, especially heartwater and sarcoptic mange. The results are consistent with community perceptions (Abebe 2016). This also applies to findings of a collaborative project by the University of Florida, Tufts University, Makerere University and Mercy Corps in Karamoja following evaluation of approaches for controlling PPR using a thermostable vaccine and to build capacity for vaccine distribution (Feed the Future Innovation Lab for Livestock Systems 2019). By using participatory epidemiology and serological and molecular tests, the project identified disease transmission hotspots to develop a targeted vaccine strategy. These spots are in two areas, one in the north and one in the south, linked with the transmission in Kenya. These represent separate systems and should be targeted ad hoc, including their transboundary nature (Nkamwesiga et al. 2019). Vaccine supply chain analysis is one important issue to consider if vaccination programs are to be effective and efficient (Acosta et al. 2019). Thermostable PPR vaccines are being considered for trial in the

Karamoja region but logistical support to transport vaccines remains a big challenge and most facilities are not considered safe and appropriate. It may be necessary to integrate cold chain management and supply chain management between human and animal supply chain.

2.9 Review on national policy and legislation on animal health

Review of policy and legislative framework relating to animal health systems and coordination mechanisms in Uganda (Appendix 14)

Review of policy

The National Policy for the Delivery of Veterinary Services (2001) governs the delivery of veterinary services in Uganda. Under the policy, the central veterinary authority is responsible for funding the management of only four diseases which include FMD, rinderpest, Rabies and CBPP. However, the policy does not provide for PPR among the diseases of immediate concern. Therefore, the government should review the policy to include PPR among the diseases of immediate concern.

Review of legislation

This part shall review principle legislation that includes the Animals Diseases Act, Cap. 38, the Veterinary Surgeons Act, Cap. 227, the Cattle Traders Act, Cap. 43 and the Cattle Grazing Act Cap. 42 and the Local Government Act, Cap. 243.

Proposed bills in place shall also be reviewed to appreciate the efforts being made to address the current problems in the control of animal health and the bills include the Veterinary Practitioners Bill and the Animal Identification and Traceability Bill.

The review shall also cover the regulation of laboratories which should be provided for by new legislation.

The Animals Diseases Act, Cap. 38

The Act provides for the control, management, separation, notification of farmers, treatment, slaughter, burial, powers of inspection, powers of entry and declaration of diseased areas.

Findings and analysis

- a. The Animal Diseases Act, Cap. 38 is outdated and does not reflect the internationally recognized practices on the promotion of animal health.
- b. The interpretation of the word 'animal', in the Act, is limited.
- c. The Animal Diseases Act, Cap. 38 does not mention the personnel that carry out laboratory tests.
- d. The law refers only to blood tests and yet there are other tissues and tests that can be taken.
- e. The law is quiet about diagnostic services (personnel, organizational structure and physical infrastructure).
- f. The Act only caters for food animal diseases leaving out non-food animal diseases and zoonotic diseases.
- g. Various local governments have made Ordinances concerning animal health. These Ordinances vary greatly, yet the presupposed subject of regulation is the same.
- h. The law is silent on areas that include; collection, transmission and utilization of epidemiological data relevant to listed diseases; an early warning system; emergency measures; measures for prevention, control and eradication;

surveillance measures; measures for official disease surveillance; specific rules for listed diseases; prevention and control of animal diseases and quarantine of animals.

- i. The lack of access to emergency funding to control outbreaks of animal diseases.

Recommendations and conclusions

- a. This Animal Diseases Act, Cap. 38 should be amended to incorporate the following proposals:
 - i. review the interpretation of the word 'animal', in the Act and harmonize it with the OIE provisions;
 - ii. create a linkage and coordination mechanism with local authorities under the Department of Production and Marketing, who should be required to submit monthly or quarterly reports to the Ministry of Agriculture, Animal Industry and Fisheries.
- b. The Act should-
 - i. provide for collection, transmission and utilization of epidemiological data relevant to listed diseases;
 - ii. provide an early warning system;
 - iii. provide for emergency measures;
 - iv. provide measures for prevention, control and eradication to include stringent control measures especially at borders which may consist of livestock holding grounds, communal livestock crushes, creation of buffer zones and livestock markets;
 - v. provide surveillance measures;
 - vi. provide for measures for official disease surveillance;
 - vii. under prevention, specific rules for each listed disease should be provided for by regulation;
 - viii. provide for the prevention and control of animal diseases;
 - ix. linkages with local governments and other ministries, departments and agencies;
 - x. outline the powers of veterinary professionals to include powers to authorize entry and conditions for obtaining access to professional and private premises and vehicles;
 - xi. powers and procedures of veterinary professionals to gain access to documents, take samples, retain animals and goods pending a decision on final disposition;
 - xii. obligations of veterinary professionals, e.g. to respect confidentiality;
 - xiii. penalties for persons who use wrong application methods;
 - xiv. list the administrative and enforcement actions which may include;
 - xv. seizure of animals, products and food of animal origin;
 - xvi. suspension of one or more activities of an inspected establishment;
 - xvii. the temporary, partial or complete closure of inspected establishments;
 - xviii. suspension or withdrawal of authorizations or approvals; and

- xix. right of appeal against any action or a decision of a veterinary officer.
- c. The Act should also provide for emergency funds for animal disease control.
- d. The Act should provide for improved stakeholder involvement in animal disease surveillance, including adherence to national surveillance plans, the establishment of a national surveillance steering committee, national surveillance technical committee and allocation of specific funds for laboratory and epidemiology functions.
- e. The Act should establish public–private partnerships in animal health programs to promote efficiency.
- f. The Act should establish innovation platforms to cater for technology transfer and wider stakeholder involvement including farmers, community leaders, vaccine manufacturers, vaccinators, researchers, livestock traders and other input and service providers.

The Veterinary Surgeons Act, Cap. 227

Veterinary professionals are regulated by the Veterinary Surgeons Act, Cap 227, which governs the practice of veterinary surgery, excluding veterinary paraprofessionals. This Act is not in conformity with the East African Community and OIE standards on the practice of veterinary practice.

There is, however, a proposed Veterinary Practitioners Bill 2018, which seeks to regulate the veterinary profession and practice of veterinary paraprofessionals and veterinarians. Its purpose is to ensure effective and efficient veterinary service delivery towards improving animal production and productivity. It will repeal the Veterinary Surgeons Act 1958 when it comes into force and will replace the Veterinary Board with the Veterinary Council.

The Act establishes the Uganda Veterinary Board, provides for the registration of practitioners of veterinary surgery and clinical practice and matters related to the practice of veterinary surgery.

There is, however, a proposed Veterinary Practitioners Bill 2018, which seeks to regulate the veterinary profession and practice of veterinary paraprofessionals and veterinarians. Its purpose is to ensure effective and efficient veterinary service delivery towards improving animal production and productivity. It will repeal the Veterinary Surgeons Act 1958 when it comes into force and will replace the Veterinary Board with the Veterinary Council.

Findings and analysis

The Act only regulates the practice of veterinary surgery and excludes veterinary paraprofessionals. The significant gaps in the Act relate to the lack of a suitable definition for veterinary medicine, the focus on private practitioners with little mention of veterinarians in public service and the lack of reference to veterinary paraprofessionals, their training, credentialing, responsibilities and supervision. Additionally, the Act is not in conformity with the EAC and OIE requirements on the practice of veterinary medicine.

Recommendations and conclusion

The law is limited in scope. It only covers aspects of veterinary surgery and not veterinary paraprofessionals.

The Veterinary Practitioners Bill 2018 (Draft) seeks to regulate the profession and practice of veterinary paraprofessionals and veterinarians to ensure effective and efficient veterinary service delivery towards improving animal production and productivity. It shall repeal the Veterinary Surgeons Act 1958 when it comes into force.

The Bill should provide for continuance education requirements for veterinary professionals, the establishment of a veterinary service council to replace the veterinary board and minimum standards for training institutions to ensure that the desired quality of professionals is produced. The proposed regulation 27 (g) related to guidelines for professional

standards operating procedures for abattoirs and slaughterhouses and handling of animal products should be deleted and provided for under the proposed Animal Health Bill and to include a provision under clause 27 of the proposed Bill to enable the making of regulations to define professional responsibilities of veterinarians and persons working under their control.

Cattle Traders Act, Cap. 43

The Act provides for the regulation of cattle trading within Uganda as well as export licenses, among other things. The Act is outdated and does not reflect the internationally recognized practices on the promotion of animal health.

Findings and analysis

The Act has several gaps that need to be addressed that include the following:

- a. limited interpretation of the words 'cattle' and 'cattle trader' in the Act;
- b. contradictory definition of 'veterinary officer', which also refers to the commissioner of livestock and entomology;
- c. contradictory definition of 'inspecting officer';
- d. no provision for the interpretation of 'minister', 'commissioner' and 'currency point';
- e. The law is silent on the following matters:
- f. powers of the veterinary officer;
- g. conditions and terms of the license issued under this Act;
- h. requirements for a transporter to always carry the license and other documents relevant for animal movement;
- i. restriction on movement of animals in cases of disease or suspected diseases;
- j. the duration of the Commissioner's response concerning the appeal mechanism under section 3 of the Act;
- h. variation of the license under section 7 of the Act.

Recommendations and conclusions

The cattle traders Act, Cap. 43 should be amended to incorporate the following proposals:

- a. review the interpretation of the word 'cattle', in the Act under section 1 by substituting the definition under the word animal with the interpretation referred to in the glossary in the OIE Terrestrial code to read 'a mammal, reptile, bird or bee';
- b. review the interpretation of the word 'cattle trader', in the Act under section 1 (b) and substitute it with 'animal trader'.
- c. 'veterinary officer' should have the same meaning assigned to it under the proposed Veterinary Professionals Bill 2018. Additionally, the definition of 'veterinary officer' under section 1 of the Act should be amended by deleting the reference to the Commissioner of livestock and entomology and replacing it with the Commissioner responsible for animal health;
- d. 'inspecting officer' should be amended to include any veterinary officer or person authorized by the commissioner responsible for animal health;
- e. The interpretation section should make provision for the following:

- i. the Minister responsible for Animal Industry to administer the Act;
 - ii. the commissioner responsible for animal health to implement the Act;
 - iii. the interpretation of a currency point which is equivalent to UGX 20 thousand.
- f. The law should make provision for the following matters:
- i. prescribe powers of the veterinary officer;
 - ii. conditions and terms of the license issued under this Act;
 - iii. requirements for a transporter to always carry the license and other documents relevant for animal movement;
 - iv. restriction on the movement of animals in cases of disease or suspected diseases duration of the commissioner's response in relation to the appeal mechanism under section 3 of the Act;
 - v. variation of the license under section 7 of the Act.

Animal identification and traceability

It is impossible to trade and move animals and their products internationally without an identification and traceability system in place for export purposes. MAAIF does not have a law regulating livestock identification and traceability for trade and movement in accordance with OIE animal health requirements. Therefore, MAAIF should enact a law to include the following proposals:

- a. registration and traceability system management;
- b. livestock identification, registration and traceability system; with provisions on the establishment of national livestock identification, registration and traceability system; declaration of compulsory livestock identification and registration areas; registration of livestock and premises for traceability; specification of species, application and age limit for livestock identification devices; livestock identification numbering system; acquisitions and application of livestock identification devices; functions and powers of the registrar; functions and powers of the district livestock identification and traceability coordinator; functions and powers of the livestock identification agent; duties of owners of animals; delegation of powers; and exemption of specific areas and animals from provisions of this Act;
- c. livestock registration and recording system; with provisions on retention of livestock records; establishment of livestock identification, registration and traceability registry, records for traceability; veterinary laboratory traceability; confidentiality and accessibility; livestock traceability enforcement; livestock for market or slaughter; traceability of imports and exports of livestock; livestock identification parades and obliteration, tampering or removal of official livestock identification devices; and
- d. general provisions on development, establishment and operational costs, offences, detention and seizure, evidence, penalties, regulations.

The Cattle Grazing Act Cap. 42

The cattle grazing Act regulates and controls cattle grazing. Its purpose is to prevent overgrazing and is archaic. Based on the provisions of the animal diseases Act, Cap. 38, this Act does not contribute to disease control. Additionally, it does not reflect the internationally recognized practices on the promotion of animal health.

Findings and analysis

The Act has several gaps that need to be addressed and includes the following:

- a. interpretation of the word 'cattle' in section 1(a) of the Act is limited;
- b. contradictory definition of 'veterinary officer' in section 1(b) of the Act which empowers a veterinary officer or district administration to prohibit or limit grazing. Additionally, the definition of 'veterinary officer' refers to the commissioner of livestock and entomology;
- c. the interpretation of 'administrative officer', 'minister', 'commissioner' and 'currency point' are not provided for;
- d. section 3 of the Act related to impounding of cattle is limited;
- e. section 5 of the Act empowers the minister to make rules for better carrying out the provisions of this Act, but regulations have not enacted to implement the Act;
- f. inadequate penalties to enforce compliance under section 6;
- h. the Act is silent on:
 - i powers and functions of a veterinary officer;
 - ii. stocking rates;
 - iii. duty of the veterinary officer to notify the administrative officer where an animal is impounded.

Recommendations and conclusions

This Cattle Grazing Act, Cap. 42 should be amended to incorporate the following proposals:

- a. review the interpretation of the word 'cattle', in the Act under section 1(a) by substituting the definition of the word animal with the interpretation referred to in the glossary of the OIE Terrestrial Code to read 'a mammal, reptile, bird or bee';
- b. 'veterinary officer' should have the same meaning assigned to it under the proposed Veterinary Professionals Bill 2018. Additionally, the definition of 'veterinary officer' under section 1(b) of the Act should be amended by deleting reference to the commissioner of livestock and entomology and replacing it with the commissioner responsible for animal health;
- c. section 3 of the Act should provide for impounding of cattle including provisions related to the disposal of impounded animals, removal of impounded animals and no compensation for lawful action;
- d. enact rules under section 5 of the cattle grazing Act for better implementation of provisions of the Act;
- e. penalties should be punitive to enforce compliance under section 6;
- f. the interpretation section should make provision for the following:
 - i. the administrative officer to have the same meaning assigned to it under the Local Government Act, Cap. 243;
 - ii. the minister responsible for animal industry to administer the Act;
 - iii. the commissioner responsible for animal health to implement the Act;
 - iv. the interpretation of a currency point which is equivalent to UGX 20 thousand;

g. the Act should make provision for:

- powers and functions of a veterinary officer;
- stocking rates;
- duty of the veterinary officer to notify the administrative officer where an animal is impounded.

Local Government Act, Cap. 243.

An Act to amend, consolidate and streamline the existing law on local governments in line with the constitution to give effect to the decentralization and devolution of functions, powers and services; to provide for decentralization at all levels of local governments to ensure good governance and democratic participation in and control of, decision-making by the people; to provide for revenue and the political and administrative setup of local governments; and to provide for the election of local councils and any other matters.

Findings and analysis

The Local Governments Act Cap. 243 that decentralized veterinary services has adversely impacted disease control due to the weakening of linkages between the central veterinary services and the districts.

Recommendation and conclusions

The Local Governments Act Cap. 243 should be amended to recentralize animal health and disease control services and the mandate for disease control to the veterinary services at MAAIF.

Laboratories

There is no comprehensive legislation regulating animal laboratories in Uganda. However, legislation has supported the setting up some institutions like the central diagnostic laboratory in Entebbe, the National Agricultural Research Organization (NARO), Makerere University College of Veterinary medicine, animal resources and biosecurity, National Animal Genetic Resources Centre and Data Bank (NAGRC&DB) and National Livestock Resources Research Institute (NaLIRRI).

The laws that attempt to mention aspects of laboratories are the Animal Diseases Act Cap. 38 sections 4, 9, 12 and 21(1); the Animal Diseases Rules Statutory Instrument 38-4 regulation 30 and the Veterinary Surgeons Act Cap. 277 section 23 which make some reference to testing, laboratory processes and confirmation of disease without classifying the type of laboratory and processes involved.

Similarly, there is a lack of regulation on laboratory reagents. Such regulation would provide the procedures for authorizing the reagents that are used to perform official analyses and surveillance of marketing of reagents, where these can affect the quality of analyses and quality assurance of reagents by manufacturers. The functions of regulation, importation, distribution and monitoring of pharmaceutical products in the country including veterinary drugs, vaccines and chemicals are vested with National Drug Authority (NDA), which is supervised by the Ministry of Health.

Recommendations and conclusion

There is a need to establish and maintain a comprehensive veterinary laboratory system and other means for analysing animal products and samples.

The legislation should define the conditions for the classification, approval, operations and supervision of laboratories at each level and the level of operation of each laboratory at the district, region and central.

The legislation should provide for the institution that is responsible for approval of veterinary laboratories for disease control and veterinary public health. The laboratories should be approved for; the testing of animal vaccines, veterinary products, animal products and animal by-products, disease diagnosis; food safety and assurance; monitoring and ensuring the quality of laboratories; and any other activity considered necessary.

The private sector should be allowed to invest in and operate veterinary laboratories for purposes stipulated by legislation.

Veterinary laboratories should be regulated under the control of the minister responsible for veterinary services.

The legislation should also provide for the keeping of accurate records and information on laboratories in the prescribed manner and form by the minister responsible for veterinary services and the licensed laboratories. In addition, the legislation should create a linkage between diagnostics and research.

3 Materials and methods

This assignment was largely a desk literature review complemented by national animal disease records data gathering, PMAT questionnaire administration to national authorities for self-assessment, key informant interviews based on regional disaggregation and fast respond fast consider basis, stakeholder analysis and legal analysis. Detailed consultations and data gathering with the BUILD Uganda-VSFG project team and the PPR component lead were undertaken through physical inception meeting. Thematic review of the existing laws was conducted to identify the key issues that need to be addressed by legislation reforms, to ensure that implementation of the Animal Diseases Act, Cap. 38, the Veterinary Surgeons Act, Cap. 277, the Cattle Traders Act, Cap. 43 and the Animal Grazing Act, Cap. 42 and other related laws are not hindered by unforeseen legal obstacles or by inadequate legislation.

3.1 Methods applied include

- Semi-structured questionnaires administered in nine districts (different regions of the country) to collect location-specific constraints relating to the PPR impacts, control progress and requirements. Respondents were district veterinary officers or their representatives in selected districts.
- Fifteen personnel (Appendix 1), representing 15 key stakeholders, were interviewed regarding their understanding of PPR GCES, constraints, challenges and contributions to PPR control in Uganda.
- PPR Monitoring and Assessment Tool PMAT self-assessment scores (national PPR focal person) obtained.
- Legal instruments obtained from the internet and archives. Specific consultations held with chief veterinary officer, MAAIF, Entebbe. Additional consultations with former assistant commissioner animal disease control to capture the perspectives on public–private partnerships and the scope of services of CAHWs.
- Additional data on laboratories obtained through phone calls to different personnel working in various facilities.
- Literature reviewed from internet searches and available documents (hard and soft copies).
- Organizational and historical data: obtained from phone and e-mail consultations. Also, from historical reports on technology applications, outbreaks, vaccination and diagnostic testing services.
- MAAIF provided the endorsed copy of the national PPR control and eradication strategy.

The purpose of the interviews or consultation was explained and verbal consent on disclosure obtained before proceeding.

The qualitative method was chosen because the legislation under review is specialized and its implementation challenges can best be identified by practising stakeholders.

Regarding geographic scope, this activity finding relates to the entire country and can extrapolate regionally and globally.

3.2 Review of existing surveillance and reporting mechanisms

This work covered the national animal health surveillance system, including:

- a. EMA-i under FAO, introduced in Uganda in 2013
- b. Passive surveillance system at the National Animal Disease Diagnostics and Epidemiology Centre (NADDEC). Consideration was given to data recording, curation, decision-making and reporting to OIE or other organizations.
- c. Active surveillance system

It was not possible to access data on the new FAO mobile phone reporting system for FMD under implementation by Heifer Project International under the 'Incentives for mobile phone livestock disease reporting on Foot-and-Mouth disease' project, developed with the support of The European Commission for the control of Foot-and-Mouth disease (EuFMD), FMD 2018. This was a trial activity whose report was not yet published nor data accessible from MAAIF. If found useful, it may be linked with existing reporting systems like EMA-i.

3.3 Literature review on policy/legal frameworks

This work reviewed the national policy for the Delivery of Veterinary Services (2001) and its final draft review (Veterinary Governance Project 2017).

Existing literature was reviewed to create a better understanding of the current laws, which include the Animal Diseases Act, Cap. 38, the Veterinary Surgeons Act, Cap. 277, the Cattle Traders Act, Cap. 43, the Animal Grazing Act, Cap. 42 and the Local Government Act, Cap. 243 and other related laws. Proposed strategy and bills were also reviewed to appreciate the efforts made by the government to address the problem. These include:

- a. the National PPR Control and Eradication Strategy;
- b. the Veterinary Practitioners Bill;
- c. the Animal Diseases (Amendment) Bill; and
- d. the Animal Identification and Traceability Bill.

The assignment also covered areas of the veterinary services domain like laboratories which should be provided for by new legislation.

International and regional treaties, policy and legislation that relate to the control and eradication of PPR were reviewed to ensure that the policy and legislation conform to the internationally accepted best practices. The literature review enabled assessment of the existing governance structures at the local level and the linkages with the overall governance framework at the national level. This is aimed at proposing policy and legal framework or system linked to the overall governance at the local and central level and includes mechanisms to provide financing and options for a comprehensive industry management framework building on existing laws, policies and international standards.

Tools for assessing animal health and coordination systems

- i. PPR progressive Monitoring and Assessment Tool (PMAT). This is a standard tool (FAO–OIE 2020). <http://www.fao.org/ppr/news-and-events/events/detail/en/c/1258223/>
- ii. Semi-structured interview guide on PPR stepwise approach towards GCES in Uganda (Appendix 1)

Key considerations for the semi-structured interviews:

- PPR outbreaks (last 5 years): number of goats/sheep affected and number dead
- Actions undertaken
- Challenges encountered
- Challenges to PPR eradication by 2030 and ranking as per global action plan
- Approximate annual expenditure on PPR control
- Approximate annual loss due to PPR (estimate in UGX)
- Recommendations to accelerate control and their rating in importance (very important, important, less important)
- What is the expected annual budget to support effective PPR control in your organization?
- Any other comments

iii. Key informant interviews checklist on PPR GCES (Appendix 1)

- Role/contribution to PPR GCES includes
- Challenges to the attainment of objectives of GCES by 2030
- Recommendations
- Comment/any other information

3.4 Literature review

Literature was reviewed from:

- Published research and development documents/articles
- National PPR control strategy and other official documents
- National and international data sources including available organizational data (NADDEC)
- OIE PVS assessments
- On-going project data research students, grey literature available at COVAB and other partners.

3.5 Consultative meetings

Limited physical consultative meetings were held (1 with VSFG, 1 with PPR national focal person, 1 with a retired expert). Other consultations were held on the phone to get clarification and additional information.

3.6 Data summary, analysis and presentation

Data and literature from various sources were summarized and presented in the most appropriate manner for easy understanding to enable discussions, conclusions and recommendations. Tables, charts, maps, percentages or proportions were derived.

4 Findings

4.1 Organization of the National Veterinary Service System in Uganda

The Ministry of Agriculture Animal Industry and Fisheries oversees activities of crop, livestock and fisheries in Uganda with a vision of a competitive, profitable and sustainable agricultural sector. The role of MAAIF is to create an enabling environment, including control and management of epidemics, diseases and pests. MAAIF has four directorates:

- Directorate of Animal Resources
- Directorate of Crop Resources
- Directorate of Fisheries Resources
- Directorate of Extension Services

MAAIF has 7 affiliate agencies:

- COCTU—Coordinating Office for Control of Trypanosomiasis in Uganda
- CDOUGA—Cotton Development Organization
- DDA—Dairy Development Authority
- NARO—National Agricultural Research Organization
- NAADS—National Agricultural Advisory Services
- National Animal Genetic Resources and Data Bank (NAGRIC&DB)
- Uganda Coffee Development Authority (UCDA)

The Directorate of Animal Resources is mandated with supporting sustainable animal disease and vector control, market-oriented animal production, food quality and safety; for improved food security and household income. It is composed of:

- Department of Animal Production
- Department of Animal Health
- Department of Entomology

The Department of Animal Health supports control of animal diseases and vectors for improved food security and household income, headed by the commissioner Animal Health (chief veterinary officer). It is responsible for policy formulation, technical guidance and supporting disease control. It has 3 divisions, each headed by an Assistant Commissioner:

- Veterinary Diagnostics and Epidemiology
- Animal Disease Control
- Veterinary Regulation and Enforcement

Post-independence (1962) decade was more characterized by vibrant veterinary service system under a separate Ministry of Veterinary Services and Game. Owing to continued fiscal challenges from late 1980s to date, the government of Uganda liberalized and decentralized the provision of veterinary services. As a result, many actors are involved in providing veterinary services without adequate regulation and supervision, hence the resurgence of infectious diseases, increased economic and health risks, especially to the rural poor (Ilukor et al. 2015). In 1987, the government implemented economic and structural adjustment fiscal reforms, including privatization of veterinary drug and vaccine imports and distribution as enshrined in the National Drug Policy and Authority Statute.

Multiple layers of national veterinary system, poor coordination mechanisms and underfunding greatly affect animal disease surveillance and control in Uganda (Figure 9). The district veterinary officers (DVO's) oversee the portfolio for animal disease control at the district level, yet they are directly responsible to the chief administrative officer instead of reporting directly to the commissioner of Animal Health. In 2020, Uganda had 135 districts; disease control cannot be effective without a single chain of command.

Diseases at the local level are reported to the subcounty veterinary officer who in turn reports to the district veterinary office and ultimately to the chief veterinary officer. Notifiable diseases are reportable to the chief veterinary officer as soon as possible.

4.2 National Animal Disease Epidemiology Surveillance System (NADESS)

The National Animal Disease Diagnostics and Epidemiology Centre (NADDEC) operates under the veterinary diagnostics and epidemiology division with no clear operational policy framework nor funding to provide for specialized requirements. The government meets staff salaries and limited running costs at the centre, but the district and regional surveillance structures are not yet defined. NADESS were setup in most developing counties during the last phase of rinderpest eradication to provide information on the disease prevalence and distribution, making it possible to manage diseases in a cost-effective manner (FAO/MAAIF 2015). The role of NADESS is to facilitate early detection of pathogens to enable efficient preparedness, early detection, rapid response and control of disease outbreaks. The East African Regional Laboratory and Epidemiology Network (EARLEN) identified the need to strengthen the NADESS as a foundation for effective animal disease control in the region. The standards of a functional NADESS were reviewed by FAO/MAAIF 2015.

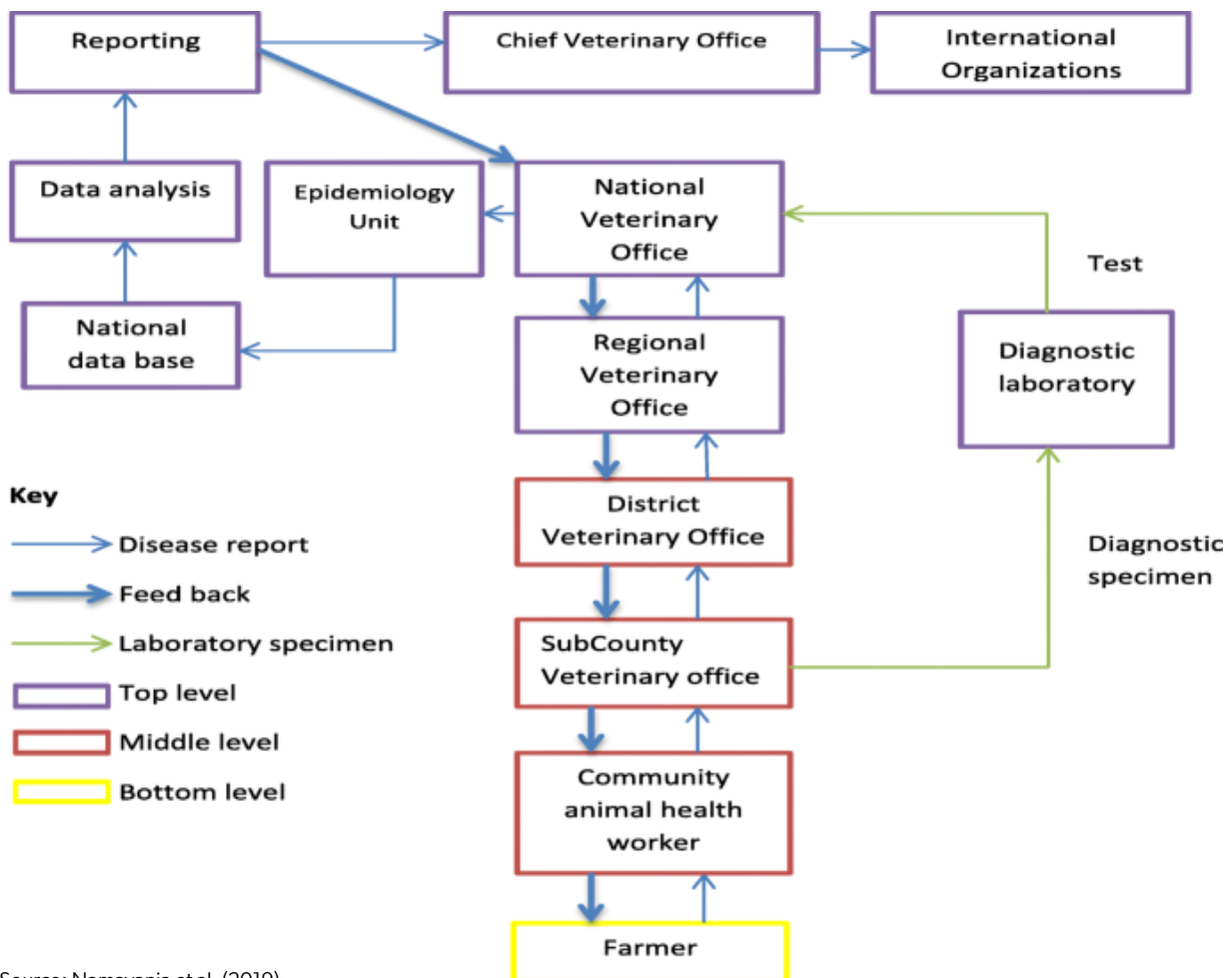
A functional NADESS should have:

- clear objectives and organizational structure
- definite target population, stakeholders, roles, coordination and integration mechanisms
- well-identified information flow with feedback and information dissemination mechanisms in place supported by appropriate infrastructure, skills and capacities
- simplicity, flexibility, acceptability, sensitivity, positive predictive value, representativeness, completeness and timeliness
- adequate resources (human resources, travel, supplies, equipment and services)
- support by policies, strategies (general and specific), legal frameworks and SOPs

- defined performance indicators as well as monitoring and evaluation system

NADDEC is responsible for animal health laboratory and epidemiology services and coordinates with districts to ensure systematic collection and sharing of animal disease information (Figure 9). It also works closely with research and training institutions to ensure a centralized system of information flow (Wanderema 2014). Regular evaluation of the surveillance system is essential to support decision-making, including priority setting and resource allocation (Namayanja et al. 2019). In March 2016, the Ministry of Health (MOH), MAAIF, Ministry of Water and Environment (MWE) and Uganda Wildlife Authority (UWA) signed a Memorandum of Understanding (MOU 2016) to form the National One Health Platform and work closely with other stakeholders, including other stakeholders like Makerere University College of Veterinary Medicine, Animal Resources and Biosecurity (COVAB), School of Public Health, and other partners on One Health approach i.e. FAO, USAID and World Organization for Animal Health (OIE), Intergovernmental Authority for Development (IGAD), World Health Organisation (WHO), World Bank, Uganda Red Cross Society (URCS), Uganda Peoples Defence Force (UPDF), Uganda Police Force (UPF), Family Health International 360 (FHI360) and Doctors Without Border (MSF). Such an MOU provides for collaborative arrangements with other institutional laboratories like the Uganda Virus Research Institute (UVRI), Central Public Health Laboratories (CPHL), National Drug Quality Control Laboratory and other laboratories like Uganda National Bureau of Standards. Operational framework and linkage of NADDEC to other laboratories are not yet in place leave alone fully operationalization and practice of One Health as there is no policy and direct institutional support yet.

Figure 9. Organization of National Animal Disease Surveillance Framework in Uganda.



Source: Namayanja et al. (2019).

Recent evaluation of the current animal disease surveillance system in Pallisa and Kumi districts indicated that stakeholders perceive the system as being representative, sensitive and acceptable, with ability to collect good quality data

(Namayanja et al. 2020). However, the challenges included poor laboratory diagnostic services, limited resources, slow data transmission, lack of feedback and poor data collection. The major challenges included poor communication (information flow) and inadequate staffing.

It should be noted that the national animal disease surveillance system was evaluated by FAO in 2015 (FAO/MAAIF 2015) and later in 2018 (FAO 2018).

The performance of the national animal disease surveillance system in 2015 indicated that:

- The current assessment findings for the NADESS do not differ from what was derived in 2015, that is:
- The authority for NADESS is in place with a functional head as the commissioner Animal Health (chief veterinary officer) and deputy, assistant commissioner (diagnostics and epidemiology)
- The National Animal Disease Diagnostics and Epidemiology Centre (NADDEC) is in place with clear objectives and organizational structure, facilitating the integration of the National Laboratory and Epidemiology Services
- The single chain of command is not in place between the MAAIF and districts. Districts operate independently under the Ministry of Local Government
- There is no approved National Surveillance Plan to support NADESS activities
- There is neither a strategic plan nor operational policy framework for NADESS
- Coordination mechanism for multi-sectoral collaboration was lacking
- Weak national laboratory and epidemiology networks
- Staffing was far below the approved requirement at the centre and within the districts
- NADDEC had no specific budget vote at MAAIF and in the districts
- The attributes of the NADESS generally fell below average
- There are no defined performance indicators as well as monitoring and evaluation system
- There were no established public–private partnerships
- Systems were in place for animal disease information exchange (hard and soft copy/electronic) and feedback, but feedback was often slow and sometimes not forthcoming
- Available tools included:
 - Internet is in place for mail exchange
 - SILAB for laboratory information management system (LIMS)
 - Pathogen Access Control System (PACs) for biorisk management and tracking of samples
 - Phones for verbal exchange
 - Local area network for data entry, storage and internal sharing
- Diagnostic techniques are in place included serology (ELISA) conventional Polymerase Chain Reaction (PCR), microscopy, real-time PCR, chemistry, parasitology etc.
- There was no established national surveillance steering or technical committee
- Minimal or no data received on slaughter facilities or drug outlets for purposes of animal disease surveillance
- Collaboration with other laboratories existed on a small-scale and not fully institutionalized (NARO, COVAB, MOH, CPHL, UVRI, UWA etc.)

- CSOs/ NGOs not fully linked to NADDEC. Such organizations include: Conservation Through Public Health (CTPH) and Mercy Corps
- Operations depended less on guidelines or standard operating procedures
- Laboratories were fewer at the national, regional and local level but not operationally linked to NADDEC.

The 2018 evaluation of the National Surveillance System using the FAO Surveillance Evaluation Tool (SET) found the following:

- high scores for utility (57%) based on the level of basic data analysis at NADDEC and reporting to international organizations
- the speed of the system scored so low (26%) reflecting logistical and field challenges
- the scores for other attributes included; flexibility (37%), acceptability (21%), data quality (20%), sensitivity (18%), specificity (15%), stability (13%), simplicity (12%) and representativeness (10%).

This evaluation found out that national surveillance and steering committees were lacking. Districts lacked surveillance committees. Standardized tools, protocols and training on data collection and animal disease reporting were not fully implemented. The national referral laboratory at NADDEC was implementing plans to scale up from BSL2 to BSL3. There were 40–60 district laboratories, but they are not fully functional. Several regional laboratories (Moroto, Mbale, Gulu, Arua, Lira, Masaka, Mbarara and Kiboga) have been setup with the support of FAO and other partners. Laboratories have recruited technologists but still lack budget to support field surveillance activities and perform diagnostics as required. There is no veterinary laboratory that is ISO/ICE/17025 certified in the country.

Staff supervision was highlighted as being necessary at all levels to satisfy the requirements for different positions along the national surveillance system. Reporting rates were estimated at 20%, with only three-quarters of the received monthly reports being filled out correctly. Several districts depend on hard copy animal disease reporting much as soft copy reporting formats and mobile phone reporting options using EMA-i or open data source (ODK) were available. The laxity in the reporting systems and mechanisms relate to the apparent disconnect between the centre and the districts due to decentralized governance. Districts are not necessarily accountable to MAAIF (FAO/MAAIF 2015). Supportive epidemiology surveillance reporting methods, technologies and formats relate to the different funders in the interest of better efficiency and sustainability. However, multiple technologies, formats and methods can be confusing or not sustainable; hence the need for executive decisions to address NADESS. The high chances of livestock–wildlife interactions across unfenced protected areas presented opportunities for disease transmission in different parts of the country. Much as the country put in place a national One Health platform, intersectoral coordination is affected by lack of a dedicated budget, poor institutional policies and lack of coordination. This affects information exchange relating to the control of zoonotic diseases and other public health events.

The following are some observations in the NADESS since 2015:

- Laboratory facilities were repaired and internet upgraded by NADDEC
- District Animal Disease Surveillance Focal Person (DADSFP) were identified at each district
- Terms of reference (TORs) for the National Steering and Technical Committee were developed
- The National Animal Disease Surveillance Plan (September 2020) was validated
- Surveillance/disease control documents for other diseases including National Surveillance Plans (Brucellosis and HPAI) and National Control Strategies (Anthrax and Rabies) were developed
- MAAIF has a draft NADESS Strategy
- One Health multi-sectoral coordination mechanisms are in place, guided by the MoU and national OH strategic plan

- The Uganda National Animal Health Network is in place with an executive committee. Disease information has been shared via a WhatsApp group, emails and quarterly newsletter
- Staffing within the division of veterinary diagnostics and epidemiology has improved = 15/30 (50%). Several staff gained skills in epidemiology surveillance
- NADDEC has no specific budget vote at MAAIF and competes with other animal health activities hence surveillance activities at the centre and in the districts are underfunded
- The attributes of the NADESS generally fall below average
- There are no defined performance indicators as well as monitoring and evaluation system
- There are no formal established public–private partnerships much as NADDEC serves both public and private players
- Systems are in place for animal disease information exchange (hard and soft copy/electronic) and feedback, but often feedback is slow and sometimes not forthcoming. Available tools include:
 - Internet
 - SILAB for laboratory information management system (LIMS)
 - Pathogen Access Control System (PACS) for biorisk management and tracking of samples
 - Phones
 - WhatsApp and email groups
 - Local area network for data entry, storage and internal sharing
- Diagnostic techniques are in place, including serology (ELISA) conventional Polymerase Chain Reaction (PCR), microscopy, real-time PCR, chemistry, parasitology etc.
- There is no established National Surveillance Steering or Technical Committee
- Antimicrobial Resistance Surveillance Plan has been developed
- Routine coordination meetings are held
- Collaboration with other laboratories (NARO, COVAB, MOH, CPHL, UVRI, UWA etc.) has greatly improved with evidence of participation of multiple stakeholders whenever meetings are held.
- CSOs/NGOs are not fully linked to NADDEC. Such organizations include: Conservation Through Public Health, VSFG/BUILD and Mercy Corps
- Several facilities operate without guidelines or standard operating procedures
- Several laboratories exist at the national, regional and local level but are not operationally linked to NADDEC
- National PPR preparedness and response plan for PPR has been drafted
- The number of district and regional laboratories has increased.

About 1,000 veterinarians (Bachelor of Veterinary Medicine) and 2,000 animal husbandry officers (Diploma in Animal Husbandry) are in the country, largely employed by the government within veterinary departments in the district local governments (SET 2018). The total number of private veterinarians is not well documented nor regulated by Uganda Veterinary Board (UVB), leaving room for substandard service providers. CHAWs are stakeholders at grassroots but not legally recognized in the veterinary service system and only limited to the Karamoja region. The data from private sector providers is not readily captured in the national surveillance system due to poor coordination between private and public players. Reporting notifiable diseases is mandatory for private veterinarians.

4.3 Stakeholders of the National Animal Disease Surveillance System and their roles

Stakeholder analysis identifies people, groups and institutions that will influence positively or negatively PPR control and eradication projects; it is important to anticipate the kind of influence the groups will have. This helps to develop strategies to get the most effective support possible for the project and reduce obstacles to the project implementation.

Based on the literature search and limited consultations, stakeholder analysis identified the key bodies/categories involved (Table 4).

Table 4. Stakeholder analysis for the small ruminant value chain in Uganda

(High interest, minimal influence)	(High interest, high influence)
MEET THEIR NEEDS (Keep satisfied)	KEY PLAYER (Manage closely)
Stakeholders	Stakeholders
Traders (input dealers)	Chief Veterinary Officer/Commissioner Animal Health
Breeders	MAAIF permanent secretary
Livestock farmers	The Director Animal Resources
Community Animal Health Workers	Uganda Veterinary Board
Researchers	Uganda Veterinary Association
Students	International Agencies: ILRI, FAO, AU-IBAR, FAO
	Universities/tertiary institutions: COVAB Makerere University, Bukalasa Agricultural College, Busitema University (Arapai)
	Uganda Wildlife Authority
	Conservation through Public Health (CTPH)
	NGO's: VSFG (BUILD project), Mercy Corps, Caritas, Welt hunger, Farm Africa, CRS
	Donors: BMZ, UKAID, SIDA, DFID, EU, DANIDA, USAID
	Research/development agencies such as NaLIRRI, NAGRIC&DB, vaccine manufacturers
	National Drug Authority
	Farmer Associations: UMPCU
	Parliament/political bodie

(Minimal interest, low influence)	(Low interest, high influence)
LEAST IMPORTANT (Monitor)	SHOW CONSIDERATION (Keep informed)
Stakeholders	Stakeholders
General/subsistence farmers (crop, aquaculture, horticulture)	The commissioner animal production
Beef/goat producers association	Public veterinarians in MAAIF
Veterinary drug shops	Public veterinarian in local governments
	Private practicing veterinarians
	Paraprofessionals in the public sector
	Paraprofessionals in the private sector
	Private veterinarians
	Ministry of trade and transport
	UNBS
	UBOS
	Public veterinary laboratories
	Private veterinary laboratories
	Politicians
	Finance people

4.3.1 Stakeholders in livestock value chains in Karamoja

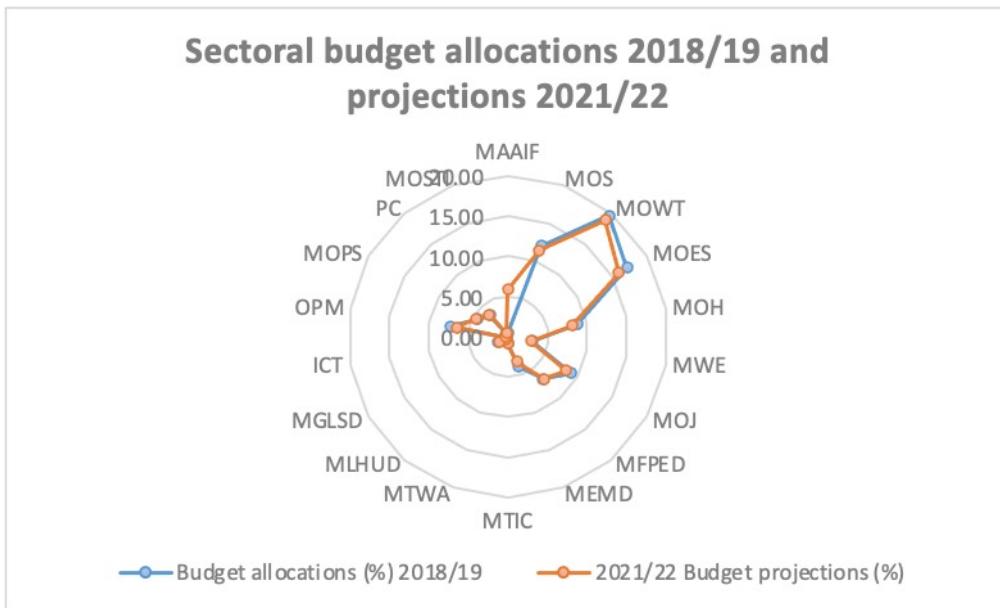
The following are some of the NGOs supporting livestock in Karamoja:

1. Farm Africa's livestock for livelihoods supports women on small-scale goat farming to generate household income and better nutrition
2. Catholic Relief Services is supporting Nuyok project (Abim, Napak and Nakapiripirit) building resilience to shocks and enhancing livelihoods and improved food security for vulnerable families
3. Mercy Corps Apolou project and RCF (Kaabong, Kotido, Moroto and Amudat)
4. VSFs

4.4 Budget sectoral allocation

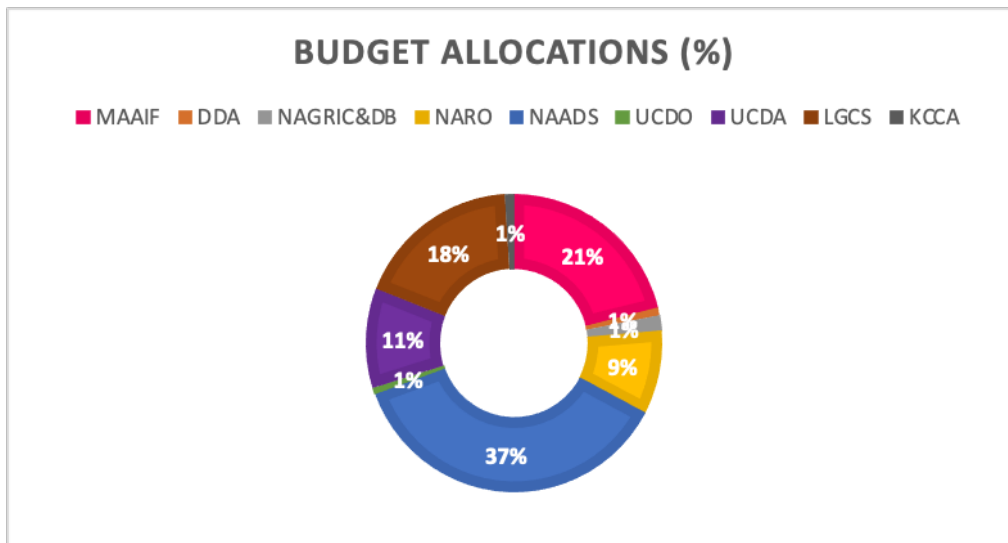
The 2018/19 allocation to MAAIF was 0.44% total of the national budget (Figure 10 and Appendix 2). Only 21.2% of the allocated budget goes to MAAIF mainstream activities. The rest goes to other expenditure lines and parastatals (Figure 11 and Appendix 3).

Figure 10. Wheel chart to illustrate the relative percentage of sectoral budget allocation to MAAIF (2018/19) and projected budget (2021/22).



Source: MFPED (2018). Calculated from budget call 2019/2020.

Figure 11. MAAIF subsectoral budget allocations and projections.



Source: MFPED (2018). Calculated from budget call 2019/2020.

Budget estimate for 2019/2020 UGX 33,080.5 billion (Government UGX 24,758 billion; External UGX 8,322.5 billion).

The budget strategy was guided by NDP II under the theme: Industrialization for job creation and shared prosperity. The country aimed at attaining a lower-middle-income status by 2020. This required that average income per Ugandan per year is raised from the current USD 733 per year to at least USD 1,039 by strengthening the country’s competitiveness through sustainable wealth creation, employment and inclusive growth. This is possible through unlocking constraints to primary growth sectors prioritized by NDP III and NRM manifesto 2016/17–2020/21.

The financial year 2019/20 budget strategy was structured along five major thematic areas:

- i. Harnessing growth opportunities in agriculture, tourism, oil, gas and minerals
- ii. Enhancing private sector growth and development

- iii. Trade and export promotion
- iv. Strengthening public sector interventions and management to support private sector-led growth: social services, public investment management system (PIMS) and fiscal governance and
- v. Enhancing domestic revenue collection and debt sustainability

The government has no specific budgetary allocations ring-fenced for PPR eradication (that prioritize animal health, which includes funds for supporting PPR control). It was observed that the funds allocated to the different sections were not commensurate with the requirements for the eradication of PPR.

4.5 Veterinary professional services in Uganda

Delivery of veterinary professional services was reviewed by EAC (2015). The number of registered veterinary surgeons in Uganda in 2013 was 1,048 compared to 707 (Tanzania), 220 (Rwanda), 1,110 (Kenya) and 56 (Burundi). In East Africa, 50% veterinarians are employed in government, 42% private practice, 6% parastatals and 1% NGO's or not classified. Apart from Kenya, the proportion of private veterinary practice is smaller in East Africa than in other regions in Africa. Paraprofessionals play an essential part in the provision of veterinary services. The number of public sector veterinary surgeons per 1,000 livestock units was 0.39 (for 587 public veterinarians) in Uganda compared to 0.21 (for 539 public veterinarians) in Kenya. Newly registered national veterinary surgeons in Uganda were 32 (2011), 24 (2012) and 44 (2013). Paraprofessionals play an essential role in the provision of veterinary services based on numeracy.

The only institution with the academic standard for a recognized veterinary degree Bachelor of Veterinary Medicine (BVM) in Uganda is Makerere University (College of Veterinary Medicine Animal Resources and Biosecurity COVAB). It is a 5 year, OIE compliant degree. Uganda has a code of ethics for veterinary practice; the guide to professional conduct, veterinary clinics and hospitals in Uganda 2001. Veterinary services are regulated and standard of practice must be adhered to including annual professional registration of members by Uganda Veterinary Board (UVB). The veterinary facilities are supposed to be fully registered, but as of 2013, registered facilities in Uganda were 3 compared to Tanzania (300), Kenya (90) veterinary practices/Kenya (85) paraprofessionals. The Uganda Veterinary Board (UVB) is mandated with registration and regulation of veterinary issues in Uganda.

Uganda Veterinary Association (UVA) on the other hand is the professional subscription membership organization of veterinarians in Uganda with up to 1,200 members (Sylvia Baluka personal communication). UVA provides a platform for veterinarians to associate, advocate for their professional interests and professionalism to serve the livestock farmers to achieve their economic and business interests and to contribute towards food security, improved household livelihoods and national economic transformation. The Uganda Veterinary Paraprofessional Association (UVPPA) is the umbrella organization for paraveterinary professionals in Uganda. It embraces certificate and diploma holders. Institutions training paraprofessionals include:

- Busitema University
- Uganda Martyr's University Nkozi
- Bukalasa Agricultural College
- Ankole Western Institute of Science and Technology
- Ssesse farm school
- Kayunga centenary college
- Kyeera agroveter college

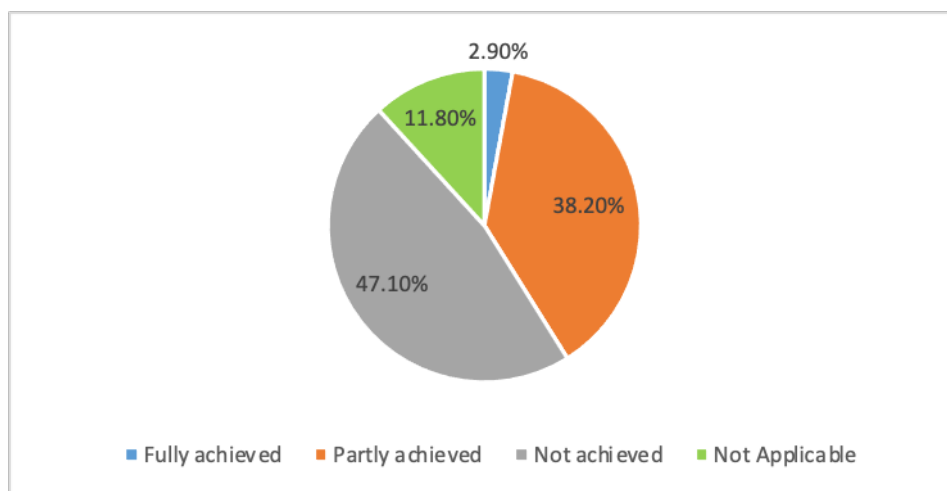
- Mityana agrovet college
- Mityana school of livestock husbandry

The institutions examine students on Uganda Business and Technical Examinations Board (UBTEB) to issue certificates (2 years) or diploma (3 years). College of Veterinary Medicine Animal Resources and Biosecurity (COVAB), Makerere University, offers Bachelor of Animal Production and Technology Management (4 years). Continuous professional development (CPD) is not mandatory (not specified in the veterinary professional code of conduct 2001) but increasingly becoming more valued for membership retention on the annual register. On 20 February 2020, a list of 1,320 registered degree and diploma holders allowed to practice veterinary medicine in Uganda was published (The Uganda gazette Vol. CXIII, No. 27). Disciplinary measures for errant members include removal from the register, cancellation of license, suspension or reprimand. The current number of practitioners in the public sector is about 393 veterinarians and 1,132 paraveterinarians (Prof Clovice Kankya, unpublished). The private sector veterinarians in various districts and companies or NGOs is about 2,688 (paraveterinarians) while 514 Community Animal Health Workers are distributed in about 17 districts, 10 of which are outside Karamoja.

4.6 Results of PMAT self-assessment for Uganda (Stage 2), September 2020

Detailed results of PPR PMAT self-assessment are shown in Figure 12 and Appendix 4. The country is pursuing PPR control and eradication in line with the PPR GCES for eradication by 2030. The last performance of veterinary services (PVS) follow up mission was in August 2018. The national PPR focal point facilitated the filling of the questionnaire. Findings indicate that out of 34 criteria, 2.9% are fully achieved, 38.2% partly achieved, 47.1% not achieved and 11.8% regarded as not applicable.

Figure 12. Pie chart showing the summary results from PPR self-assessment findings (PMAT Stage 2) of the global control and eradication strategy for Uganda, September 2020.



4.7 Laboratory capacity for animal disease diagnosis in Uganda

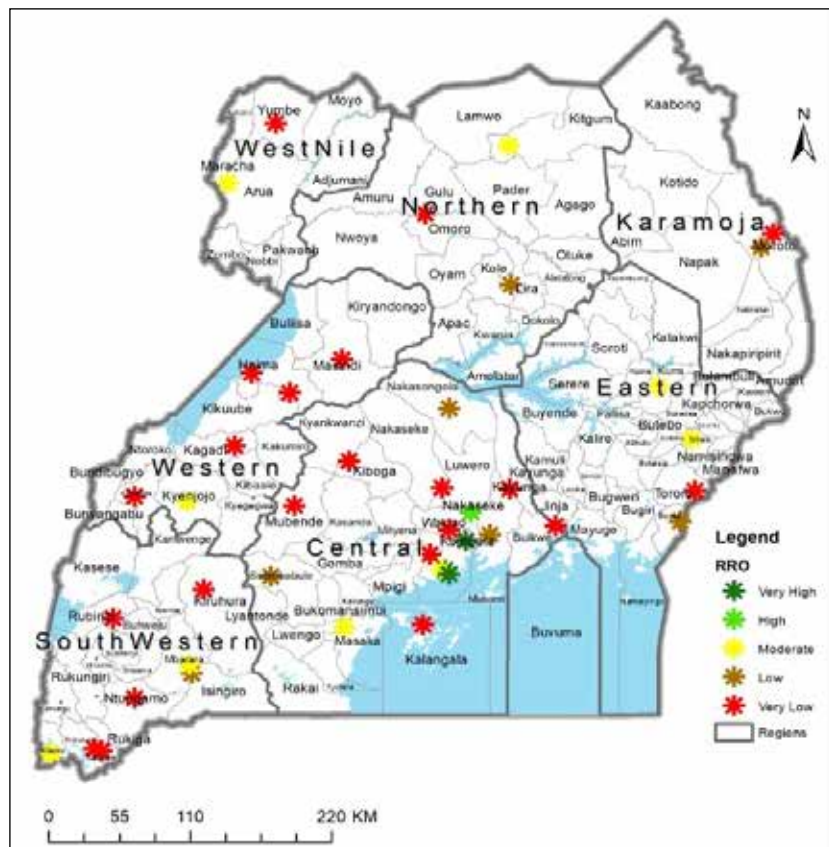
The distribution and relative capacity of veterinary laboratories in Uganda is shown in Figure (13) and Appendix (6).

- Number of veterinary laboratories in Uganda 43, rated as very high (3), high (1), moderate (9), low (8) and very low (22)

- Laboratories with technicians 30/43 (70%)

Currently, there is no laboratory policy in Uganda and capacity is variable depending on the availability of funding. The position of laboratory technologist was only been reactivated in 2018 (<https://www.publicservice.go.ug/media/resources/JOB%20MANUAL%20FOR%20MAAIF.pdf>) and most clinicians depended on symptomatic animal treatment. There is no veterinary clinical laboratory that is internationally accredited as per ISO/ICE/17025 or any other standard. Typical private business veterinary laboratories are lacking and largely unviable.

Figure 13. Distribution of veterinary laboratories and their relative rating.



Source: Ayebazibwe et al. (unpublished).

4.8 National animal disease reporting in Uganda

Animal disease reporting is central to the functionality of the national animal disease surveillance system (Figure 9). A standard monthly reporting format exists at the epidemiology unit, National Animal Disease Diagnostics and Epidemiology Centre (NADDEC). Reporting is obligatory under the Animal Diseases Act and starts at the lower level with the owners of the animals, animal herders, local leaders, traders, local administrators, community animal health workers, paraveterinarians and local area veterinarians (see Figure 9). Animal diseases are reported through a hierarchy up to the Commissioner Animal Health (Chief Veterinary Officer) who is expected to eventually make decisions concerning animal disease control. The lowest veterinary office is at the subcounty level, manned by the veterinary officer. Animal disease reporting is a regular activity requiring update of authorities and gathering the necessary data to guide national actions and projects. The list of priority transboundary animal diseases (TADs) in East Africa (EAC 2015) is included below:

- Highly pathogenic avian influenza

-
- Rift Valley fever (RVF)
 - Foot-and-mouth disease
 - Contagious bovine pleuropneumonia
 - Newcastle disease
 - Trypanosomiasis
 - Peste des petits ruminants
 - Contagious caprine pleuropneumonia
 - Lumpy skin disease
 - Rabies
 - African swine fever
 - Tick-borne diseases (*Theileria*, babesia and anaplasma)
 - Bovine spongiform encephalopathy
 - Blue tongue
 - Nairobi sheep disease
 - Canine distemper
 - Gumboro

The list of priority zoonotic diseases (PZDs), (CDC 2017) is included below:

- Anthrax
- Zoonotic influenza viruses
- Haemorrhagic fevers (Ebola, RVF, CCHF and Marburg)
- Brucellosis
- Rabies
- Trypanosomiasis
- Plague

Active surveillance necessitates that the disease investigator goes to the field to ascertain the disease dynamics in the target population. Passive surveillance, on the other hand, facilitates information flowing from the field to the officer at the workstation. Some diseases are notifiable (listed) and must be reported to authorities as soon as suspected or detected clinically or by laboratory confirmation. PPR is a listed disease. Animal disease outbreaks of high economic or public health importance must be reported immediately and follow up situational reports (SITREPs) provided. Apart from monthly passive reports, each outbreak is an independent event that must have a file opened and closed officially. Statutory reporting to high level organizations may also be ad hoc or periodic at agreed intervals. Due to the disadvantages of the tedious hard copy reporting, there is a desire to move to an electronic reporting system that includes: Email, Microsoft Office (Word, Excel, Access), Mobile Reporting Applications (EMA-i), Open data kit (ARIS 2), World Health Information System (WAHIS) etc. Each district is supposed to have a district surveillance focal person to process data for the attention of the district veterinary officer (DVO). Different reporting systems exist at NADDEC, but there is need to improve the MS Excel reporting format to allow for easy entry, data sorting, data editing, data categorization, data analysis, visualization and system interoperability with other technologies (IDDS 2020).

Event Mobile Reporting Application (EMA-i) scale-out in Uganda

FAO introduced the mobile reporting application (EMA-i) in 2013 to revolutionize animal disease reporting so that reports can be received and validated, almost immediately. This system is only in a few districts (37); yet to cover the entire country (Appendix 14). This system was tried out in Karamoja region and it proved to be useful in hard-to-reach areas, especially when integrated with community animal disease reporters (FAO 2019b). The EMA-i reporting system has now been upgraded and can be accessed via Google Play to make it more useful; professionals using their Smartphones to extend benefits to communities.

- Pilot EMA-i districts (2013): Nakasongola, Mbale, Rakai, Sironko, Busia, Lyantonde, Isingiro, Masaka, Mukono, Mityana and Kibaale.
- Second phase districts (2016): Kaabong, Kotido, Abim, Moroto, Napak, Amudat and Nakapiripirit
- Scale out districts (2019): Busia, Gulu, Kyenjojo, Mbarara, Kabarole, Hoima, Kabale, Yumbe, Kampala, Lira, Arua, Kirohura and Ibanda

The pilot and second phases of EMA-i were funded by FAO. The technology was embraced by the country. As of November 2017, a total of 1,222 disease reports were received from 105 users in 36 district reports (see map, Appendix 14). An evaluation was done in 2017 and agreed that for sustainability, the veterinary practitioners needed to embrace EMA-i and apply it using personal Smartphones.

Key recommendations following EMA-i evaluation in 2017

- EMA-i scale-up and ownership by the national government
- Smartphone usage and internet access is still very low; users need to access EMA-i through other means such as desktop computers. SMS compatibility with non-Smartphones could solve this
- Information sharing with other stakeholders/feedback is crucial
- Need to explore agreement on data property between national authorities and FAO
- Response to the suspected cases is an incentive for reporting
- Validation process is sometimes delayed hence commitment from the host country is essential
- Continuous training required as the application is updated time and again.

In December 2019 FAO initiated a full scale-out process of EMA-i involving a total of 36 districts listed above (FAO 2019a).

An innovative mobile phone technology was piloted by FAO (EUFMD 2019) on FMD reporting in Isingiro district. It is hoped that this system will make animal disease reporting even more impactful and accommodative to facilitate direct community reporting of PPR and other important diseases to veterinary authorities. However, this can also create duplication and confusion if systems are neither perfected, synergistic, nor interoperable. District performance on monthly passive animal disease reporting is shown in Table 5 and Appendix 7. The results indicate a gradual decline in passive disease reporting from 60% in 2011 to 27.6% in 2019. This has a serious implication for animal disease control since some diseases go unnoticed and once diseases get established (endemic) it negatively impacts on trade in animals and animal products, including the lucrative international trade.

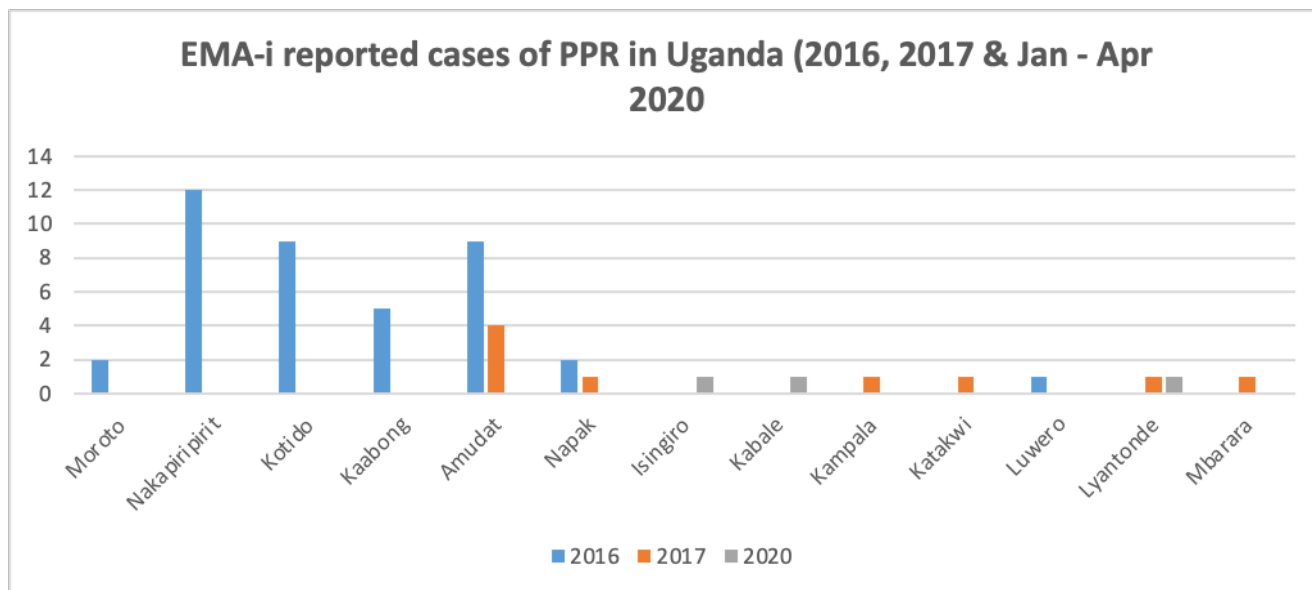
Table 5. Summary of monthly district animal disease passive reports to MAAIF (2011 2016 and 2019)

District	Monthly passive reports submitted to MAAIF		
	2011	2016	2019
Total received	770	517	354
Total expected	1,284	1,284	1,284
Percentage received (%)	60	40.3	27.6

Source: NADDEC (2020).

Figure 14 shows PPR outbreaks ever reported by EMA-i in Uganda since its inception. This data indicates that 13 districts ever reported PPR outbreaks. This applies only to about 20 districts where the technology was initially tested and had interest or capacity to report.

Figure 14. EMA-i reporting on PPR in Uganda (2016–April 2020).

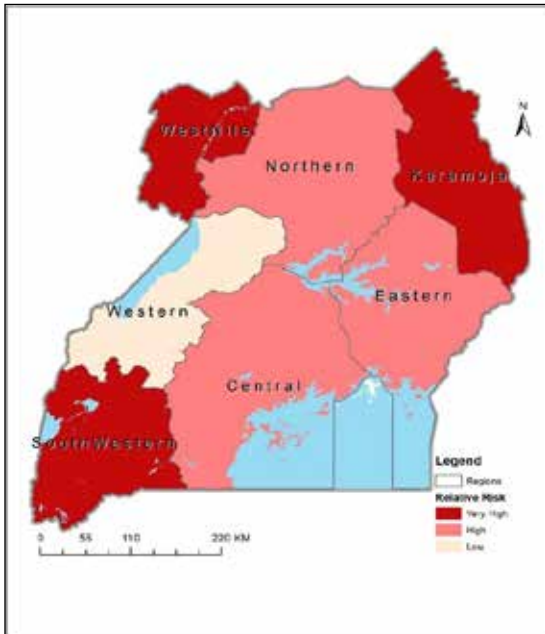


Source: Adapted from NADDEC (2020).

4.9 Risk map for PPR in Uganda

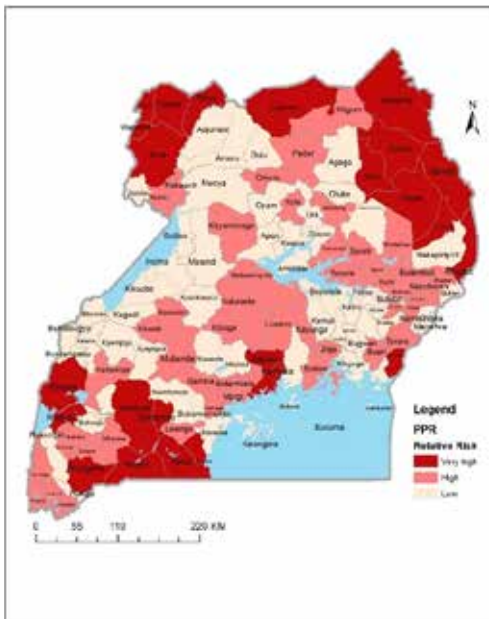
PPR relative risk map (Figure 15) was derived based on several factors including laboratory reports, epidemiology reports, vaccination history and other factors (refugees-hosting a high number of goats and sheep populations, disease publication history and expert judgement). The total number of districts that have ever reported at least one (1) PPR positive samples (2007–2020) laboratory tested (55) (Appendix 8). Districts that ever vaccinated against PPR (2016–2020) (51). Districts considered PPR positive by EMA-i, laboratory reports and vaccination records (80/135). It should be noted that the whole country is at risk. However, at the regional level, Karamoja, West Nile and Southwestern parts of the country have very high risk while Northern, Eastern and Central regions have high risk while the Western region has low risk. Some districts are riskier than others (see Figure 16) and there is need to undertake more detailed studies to zoom to specific localities, as more data becomes available. The country has in place a PPR Control and Eradication Committee (CEC), Appendix 9. However, the proceedings of the last CEC meeting in September 2019, supported by the BUILD project, indicated that the committee cannot meet its obligations due to lack of funding (ILRI/MAAIF 2019).

Figure 15. Map of Uganda showing the relative risk categorization for PPR by regions.



Source: Ayebazibwe et al. 2020 (unpublished).

Figure 16. Map of Uganda showing the relative risk categorization for PPR by districts.



Source: Ayebazibwe et al. (unpublished).

4.10 PPR vaccinations in Uganda

4.10.1 Vaccinations 2016–2020

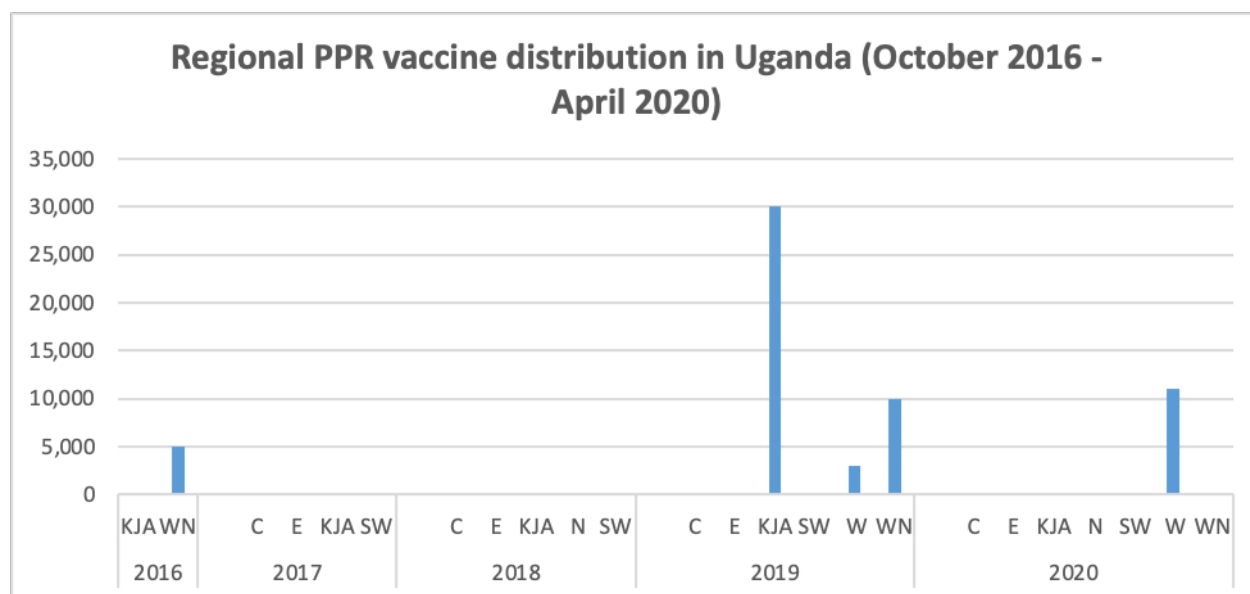
Data on PPR vaccination was obtained from MAAIF (October 2020). Total vaccine used October 2016–April 2020 = 1,190,800 doses, Figure 17 (current total districts = 135). On average, the country used 300 thousand doses of PPR vaccine per year. Among the districts that vaccinated against PPR, each received about 10 thousand doses. All PPR vaccination activities were centrally coordinated by MAAIF. Most districts received vaccines without any additional facilitation to undertake the vaccination campaign. Most vaccinations are demand but not necessarily risk-based,

vaccinations following reported outbreaks. Several districts demanded for additional vaccines following initial vaccinations; an indication of a possibility that farmers noticing positive changes in the field. Data on private PPR vaccinations was not available, but this is suspected to be so low (< 10%) based on expert opinion. The PPR vaccine doses used during the different years are as follows;

- 2016—2,015,000 doses
- 2017—68,000
- 2018—221,500
- 2019—195,000
- 2020—501,300

Fifty-one districts received PPR vaccines in the period 2016–April 2020. The districts that received the highest number of PPR vaccine doses include:—Amudat, Amuria, Kaabong, Kotido, Kiruhura, Lyantonde, Moroto, Nakapiripirit, Napak, Sembabule, Kween and Isingiro 26/51 (51%) districts received PPR vaccines from MAAIF at least twice during the period 2016–2020. All the vaccinations are centrally coordinated by MAAIF, even if funded by development partners or NGOs. Karamoja region received the highest amount of PPR vaccines. Government directly purchased most of the vaccines, unlike in the past. At the time of this assignment, the country had a few doses (total not specified) just for emergencies in case outbreaks occurred in any of the districts (Lumu Paul, personal communication).

Figure 17. Illustration of regional PPR vaccine distribution in Uganda (October 2016–April 2020).



Key: KJA—Karamoja, WN—West Nile, C—Central, E—Eastern, SW—Southwest, N—Northern

Source: Adapted from MAAIF (2020).

4.10.2 PPR vaccinations in Uganda (2007–2015)

Approximately 6,293,819 doses of PPR vaccines were used for control of PPR in Uganda 2007–2015 (Table 6). Most outbreaks were limited to the Karamoja region, much as antibodies were gradually detected in different parts of the country. Most of the support was donor-driven, quite often support extending to support other capacity areas including laboratory diagnostics, surveillance, sensitization and equipment support.

Table 6. Summary of approximate PPR vaccines used in controlling the disease in Uganda (2007–2015)

Implementing partner/project	Year	Vaccination coverage	Doses
FAO emergency TCP	2007/08	Karamoja	500,000
FAO	2008/09	Karamoja	2,400,000
FAO	2008/09	Peri-Karamoja	500,000
AU-IBAR (VACNADA)	2011	Karamoja and selected northern and eastern district	1,663,819
ILRI/thermostable PPR vaccine trials	2013	Kotido district	90,000
FAO/CERF	2014	Kotido district	40,000
MCI/Morocco Bivalent PPR/Pox trials (GALVmed)	2015	Moroto district	70,000
MCI/Morocco Bivalent PPR/Pox trials (GALVmed)	2015	Sembabule district	30,000
FAO	2015/16	Karamoja	1,000,000
Total			6,293,819

Source: NADDEC (2015).

4.11 The state of PPR and its control in Uganda

Semi-structured questionnaires were administered to nine districts to collect location-specific constraints relating the PPR impacts, control progress and the requirements. Respondents were district veterinary officers or their representatives. According to the information from district veterinary officers, the average cost of a breeding goat in Sembabule district is UGX 1 million (USD 268.3) compared to UGX 200,000 (USD 54) for an average breeding goat in Moroto district. This indicates that goat farming is more beneficial in some areas compared to others. This may also relate to the individual farmer effort to have better breeds, collaborate widely and personally invest in controlling animal diseases.

Refer to individual perceptions and organizational contributions to PPR control in Uganda (Appendix 5).

4.11.1 PPR problem in Uganda

Four out of nine (44.4%) districts perceived PPR as a big problem in their districts (Table 7).

Table 7. Semi-structured questionnaire responses on PPR problem in Uganda

	District	Region	Key finding	Comment
1	Rubanda	Southwest	PPR a big problem	Last outbreak in 2018 (morbidity 10,000; mortality 6,000)
2	Kiruhura	Southwest	PPR a big problem	Last outbreak in 2017 (mortality 72,000)
3	Wakiso	Central	PPR not a problem	No specific PPR surveillance plan
4	Kabarole	Western	PPR not a problem	No PPR outbreak ever reported
5	Mpigi	Central	PPR not a problem	Not aware
6	Namayingo	Eastern	PPR a problem	Last outbreak in 2019 (mortality 100 goats)
7	Mukono	Central	PPR not a problem	The district has no PPR surveillance or preparedness plan
8	Nebbi	West Nile	PPR not a problem	Requires training on PPR diagnosis and investigation
9	Moroto	Karamoja	PPR a big problem	Last outbreak in 2019–2020 (morbidity 3,732 shoats; mortality 1,240)

Actions taken after PPR outbreaks within districts included animal movement restrictions, official reporting, quarantine and vaccination (3/4 districts). One district indicated that actions taken included official reporting, sensitization and animal treatment against secondary bacterial infections. Multiple challenges to contain PPR outbreaks within districts were highlighted, including:

- poor compliance to quarantine requirements by farmers and traders,
- low technical staffing levels in the districts to enable an adequate response,
- inadequate logistics from districts and MAAIF,
- political interference,
- inadequate vaccines,
- PPR misdiagnosis in the field,
- lack of vaccines on the local market,
- lack of PPR surveillance plans,
- no confirmatory diagnosis by MAAIF,
- lack of animal holding grounds/quarantine stations,
- limited cold chain facilities for vaccine handling,
- limited logistics and funding (lack of motorcycles and allowances),
- inadequate budget for PPR control,
- lack of training,
- lack of PPR preparedness plan,
- lack of PPR surveillance activities in some districts,
- rainy weather,
- bad roads/bad terrain affects access to some areas,
- frequent livestock movements and
- mixing of different flocks across districts and countries (Kenya).

The issues highlighted largely point to public sector dominated services and all banking on central level support, yet there is no direct funding for PPR from MAAIF.

4.11.2 List of factors that may affect the attainment of PPR GCES in Uganda by 2030

District authorities listed the following factors as critical to attain PPR GCES if addressed

- Uncontrolled animal movement within and outside the country
- Lack of efficient animal identification and traceability system
- Inability to identify the disease at source affects handling of PPR outbreaks
- PPR vaccine not readily available to support containment of disease at source
- Lack of knowledge, skills and experience in handling the disease

- Lack of funding for disease surveillance and control
- Lack of vaccines
- Some farmers are not cooperative in implementing animal disease control activities
- Disjointed collaboration with MAAIF, districts and other players
- Weak animal movement control enforcement
- Low farmer awareness
- Lack of funding for PPR control and eradication projects
- Poor funding from local government
- Poor laboratory capacity

The highly ranked factors (very important), critical for PPR GCES in Uganda by 2030 included: the shortage of PPR vaccines, lack of motorcycles by field staff, lack of funding for field activities, failure to screen animal supplies (goats and sheep) and ineffective movement restriction of animals.

The factors that ranked (important) for consideration in pursuing PPR GCES included:

- Lack of holding facilities to check disease in recently introduced/in transit animals
- No intervention to demonstrate the absence of the disease yet
- No SOP for PPR risk mapping
- Unregulated animal movements
- PPR vaccine not available
- Poor funding to local government
- Poor private sector involvement in the control of animal diseases in the district
- Poor linkage between central and local governments veterinary services
- Lack of surveillance capacities and lack of awareness communities, are not yet sensitized against the disease
- Delayed or unavailability of PPR vaccines ahead of outbreaks
- Inadequate vaccines allocated to districts for PPR control
- Frequent transhumance and communal grazing
- Impassable terrain in some subcounties and
- Poor roads in rainy seasons.

4.11.3 Estimate district annual losses due to PPR

Districts gave an indication of losses due to PPR outbreaks, based on expert opinion (Table 8).

The average annual estimate losses to PPR per district—UGX 4,493,506,467. The budget requirement to control PPR per district per year—UGX 46.6 million.

Table 8. Estimate annual losses to PPR in Uganda

Districts	Approximate annual loss due to PPR control (UGX) in different districts	Total estimate annual losses associated with PPR per district (UGX)
Rubanda	6,000,000,000	6,000,000,000
Kiruhura	10,800,000,000 (approximately 10 billion was lost in 2017 alone) Approximately 300 million lost annually for other years	10,800,000,000
Namayingo	Over 150 million	150,000,000
Nebbi	196 million	196,000,000
Moroto	Mortality—1,634,725,000 Weight loss (at least 1 kg)—538,160,000–3,587,733,333 Milk loss (200 million litre)—28 million –70 million Skin/hide loss (20 thousand per skin), 29,074,000	5,321,532,333
Total losses for 5 districts		22,467,532,333

Exchange rate: USD 1 = UGX 3,704.06 in October 2020.

4.11.4 Estimate district annual budget requirements to control PPR in Uganda

District officials estimated the annual budget requirement to control PPR in Uganda, as shown in Table 9.

- Average vaccination requirement per district = $186,400,000/4 = \text{UGX } 46.6 \text{ million}$
- Estimate national annual expense on vaccination = $46 \text{ million} \times 135 \text{ districts} = \text{UGX } 6.291 \text{ billion}$
- This cost excludes vaccine purchase which is believed to be a function of MAAIF.

Table 9. District annual budget estimate to control PPR in pursuit of GCE

Districts	Approximate annual district expenditure on PPR control (UGX)—breakdown	Approximate annual district expenditure on PPR control (UGX)
Kiruhura	(i) Staff training—4 million (ii) Farmer sensitization 30 million (iii) Logistics 10 million (one off)	44 million
Namayingo	11 staff 1 million $\times 11 \times 4 \text{ quarters} = 44 \text{ million}$ DVO supervision $2 \text{ m} \times 2 \text{ staff} \times 4 \text{ quarters} = 16 \text{ million}$ Report submission and vaccine collection—4 million	64 million
Nebbi	Estimate small ruminant population (350,000 vaccination 28 million; Fuel + allowances—20.4 million)	48.4 million
Moroto	30 million	30 million
Total		186.4 million

4.11.5 District specific recommendations for improved PPR control in Uganda

For effective and efficient PPR control in Uganda, district-specific recommendations made included:

- Undertake public awareness and farmer sensitization

- Enforce animal disease control legislation
- Undertake continuous surveillance for PPR and other small ruminant diseases
- Budgetary provision for PPR control and eradication
- Increase staffing in districts
- Strengthen animal movement control
- Continuous professional development courses on disease outbreak investigation and reporting
- Strengthen inter-agency collaboration between MAAIF, DLGs and other players
- Routinely vaccinate over 85% of shoats
- Support districts with laboratory equipment and reagents for PPR detection
- Provide enough vaccines for annual vaccination of goats and sheep
- Provide enough funds and logistics for vaccination
- Rapidly confirm and respond to suspected outbreaks
- Build staff capacity—training on PPR epidemiology
- Quarantine/isolate or screen animals before supply
- Develop a PPR preparedness (contingency) plan.

4.11.6 Challenges and opportunities for PPR control

Fifteen personnel representing 15 key stakeholders, were interviewed regarding their understanding of constraints, challenges, contributions or opportunities to PPR GCES in Uganda by 2030:

- All 15/15 (100%) respondents considered PPR a serious problem in Uganda
- On whether PPR control and eradication in Uganda is feasible by 2030, 6/15 (40%) participants responded in the affirmative, 7/15 participants dissenting and 2/15 participants (13%) were not sure

4.11.7 Key findings on legal review for animal health systems and coordination mechanisms

The key findings revealed that the following matters constrain the national veterinary services:

- a. Decentralized veterinary services and associated disruption of the veterinary chain of command, following the implementation of the Local Government Act Cap.243.
- b. Inadequate human, physical and financial resources to undertake disease control.
- c. Lack of public–private partnerships to promote the control of animal diseases, including PPR.
- d. Outdated policy and legislation not compliant with OIE requirements and other international standards which include, the Delivery of Veterinary Services Policy (2010), the Animal Diseases Act, Cap. 38, the Veterinary Surgeons Act, Cap. 277, Cattle Traders Act, Cap. 43 and the Cattle Grazing Act, Cap. 42.
- e. Inadequately regulated or obsolete legal framework to regulate veterinary laboratories.
- f. Inadequate capacity to control animal and public health diseases.

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- g. Inadequate disease control infrastructure that includes quarantine stations, holding grounds and slaughterhouses.
 - h. Lack of an efficient vaccine distribution system that ensures availability and accessibility countrywide.
 - i. Lack of a national animal identification and traceability system.
 - j. Weak animal disease detection, surveillance and reporting system.
 - k. Lack of coordination mechanism between the central government, the local governments and all the stakeholders.
 - l. Lack of coordinated and synchronized cross-border disease surveillance, animal movement and vaccination mechanisms against priority transboundary animal diseases.
 - m. Limited budgetary allocation to the agricultural sector.
 - n. Lack of a compensation policy and mechanisms for disease control and eradication.
 - o. Inadequate supervision of veterinary surgeons, paraveterinary professionals and community animal health providers.

5 Discussion

PPR is one of the most devastating diseases of goats and sheep in Uganda and over 70 countries in Africa, middle and near East, Central and East Asia. It is responsible for up to USD 2.1 billion annual economic losses severely affecting the lives of 300 million poor rural families that rely on sheep and goats to make a living. Its impacts are more felt among the impoverished and vulnerable communities, especially the women and youths who largely depend on goats and sheep as cash accounts. The disease can entrench poverty, malnutrition, unemployment and insecurity. It has now been targeted for global eradication by 2030 (GREP), basing on the experiences that led to the eradication of rinderpest in the 1990s. PMAT self-assessment of national veterinary services indicated that out of 34 outcome indicators, Uganda fully achieved only 2.9% while 38.2% partly.

Apart from endorsing the national PPR control and eradication strategy, the formation of national PPR committee and distributing 1,190,800 doses of PPR vaccine (2016–2020), there is no full country commitment to eradicate PPR by 2030. This situation is more compounded by the declining trend in passive animal disease reporting from (60%) in 2011 to (27.6%) in 2020, attributed to fewer donor-supported projects. The meagre budget allocation to MAAIF of UGX 62.35 billion (0.44% of total budget allocation for 2018/19), including animal health and the diversity of investments required further indicate that the sector is heavily underfunded hence performing below the 10% budget allocation recommendation as per the Malabo declaration (AU 2014). Successful rinderpest eradication was dependent on heavy investments and donor funding to different countries through Pan African Rinderpest Campaign (PARC 1986–1999) worth EUR 115 million in 34 countries and the Pan African Program for the control of Epizootics (PACE 2000–2007) worth EUR 77 million in 32 countries. Currently, there is no dedicated national budget for PPR control in Uganda and donor support for animal disease control projects is limited. Development partner-supported projects have significantly reduced and since 2016, only two PPR projects have been supported:

- A collaborative project by the University of Florida, Tufts University, Makerere University and Mercy Corps in Karamoja region to assess innovative approaches to PPR control using the thermostable vaccine, Community Animal Health Worker Systems and Participatory Disease Search (Feed the Future Innovation Lab for Livestock Systems 2019).
- Boosting Uganda's investments in Livestock Development (BUILD 2019–2023) funded by the German Ministry for Economic Cooperation and Development and implemented by ILRI in partnership with the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), the National Livestock Resources Research Institute (NaLIRRI) together with the Friedrich-Loeffler Institut (FLI), Island of Riems, Germany, Vétérinaires Sans Frontières (VSF) Germany and Free University of Berlin (FU Berlin), Germany. The USD 7 million project aims to control peste des petits ruminants, Rift valley fever, antimicrobial resistance and promote veterinary public health at the point of slaughter in Uganda.

The average annual estimate losses to PPR per district is UGX 4,493,506,467 (approximately USD 1,206,737) compared to the annual budget to control the disease per district of UGX 46.6 million (approximately USD 12,515) without the cost of vaccines. This could be the reason as to why 40% of the respondents were sceptical that PPR is eradicable in Uganda by 2030. The fact that the cost of PPR vaccine is USD 0.06 (0.001%) of the average value of a goat (USD 54), farmers and private sector would perhaps reduce the required amounts by almost half. Farmers in Sembabule district were desirous

to paying for PPR vaccines if they are readily available. The diverse production systems and farming dynamics dictate location-specific approaches and targeted vaccinations to control PPR. PPR vaccinations in Karamoja are purely public sector driven and funded by government or development partners, whenever funds are available. Vaccine-demand by farmers increases whenever outbreaks occur and private companies find it hard to stock vaccines in anticipation of outbreaks. Several companies have the capacity to import the required PPR vaccines in Uganda but are challenged by limited farmer demand and in some cases, perceived competition with government systems. Currently, there is no initiative to produce PPR vaccine locally; besides, such factories may make more commercial sense if coordinated regionally to market in more than one country.

It is encouraging to note that Uganda has up to 43 veterinary laboratories distributed throughout the country. The relative rating of laboratories indicated that 51% of the laboratories ranked very low. Thirty, out of 43 laboratories (70%) recently recruited laboratory technologists, indicating a general increase in staffing levels. It is further interesting to note that farmers themselves through Uganda Meat Cooperative Union have setup two laboratories. However, the National Animal Disease Diagnostics and Epidemiology Centre (NADDEC) remains the only laboratory in the country with the capacity to test for PPR. The declining trend in passive animal disease reporting signals a much less performance in laboratory disease confirmation and reporting. It was further revealed that only 52 PPR outbreak-events were picked by event mobile phone application (EMA-i) in 9/45 (29%) of the districts were commissioned (July 2013–April 2020). However, the total disease events in Uganda ever picked by EMA-i were well over 1,333 indicating that this technology may have underreported PPR, perhaps due to confounding disease presentation in the field and the fact that most practitioners are not yet very familiar with the disease to facilitate efficient reporting. PPR outbreak data indicated that the disease is now present in over 80/135 (59.3%) districts in Uganda, the highest risk being in the Karamoja, West Nile and Southwestern regions. By using participatory epidemiology and serological and molecular tests, two hotspots were identified in Karamoja (Nkamwesiga et al. 2019) indicating that PPR virus transmission is not generalized, hence the need to apply location-specific interventions.

Currently, Uganda has over 393 veterinarians and 1,132 paraveterinarians within the public animal health services. The government has developed guidelines for continuous professional development training for veterinarians and paraprofessionals. Under the National Development Plan III, the government is emphasizing the need for public, private partnerships in service delivery as a way of increasing efficiency and equity of service delivery. There is no clear institutional mechanism of full participation of private-sector animal health service providers in the control of PPR or other transboundary animal diseases. Non-governmental organizations and other development agencies supported the training and equipping of CAHWs only in Karamoja. UVB does not recognize CAHWs as competent animal health service providers apart from special situations like insecurity or hard-to-reach areas.

The PVS gap analysis (OIE 2011) pointed out that the government prioritized free vaccinations against PPR. However, the government only procured vaccines after 2016 and even then, supplies were inadequate to fulfil the district demands. This study underscores the need for the public sector to provide opportunities for the private sector to thrive and drive the economy. The major aim of the vaccination program is to prevent the disease rather than ad hoc vaccination following outbreaks. The current approach is termed 'political vaccination' given that it responds to outbreaks with a few doses of vaccines distributed to districts whenever outbreaks occur. The number of vaccine doses to districts (2016–2020) is 10 thousand while the total vaccines distributed were 1,190,800 doses, far less than 20 million goats and sheep countrywide. The districts that received the highest number of PPR vaccine doses included Amudat, Amuria, Kaabong, Kotido, Kiruhura, Lyantonde, Moroto, Nakapiripirit, Napak, Sembabule, Kween and Isingiro. Quite often, the districts get vaccines long after the outbreaks occur, due to lengthy fund requisition and procurement approval processes that last over 8 weeks. There is no PPR vaccine-producing factory in Uganda; hence procurement and importation can be tedious and lengthy, further affecting the need to containing outbreaks at the source. To this end, it is imperative that farmers and other key stakeholders should be empowered to participate in deriving priorities of the sector. The effective control program for PPR or other priority diseases is dependent on key stakeholder participation and involvement, including

gender considerations, at national and subnational levels. The national PPR committee is not empowered, influential, nor active. The cabinet and general public ought to be aware of the PPR GCES 2015 by now and therefore demand for political will. There is a need to fast track dissemination of the national PPR control and eradication strategy, development of a cabinet memo, policy paper and general guidelines required for control and eradication of PPR by 2030. This is achievable through harmonization of activities nationally and regionally, including integration with other sectors like wildlife while linking with the markets to ensure competitiveness and profitability. The PVS follow up mission to Uganda (OIE 2018) indicated that external coordination of veterinary services in Uganda is rated high. This could be used as an asset to present a case for improved resourcing for the sector.

The current attenuated PPR vaccine strain (PPR NIG/75/1) is protective against all the four lineages of PPR virus (Diallo et al. 1989b; Baron et al. 2017) and is in wide use in Africa, Middle East and parts of Asia. The Sungri PPR vaccine strain is often used in India (Siddappa et al. 2014). Both vaccine strains are cross-protective and can illicit immunity that lasts up to 3 years. It is now ideal to eradicate PPR virus in the world (Njeumi et al. 2020) because:

- most small ruminants can be vaccinated at least once in their lifetime to remain protected
- available vaccines are safe, affordable and accessible
- technology for thermostable and combination vaccines is available
- vaccine quality assurance system is available at AU-PANVAC, Ethiopia.

It is important to understand the epidemiology of PPR virus in domestic and wild animals, including the use of DIVA and pen side tests to optimize control options. Uganda already has a laboratory network in place and can greatly benefit from regular information exchange and technology transfer. Lack of a robust animal identification and traceability system remains a big challenge in Uganda. An electronic animal disease identification and traceability system is under development for use by MAAIF under the market-oriented beef export project (MOBIP). Some farmers and traders ignore the need to obtain animal movement permits for goats and sheep, compared to cattle. Technology advancement and adoption very much depends on wider stakeholder involvement.

Control of PPR may be more beneficial if not done in isolation and consideration given to the production system in place and other small ruminant diseases prevalent like CCPP, goat/sheep pox, Foot-and-mouth disease, Bluetongue, Orf, Rift Valley fever, pasteurellosis, ticks and tick-borne diseases, helminthosis and brucellosis. The benefits of goat or sheep farming are many and include high twinning rate, rapid multiplication and resistance to diseases, quick market access, high meat preference and easy management. This has attracted many government and NGO programs to design goat/sheep restocking projects to contribute to poverty alleviation. This has greatly contributed to the spread of various animal diseases in the country hence the need to observe prescribed sanitary measures including preshipment quarantine, inspection and testing of animals.

6 Conclusions and recommendations

6.1 Conclusions

6.1.1 Animal health technical aspects

6.1.2 Animal health systems

- The laboratory system should work with a higher level of efficiency than in Stage 1, biomolecular techniques, Laboratory Information Management System and studies on the understanding of circulating PPRV strains fully operationalized.
- The surveillance system is partially strengthened, mainly in its passive component.
- A targeted vaccination campaign is partly implemented.
- Additional measures are partially put in place to ensure the success of the vaccination campaign.
- The legal framework is partially supportive of the control and prevention activities.
- The stakeholders partially contribute to the control efforts foreseen in Stage 2.
- There is limited private sector participation in animal disease control activities.

6.1.3 Animal health coordination mechanisms

- Delivery of veterinary services in Uganda is decentralized.
- Funding for MAAIF is far below 10% Maputo declaration recommendation.
- Uganda is at Stage 2 of the PPR GREP, supported by the national PPR control and eradication strategy and the national PPR control and eradication committee.
- The National Animal Disease Surveillance System in Uganda is not operationalized due to lack of national steering and technical committee.
- The Uganda National Animal Health Network (UNAHN), composed of laboratory, epidemiology, wildlife and one health subnetworks, can contribute greatly to animal health information exchange and disease control, but is not fully functional nor supported.

6.2 Animal health legal reforms

- Several veterinary legislation requires amendment or revision to facilitate improved animal health surveillance and coordination mechanisms including:
 - The Animal Diseases Act, Cap. 38 be amended to incorporate the new proposals.

- The Veterinary Surgeons Act, Cap. 27 is limited in scope as it only covers aspects of veterinary surgery and not veterinary paraprofessionals.
- There is no regulation on CAHWs with consequences for animal production as well as animal and human health.
- Cattle Traders Act, Cap. 43 is limited to cattle and cannot appropriately apply to other species.
- There is no law in Uganda to provide for animal identification and traceability.
- Stakeholder engagement in disease surveillance is limited by lack of national surveillance steering and technical committee(s).
- There are no established guidelines for establishing animal health innovation platforms in Uganda in spite of the enormous potential to address the organizational constraints of the livestock value chain actors.
- The Public–private Partnerships Act 2015 can also apply to animal health service delivery including vaccination, infrastructure development, laboratory services, surveillance and community mobilization.

6.3 Recommendations

The government has the responsibility for control of animal disease in Uganda, including manufacturing, importing and distributing vaccines and other inputs. On the other side, the characteristic of the small ruminant husbandry system in Uganda, the very high number of households having only a few animals (but at the same time representing an important asset in the family economy) calls for a multi-stakeholder approach which requires a territorial and household access even higher compared to the one required in the past for the rinderpest eradication, which cannot be guaranteed by an underbudgeted and understaffed ministry.

Proactive engagement of the private sector in the PPR control and eradication will offer a possibility to increase the number and enhance distribution of private animal health service providers at the national level, directly increasing the capacity to control and reduce the incidence of other diseases affecting small ruminant production. Currently, there are limited options for ensuring private sector participation and no large-scale vaccine or animal health input manufacturers. A clear model of implementation of disease control has to be developed to engage the private sector for purposes of promoting equitable distribution, control, availability and access to veterinary vaccines working as an outreach of the public sector under the 'sanitary mandate' enhancing the public sector capacity of its instrumental functions such as monitoring, coordination, supervision and quality assurance.^{1,2} It is pertinent that a catalytic project is developed to spur the necessary changes for control and eradication of PPR at local government, national, regional and international levels, including the political will and assurance that the community level stakeholders take part in the decision-making process, have access to necessary inputs for efficient and effective animal disease control. Refer to Appendices 10, 11 and 12 for programmatic and administrative approaches.

Specific policy recommendations

The government should implement the following policy recommendations:

- a. Return veterinary services to the central government by amending the Local Government Act Cap. 243 to strengthen the chain of command with Chief Veterinary Officer (CVO).
- b. Prioritize control of key animal disease epidemics in accordance with pathways for PPR, Rabies and Foot and mouth disease global (OIE/FAO) and national control and eradication strategies that provide for eradication by 2030.

¹ Drira H. and Le Brun Y. 2008. Deuxième mission d'appui au fonctionnement du mandat sanitaire. Projet de renforcement des services d'appui à l'agriculture. Prêt BIRD (Banque internationale pour la reconstruction et le développement) n°7063-TN.

² www.oie.int/publicprivatepartnerships.

This will be implemented by providing adequate human, physical and financial resources to enable the veterinary services to undertake all aspects of disease control.

- c. Strengthen public–private partnerships to promote the efficient control of animal diseases, including: surveillance, vaccinations, testing, diagnosis, awareness, sensitization, biosecurity, infrastructure development and disposal of dead animals.
- d. Reform and review the policy and legislation for animal disease prevention and control measures. The policy and legislation should include the delivery of veterinary services policy (2010), the Animal Diseases Act, Cap. 38, the Veterinary Surgeons Act, Cap. 277, Cattle Traders Act, Cap. 43 and the Cattle Grazing Act, Cap. 42.
- e. Enact a legal framework for the national veterinary laboratory services to promote coordination, synergy and functionality of testing facilities.
- f. Strengthen the capacity of veterinary diagnostics, surveillance, vaccination and awareness services through efficient animal disease control services, including domestic animal, wild animal and environmental pathogens to promote one health.
- g. Advocate for infrastructure that includes quarantine stations, laboratories, vaccine cold rooms/fridges, holding grounds and slaughterhouses.
- h. Establish a robust and efficient vaccine distribution network that ensures availability and accessibility countrywide. Consideration should be made of the unique challenges faced at the local levels, including the availability and accessibility of quality vaccines to stakeholders who include farmers and veterinarians at the community level to enhance private sector driven initiatives.
- i. Establish a national animal identification and traceability system.
- j. Establish the national surveillance steering committee, provided for under the national surveillance plan and national animal disease surveillance strategy to improve reporting and coordination of animal disease control.
- k. Establish disease control committees to enhance coordination between the central, local governments and other stakeholders.
- l. Enhance/strengthen coordinated and synchronized cross-border disease surveillance, animal movement and vaccination mechanisms against priority transboundary animal diseases through bilateral agreements. Cross-border coordination mechanisms exist with the Republic of Kenya and South Sudan.
- m. Advocate for an increase in the budgetary allocation to the agriculture sector as per the 10% recommendation from the Maputo Declaration on Agriculture and Food Security (2003).
- n. Establish a compensation policy and mechanisms for PPR eradication.
- o. Adequately supervise the delivery of the veterinary services, including an independent framework for regulating community animal health providers.

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Appendices

Appendix 1. Persons consulted on animal health systems and coordination mechanisms contributing to PPR global control and eradication by 2030

	Name	Title	Institution	Contact
1	Hannington Katumba	DVO	Rubanda District	777538911
2	Asiimwe Grace	DVO	Kiruhura District	782672805
3	Dr Kafuma Paul	DVO	Wakiso District	775461210
4	Dr Henry Mulondo	DVO	Kabarole District	782165915
5	David Mugabi	DVO	Mpigi District	
6	Dr Mangeni George Otebero	DVO	Namayingo District	772649529
7	David Kiryabwire	DVO	Mukono District	776635555
8	Abedkane William	DVO	Nebbi District	772906783
9	Dr Okino Moses	DVO	Mototo District	773129994
10	Ssali Angelo	DVO	Sembabule District	772384959
11	Ruhinda Kagoro	Manager	UMPCU	772366951
12	Lumu Paul	SVO/Nat. PPR FP	NADDEC/MAAIF	772828689
13	Joseph Nkamwesiga	PhD student (PPR epidemiology)	BUILD project	703492715
14	Peter Lule Mulindwa	PhD student (PPR socio-economics)	BUILD project	759127931
15	Alex Mabirizi	MSc student (PPR combination vaccines)	BUILD project	773472524
16	Poncianah Akumu	Veterinarian	Mercy Corps	782750693
17	Sessanga Sam	SVO/project coordinator	MAAIF	772573752
18	Hamis Ssemenda	Farmer	Farmer	773343283
19	David Dowdy	Farmer (goat breeder)	Farmer	782486749
20	Gerald Nizeyimana	Consultant	Consultant	773049283
21	Henry Busulwa	President	UVPPA/NAGRIC	772624755
22	Sylvia Baluka	President	UVA	775043052
23	Esau Martin	Laboratory technologist	NADDEC	772350517
24	Frank Mwiine	Professor	COVAB	787405220
25	Susan Kerfua	Scientist	NALIRRI	772895904
26	Joshua Waiswa	Epidemiologist	VSFG	779342175
27	Claire Akwongo	Veterinarian	VSFG	777153585
28	Joseph Sserugga	SVO/NADDEC	NADDEC	772370529
29	Lokiru Sisto Dodoth	CAHW/Farmer/Ago-entrepreneur	Moroto	7031845034

Appendix 2. Sectoral budget allocation (2018/19) and projected budget (2021/22) in UGX

Sectors	Sectors	2018/19 approved budget (billion)	Budget allocations (%) 2018/19	2021/22 budget projections (billion)	2021/22 budget projections (%)
Agriculture	MAAIF	62.35	0.44	1,061.65	5.8
Security	MOS	1,708.75	12.01	2,073.03	11.4
Works and transport	MOWT	2,791.59	19.63	3,448.89	18.9
Education	MOES	2,444.23	17.18	2,901.69	15.9
Health	MOH	1,240.1	8.72	1,469.75	8.1
Water and environment	MWE	440.17	3.09	531.84	2.9
Justice/law and order	MOJ	1,295.12	9.11	1,534.64	8.4
Accountability	MFPED	970.44	6.82	1,253.18	6.9
Energy and mineral development	MEMD	564.42	3.97	592.82	3.3
Trade and industry	MTIC	122.01	0.86	158.02	0.9
Tourism	MTWA	32.64	0.23	42.43	0.2
Lands, housing and urban development	MLHUD	66.2	0.47	81.22	0.4
Social development	MGLSD	195.42	1.37	244.77	1.3
ICT and national guidance	ICT	54.57	0.38	68.61	0.4
Public sector management	OPM	1,044.63	7.34	1,186.18	6.5
Public administration	MOPS	624.05	4.39	818.23	4.5
Legislature	PC	497.8	3.5	650.78	3.6
Science, technology and innovations	MOSTI	69.59	0.49	88.49	0.5
Total		14,224.08		18,206.22	

Source: MFPED (2018). Adapted from budget call 2019/2020. (Exchange rate: USD 1 = UGX 3704.06 in October 2020).

Appendix 3. MAAIF subsectoral budget allocations and projections (UGX)

MAAIF subsectors	2018/19 approved budget (billion)	Budget allocations (%)	2021/22 budget projections (billion)
MAAIF	144.47	21.2	404.26
DDA	5.74	0.842	7.11
NAGRIC&DB	11	1.613	13.32
NARO	62.35	9.146	73.91
NAADS	249.98	36.667	300.29
UCDO	4.99	0.732	6.1
UCDA	73.59	10.794	101.55
LGCS	122.97	18.037	147.06
KCCA	6.66	0.977	8.04
Total	681.75		1,061.64

Appendix 4. Detailed results of PPR self-assessment findings (PMAT Stage 2) of the global control and eradication strategy for Uganda, September 2020

Outcome 1: The laboratory system works with a higher level of efficiency than in Stage 1, biomolecular techniques are introduced
The country has the capacity to perform biomolecular tests in compliance with international laboratory standards (partially achieved). The country has a national veterinary reference laboratory (NADDEC)
There is a good understanding of all the PPR strains circulating and their distribution across the country (partially achieved). Only in the Karamoja subregion. The rest of the country not known
The LIMS is the central repository of PPR information generated by the PPR laboratory network and serves as a data management control tool; it is also responsible for the generation of laboratory management reports and dissemination of PPR information. PPR data is dispersed in different diagnostic and research laboratories (not achieved)
Outcome 2: The surveillance system is further strengthened, mainly in its passive component
The network of slaughterhouses (and slaughter slabs) throughout the country is fully contributing to the passive component of the national surveillance system (not achieved). No deliberate efforts to collect PPR data. Focus is on public health diseases
The national surveillance system in place can capture PPR events in wildlife (which provide good indications of a possible spill over from small domestic ruminants) (not achieved). It is only during research
A list of wild animals susceptible to PPR is available and a possible case definition of PPR in wildlife is also available (not achieved). No official list available
The country fully benefits from its active participation in the regional epidemiological surveillance network (when existing) (not achieved). Not active
The training of veterinary paraprofessionals is of a uniform standard that allows the development of only basic specific competencies (not achieved)
The veterinary services conduct passive surveillance in compliance with OIE standards for some relevant diseases at the national level through appropriate networks in the field, whereby samples from suspected cases are collected and sent for laboratory diagnosis with evidence of correct results obtained. The veterinary service has basic national disease reporting system (achieved)
Ante and postmortem inspection and collection of disease information (and coordination, as required) are undertaken in conformity with international standards for export premises and all abattoirs producing meat for distribution in the national and local markets (partially achieved). Achieved for the export market
There are formal external coordination mechanisms with clearly described procedures or agreements for some activities and/or sectors (partially achieved)
Outcome 3: A targeted vaccination campaign is implemented
The PPR vaccination campaign is delivered according to the risk-based control strategy (not achieved). Vaccinations are conducted following reports of the disease clinically or laboratory. Confirmation in the district
The vaccine distribution and delivery system are monitored on a regular basis and allows for immediate corrective actions if needed (not achieved). Not done
The vaccines used to comply with OIE quality requirements (partially achieved). Certificate of compliance from the regional reference laboratories
Most veterinary and other professional positions are occupied by appropriately qualified personnel at local (field) levels (partially achieved). The approved structure is in place, but there is laxity to adherence

Most technical positions at local (field) levels are occupied by personnel holding appropriate qualifications (partially achieved). The approved structure is in place, but there is laxity to adherence
There are internal coordination mechanisms and a clear and effective chain of command for some activities (partially achieved)
The veterinary services have suitable physical resources at national, regional and some local levels and maintenance and replacement of obsolete items occur only occasionally (not applicable). Inadequate at national, lacking completely at regional, inadequate at district. Insufficient or lack of maintenance
Funding for new or expanded operations is on a case-by-case basis, not always based on risk analysis and/or cost-benefit analysis (not applicable). Case by case basis
The veterinary services implement prevention, control or eradication programs for some diseases and/or in some areas with the scientific evaluation of their efficacy and efficiency (not applicable)
The veterinary services have implemented biosecurity measures that enable it to establish and maintain disease-free zones for selected animals and animal products, as necessary (not applicable)
Outcome 4: Additional measures are put in place to ensure the success of the vaccination campaign
The PPR epidemiological situation is further understood thanks to the systematic investigations of PPR clinical outbreaks (not achieved)
The vaccination measures have been further consolidated, considering the results of systematic PPR clinical outbreak investigations (not achieved)
The unregulated movements of small ruminants are not affecting the effectiveness of the control measures in Stage 2 (not achieved)
The veterinary services regularly analyse records and documented procedures to improve efficiency and effectiveness (partially achieved)
Outcome 5: The legal framework is fully supportive of the control and prevention activities
The impact of the control measures has been evaluated (not achieved)
The legal framework includes the necessary provisions for implementing the control measures foreseen in Stage 3 (notably compulsory vaccination of sheep and goats in the country or zone) (not achieved)
The legal framework provides for the financing of PPR control measures, such as operational expenses (not achieved)
The legal framework defines the prerogatives of veterinarians and veterinary paraprofessionals in PPR prevention and control measures (not achieved)
Veterinary legislation is generally implemented. As required, the veterinary services have the power to take legal action/initiate prosecution in instances of noncompliance in most relevant fields of activity (partially achieved). Using the Animal Diseases Act as amended
Outcome 6: The stakeholders fully contribute to the control efforts foreseen in Stage 2
The livestock keepers and other actors (forest guards, etc.) fully act as sentinels for the early detection of PPR clinical outbreaks (not achieved)
The livestock keepers are actively contributing to the implementation of the control measures foreseen in Stage 2 (partially achieved). Report the disease and bring their animals for vaccinations
The Veterinary Services ensure communication of PPR legal framework and related documentation to involve the various stakeholders (partially achieved) actively
The veterinary services contact point for communication provides up to date information, accessible via the internet and other appropriate channels, on activities and programs (partially achieved)

Source: MAAIF PPR self-assessment, October 2020.

Appendix 5. Individual perceptions and indication of organizational contributions to PPR GCES in Uganda

I. Uganda Veterinary Association (UVA)
<p>It is the umbrella professional organization of all veterinarians in Uganda. Its contribution to PPR GCES includes:</p> <ul style="list-style-type: none"> · Support to MAAIF and other partners in all animal health plans and interventions · Part of the national PPR steering committee · Supported the development of national PPR control strategy · Professional mobilization <p>Challenges to the attainment of objectives of GCES by 2030</p> <p>Lack of prioritization</p> <ul style="list-style-type: none"> · Lack of resources and projects to control PPR · Underfunding for association activities <p>Recommendations</p> <ul style="list-style-type: none"> · Need PPR dedicated projects · Approve the national PPR control and eradication strategy · Strengthen central unit PPR coordination · Undertake socio-economic studies to justify investment/highlight the benefits of control · Develop consensus with different stakeholders (farmers, involve women) · Improved PPR diagnostics, surveillance and disease confirmation · Support training of veterinarians and paraprofessionals · Let vaccines be available locally <p>Comment</p> <p>Compared to FMD, PPR is easier to eradicate. It is a significant disease to secure livelihoods of the poor, women, landless and other smallholders</p>
II. Uganda Veterinary Paraprofessional Association (UVPP)
<p>It is the umbrella professional organization of all paraveterinarians in Uganda. Its contribution to PPR GCES includes:</p> <ul style="list-style-type: none"> · Mobilization of paraprofessionals to take up continuous professional development (CPD) · Supporting participation in professional and scientific meetings for capacity building, coordination and professional standards · Supporting disease surveillance and control <p>Challenges to the attainment of objectives of GCES by 2030</p> <ul style="list-style-type: none"> · PPR is not easily diagnosed/identifiable by most practitioners · Lack of laboratories · Not easy to get samples from the field as farmers assume it is pneumonia · Most clinicians ignore goats (concerned more with cattle) · Lack of stakeholder awareness of PPR is lacking <p>· No specific recommendations from commissioner animal health on PPR</p>

<p>Recommendations</p> <ul style="list-style-type: none"> · Just like for rinderpest, there's need for specific high-level organizations to lead PPR control · Feasible multi-sectoral/multi-disciplinary PPR control plans · A strong PPR control coordination office, managed at least by assistant commissioner level and above to influence decision-making · Need for strong coordination mechanism with local governments and other institutions · Vaccines should be free · Need specific organizations to spearhead public sensitization on PPR · Focus on export promotion to facilitate trade in goats · Improve the productivity of goats and sheep through better genetics · Funding for PPR control should be available and accessible from government and development partners <p>Comment</p> <p>Most people associate PPR with bacterial infections. Few studies so far have been undertaken on the disease. Paraprofessionals have a big role to play as foot soldiers in PPR control they need training, back up and support</p>
<p>III. College of Veterinary Medicine Animal Resources and Biosecurity (COVAB), Makerere University</p>
<p>It is a national training and research institution. Its contribution to PPR GCES includes:</p> <ul style="list-style-type: none"> · Research several publications on PPR (about 10) · College teaching to create awareness impacted over 500 alumni since PPR outbreak in Uganda (50 students per year × 10) · Surveillance and disease diagnosis <p>Challenges to the attainment of objectives of GCES by 2030</p> <ul style="list-style-type: none"> · PPR is not easy to control animals move to/from other countries · Open grazing in most parts of the country · National coordination lacking after the departure of the former coordinator · Vaccination is on small-scale · Smallholder farmers not yet impacted · Institutional challenges at MAAIF · PPR is now widespread in the country <p>Recommendations</p> <ul style="list-style-type: none"> · Target smallholder farmers · Need government effort to scale-out vaccinations · National vaccination program required to harmonize district interventions · Regional vaccination program required to harmonize actions at the regional level · Resource mobilization and campaign · Mobilize stakeholders along the small ruminant value chains and ensure they are ready and willing to participate · Devise tactical pathways for PPR control and eradication understand the local situation and other factors for uptake (political, financial, literacy, human resources etc.) <p>Comment</p> <ul style="list-style-type: none"> · Policies are in place but require enabling environment

- Strengthen government structures (rinderpest was controlled through government structures)
- The private sector is profit-oriented and may exploit the opportunity

IV. Uganda Meat Producers Cooperative Union (UPMCU)

It is a membership cooperative union for livestock farmers, supported by MAAIF. Its contribution to PPR GCES includes:

- Advise farmers on control measures and possible signs for PPR identification in the field
- UPMPCU is a channel for sensitization of farmers
- UPMPCU supports distribution of vaccines to farmers
- UPMPCU supports animal disease reporting to national authorities

Challenges to the attainment of objectives of GCES by 2030

- Farmers are not sensitized about PPR and do not know its local name
- Economics for goat farming and PPR control are not yet well known/understood goats multiply faster and are more profitable than cattle
- Some veterinarians and paraveterinarians do not understand the disease
- There are no protocols for efficient disease surveillance and reporting

Recommendations

- Training and protocols on animal disease surveillance and reporting
- Invest in PPR control and eradication
- Undertake active animal disease surveillance based on standard protocols (SOPs)
- Strengthen regional/continental approaches to PPR control
- Intensify regular vaccination once or twice a year
- Map out hotspots and apply regular biosecurity measures

Comment

PPR is currently of great concern in Kiruhura, Mbarara and Isingiro districts. It can cause up to 100% mortality in naïve farms. UPMPCU members more focused on cattle, especially on FMD and tick-borne diseases. PPR yet another challenge for UPMPCU in terms of resource mobilization. Estimated the annual trade in goats and sheep to amount to UGX 9 billion yet less investment required. Goats multiply faster, high reproductive rate and give many offspring per year

V. PPR research students ILRI/BUILD project/VSFG (3 PhD and 1 MSc)

Supporting research and capacity building for PPR control in Uganda:

- Undertaking studies on PPR epidemiology in Uganda
- Undertaking research on combination vaccines with PPR
- Implementing a project on PPR control trained personnel on PDS and initiating activities for improved animal and public health
- Undertaking research on combination vaccines with PPR

Challenges to the attainment of objectives of GCES by 2030

- PPR is poorly understood
- Control efforts not aligned to PPR GCES
- Rampant and unregulated animal movements

No data to support control efforts

- Farmers not yet on board for PPR control
- Rampant animal movements and uncooperative behaviour/attitude by some stakeholders people rarely get animal movement permits for goats
- Firefighting approach to control PPR (reactive)

Recommendations

- Create political will for PPR control
- Define incentives for farmers to participate in PPR control activitiesreactivate trade in small ruminants
- Explore the use of combination vaccines
- Enforce animal movement control
- Implement compulsory vaccination against PPR
- Organize cooperatives to facilitate uptake
- Develop a PPR control policy
- Develop a marketing chain
- Enforce a national quarantine systemall animals should go through this
- Develop a strong monitoring system
- Convince policymakers based on impact and sound data
- Bring onboard different stakeholders by creating awareness on PPR
- Lobbyists are required to create a case for investment to control PPRneed to be understood by policymakers

Comment

Political will is key. Marketing standards must be met/enforced. Uganda should target lucrative markets. A policy mechanism should be in place to encourage farmers to vaccinate against PPR and other SRDs

VI. Mercy Corps

Implementing several projects on animal health. To implement thermostable PPR vaccinations in Karamoja using public-private partnerships about 500 thousand doses planned. Have supported vaccinations in Karamoja including mobilization, stakeholder meetings and training of CAHWs on the revised curriculum

Challenges to the attainment of objectives of GCES by 2030

- No harmonized way of doing work
- Thermostable vaccine supply has delayed
- The vaccine is not always enough
- Vaccination not always logically applied (scattered efforts and approach)
- No clear strategy
- Some CAHWs think they know enough, not willing to learn
- Supervision of vaccinators is not sufficienti.e. cold chain maintenance

- Farmers lose trust in the system following vaccination failure (animals get diseases even after vaccination)

Recommendations

- Harmonize PPR control efforts with different players
- Need to evaluate the impact of PPR vaccinations

- Determine interventions based on community needs (not partners deciding for farmers)
- Need for MAAIF to regularly supervise field activities
- Need public private partnerships to enhance uptake
- Train and empower communities and other players to improve animal health

Comment

To vaccinate on public-private partnership (PPP): CAHW to get UGX 200 per animal for vaccination cost (government and project each contributes UGX 100). The community will also contribute UGX 50 to the vaccine hub for storage. Other partners on PPR control in Karamoja (FAO, Mercy Corps, Farm Africa, Welthunger, World Hunger Hilfe, Caritas, C&D, CRS). Supportive veterinary drugs should be a private good. Trying out veterinary drug business models for operating drug shops in Karamoja (partnered with Zoetis)

VII. MAAIF/project coordinator Sembabule goat export project

Support a national project on commercial goat production in Sembabule district working with Sembabule goat producers association

Challenges to the attainment of objectives of GCES by 2030

- Lack of awareness of the PPR GCES
- PPR is spread across many parts of the country
- Cold chain storage of vaccine is a challenge in some places
- PPR was introduced in Sembabule following the introduction of breeding goats from Kiruhura district in 2017

Recommendations

- Farmers only pay for vaccination when there is an outbreak
- The government should target goat export as a way of promoting PPR control

Comment

- Farmers know the economic importance of PPR
- Farmers demand for services
- Farmers can pay for vaccines and vaccination when mobilized. The project is now rolling out to 7 other districts and PPP (Nakaseke, Nakasongola, Gomba, Wakiso, Kyankwanzi, Mubende, Mityana and Kiboga)

VIII. Ham animal breeding farm Sembabule district

- Mobilizes farmers and sensitizes them about PPR and vaccination
- Developed a farm schedule on vaccination and treatment of goat diseases
- Promotes goat farming through networks with local, regional, national and international farmers who come to visit the farm
- Promotes collaboration with veterinary authorities to ensure that all the animal movements are authorized by travel permits

Challenges to the attainment of objectives of GCES by 2030

- Vaccine supply is inconsistent
- Vaccine is expensive
- Vaccine is not readily available
- Some farmers are not aware or responsive
- Vaccine packages are for 100 animals (each at 100 thousand UGX) hence not suitable for smallholder farmers
- No local name for PPR (still poorly understood)
- Other goat/sheep diseases: Sheep/goat pox, CCPP and Clostridial diseases. Farmers tend to manage other diseases (Trypanosomiasis, Brucellosis and worms)

Recommendations

- Vaccine should be readily available on the private market
- Vaccinate goats every year
- Government should subsidize PPR vaccinations
- PPR vaccines should be packaged in smaller doses as opposed to the current ones for 100 animals
- Support control of other goat/sheep diseases
- Empower lead farmers (those with big stock) to influence others
- All incoming/outgoing goats should be treated
- Continue sensitizing farmers
- Avail vaccines at a cheaper cost

Comment

PPR has reduced in Sembabule due to repeated vaccination and willingness to collaborate with government. Goats cannot move in Sembabule without movement permits farmers are involved in the control processes. Sembabule can take up to 200 thousand PPR doses every 6 months

IX. Joy children’s goat breeding farm (Originally Masaka but now in Mbale)

- Goat breeding and community support

<p>Challenges to the attainment of objectives of GCES by 2030</p> <ul style="list-style-type: none"> · Not sure <p>Recommendations</p> <ul style="list-style-type: none"> · Not sure <p>Comment</p> <p>Heard about the disease in Rwenzori and Karamoja regions</p>
X. Animal production expert/Food and Agriculture Organization of the United Nations
<p>Contribution</p> <ul style="list-style-type: none"> · FAO supported national PPR preparedness plan · Contributed to improved animal disease reporting through EMA-i · Staff capacity development on PDS and GEMP training · Support sample collection in Karamoja · Enhancement of cold chain facilities in Karamoja · Creating awareness <p>Supporting the development of CAHW manual</p> <ul style="list-style-type: none"> · Supporting vaccinations against PPR and other small ruminants in Karamoja (about 1.5 million since 2016) <p>Challenges</p> <ul style="list-style-type: none"> · Uncoordinated service delivery · Lack of synergy among partners · Preparedness plan not endorsed · No earmarked specific resources · Laboratory capacity in the regions is wanting · Surveillance and response activities are reactive and not systematic · GCES is not yet customized and popularized · Need data on livestock mapping and production systems · Research agenda is disjointed and not aligned to eradication effortsno need to research on thermostable vaccines if already proven that current vaccines are effective · Risk assessment not yet conducted to prioritize hotspots · Revise the Animal Disease Act to make it easily enforceable and punitive enough <p>Recommendations</p> <ul style="list-style-type: none"> · Harmonize PPR control efforts · Approve/endorse PPR strategy and preparedness plans · Develop and popularize PPR control guidelines · Technical capacity buildinglaboratories and surveillance activities · Develop business models for different value chain actors to determine incentives and profitability <p>Comment</p> <p>Compared to rinderpest, production systems have changed and animal movements increased</p>
XI. Sembabule district veterinary officer
<p>Contribution</p> <p>Controlled PPR outbreaks: 2018, 2019 and 2020 vaccinated about 25 thousand shoats per year. Vaccination has reduced the effects of the disease. DVO undertakes surveillance and submits samples for diagnosis. Promoted private sector interventions and sensitized farmers on the dangers of the disease</p> <p>Challenges</p>

· Reactive rather than proactive vaccination. Farmers wait to see sick goats before they can vaccinate. Had a challenge of goat pox (May 2020)

Recommendations

- Proactively vaccinate animals
- Vaccinate all goats consecutively every 3 years. Kids should be vaccinated every 6 months
- Ensure vaccine availability all the time not only during outbreaks
- Continue to support cooperation of farmers and traders all goats leaving Sembabule are through formal channels and move with permits
- Continue the support for goat production as a business goats are now receiving attention
- Support farmer associations and networks some groups have not taken off
- Support laboratory capacity development recently recruited a laboratory technologist for Sembabule veterinary laboratory

Comment

Vaccines are readily available in the private market. Importers only bring in the vaccine when there are outbreaks. Vaccinate routinely and not after outbreaks. The laboratory has picked up. Recently recruited a laboratory technician. The private veterinary laboratory is supportive. Goat producer associations have not taken off

XII. Lokiru Dodoth Sisto Farmer/community animal health worker, Moroto district

Contribution

- Sensitizing livestock keepers
- Promoting farm-level biosecurity avoiding contact with sick flocks
- Supporting vaccination programs

Challenges

- Poor training of CAHWs
- Poor sensitization of farming communities
- Some farmers deliberately do not present animals for vaccination due to cultural beliefs
- Co-morbidity with other diseases like CCPP (currently killing many goats)
- Some areas are hard to reach
- Lack of transport facilitation to reach out to communities
- Incursions (Pokot and Turkana animals from Kenya)
- Farmers are used to free vaccinations/ not sure that public private partnerships can take off in the short run
- Some animals are in inaccessible locations due to bad terrain, especially Tapac and Katetikile which are mountainous
- Sometimes the number of animals is underestimated and less vaccines provided
- Pre-occupation with cattle most farmers prioritize cattle over small ruminant diseases
- Most development partners left Karamojano direct support

Recommendations

- Avail vaccines closer to farmers
- Provide facilitation to CAHWs
- Provide vaccination infrastructure like crashes and dip tanks
- Train more CAHWs
- Harmonize animal disease control programs (vaccinations, surveillance and sensitization) with neighbouring communities along the border with Kenya

<ul style="list-style-type: none"> · Implement long term sensitization programs to avoid communal grazing · Work closely with local council authorities (LCs) to ensure compliance with vaccination programs · More support supervision of CAHW activities by district veterinary staff <p>Provide incentives to CAHWs for reporting animal diseases</p> <ul style="list-style-type: none"> · Improve animal health service delivery form more farmer groups and PPPs in villages to support training, sensitization, treatment and vaccinations · Support to women groups and include lady CAHWs in operations
Comment
<p>Has served farmers for over 7 years. Trained and equipped as a CAHW and does bull fattening and restocking businesses. Several organizations were involved in training and equipping CAHWs (FAO, KADEP, Mercy Corps and C&D). Goat CAHW kit and bicycle. Farmers can pay for ECF in cattle because it is a serious problem. It will take some time for communities to pay for PPR vaccinations since they are used to getting them free of charge. Cost of an adult goat reduced from about UGX 200 thousand by almost half due to diseases and markets are seasonal. A kilogram of meat is about UGX 8,000–10 thousand. Last vaccination was in 2019 following PPR outbreak</p>

Appendix 6. National veterinary laboratory distribution, capacity and functionality

Facility name	Institution	Location	Fulltime laboratory technician presence
National veterinary diagnostic laboratories			
National Animal Disease Diagnostics and Epidemiology Centre (NADDEC)	Ministry of Agriculture Animal Industry and Fisheries	Entebbe	Yes
Central Diagnostic Laboratory (CDL)	College of Veterinary Medicine Animal Resources and Biosecurity (COVAB), Makerere University	Kampala	Yes
Supportive veterinary/bioscience diagnostic laboratories			
RTC laboratory, COVAB	College of Veterinary Medicine Animal Resources and Biosecurity (COVAB), Makerere University	Kampala	Yes
Uganda Virus Research Institute (UVRI)	Ministry of Health	Entebbe	Yes
Wildlife Veterinary Laboratories			
Queen Elizabeth National Park Wildlife Veterinary Laboratory	Uganda Wildlife Authority (UWA)	Rubirizi	Yes
Murchison Falls National Park (MFNP) Wildlife Veterinary Laboratory	Uganda Wildlife Authority (UWA)	Masindi	No
Regional veterinary laboratories			
Gulu district regional veterinary laboratory	District local government	Gulu	No
Hoima district regional veterinary laboratory	District local government	Hoima	Yes
Kabale district regional veterinary laboratory	District local government	Kabale	No

Kabarole district regional veterinary laboratory	District local government	Kabarole	Yes
Masaka regional veterinary laboratory	District local government	Masaka	Yes
Mbale regional veterinary laboratory	District local government	Mbale	No
Mbarara regional veterinary laboratory	District local government	Mbarara	Yes
Arua district veterinary laboratory	District local government	Arua	Yes
Moroto district veterinary laboratory	District local government	Moroto	No
District veterinary laboratories			
Busia district veterinary laboratory	District local government	Busia	Yes
Jinja district veterinary laboratory	District local government	Jinja	No
Kalangala district veterinary laboratory	District local government	Kalangala	Yes
Kayunga district veterinary laboratory	District local government	Kayunga	Yes
Kazo district veterinary laboratory	District local government	Kazo	Yes
Kiboga district veterinary laboratory	District local government	Kiboga	Yes
Kisoro district veterinary laboratory	District local government	Kisoro	Yes
Kitgum district veterinary laboratory	District local government	Kitgum	No
Kumi district veterinary laboratory	District local government	Kumi	No
Kyenjojo district veterinary laboratory	District local government	Kyenjojo	No
Lira regional veterinary laboratory	District local government	Lira	Yes
Mpigi district veterinary laboratory	District local government	Mpigi	Yes
Mubende district veterinary laboratory	District local government	Mubende	Yes
Mukono district veterinary laboratory	District local government	Mukono	Yes
Nakasongola district veterinary laboratory	District local government	Nakasongola	Yes
Ntungamo district veterinary laboratory	District local government	Ntungamo	No
Sembabule district veterinary laboratory	District local government	Sembabule	No
Tororo district veterinary laboratory	District local government	Tororo	Yes
Wakiso district veterinary laboratory	District local government	Wakiso	No
Yumbe district kit gum veterinary laboratory	District local government	Yumbe	No
Private sector veterinary laboratories			
Nabitanga livestock centre III laboratory	Uganda Meat Cooperative Union (UMPCU)	Sembabule	Yes
Butalangu livestock centre I laboratory	UMPCU	Nakaseke	Yes
Research laboratories			
Infectious Animal Disease Laboratory, National Livestock Resources Research Institute (NALIRRI)	National Research Organization (NARO)	Namulonge	Yes
Veterinary Research Laboratory, Bunginyanya Zonal Agricultural Research Development Institute (BUZARDI)	NARO	Namisindwa	Yes
Veterinary Research Laboratory, Kachwekano Zonal Research and Development Institute (KAZARDI)	NARO	Kabale	Yes

Veterinary Research Laboratory, Nabuin Zonal Agricultural Research Development Institute (NABUZARDI)	NARO	Moroto	Yes
Veterinary Research Laboratory, Mbarara Zonal Agricultural Research Development Institute (MBAZARDI)	NARO	Mbarara	Yes
Veterinary Research Laboratory, Bulindi Zonal Agricultural Research Development Institute (BUZARDI)	NARO	Hoima	Yes

Appendix 7. Monthly district performance on animal disease passive reporting to MAAIF

District	Monthly passive reports to MAAIF		
	2011	2016	2019
Abim	0	3	12
Adjumani	0	2	0
Agago	6	2	0
Alebtong	4	5	0
Amolatar	6	10	0
Amudat	12	11	10
Amuru	12	1	0
Amuria	8	1	0
Apac	12	3	0
Arua	12	3	1
Budaka	3	0	0
Bududa	3	11	2
Bugiri	12	9	5
Buyende	12	10	
Buhweju	11	9	2
Buikwe	10	0	0
Bukedea	10	12	1
Bukomansimbi	12	2	1
Bukwo	0	2	1
Buliisa	12	11	12
Bulambuli	12	2	10
Bundibugyo	0	0	0
Bushenyi	7	7	7
Busia	11	8	10
Butaleja	12	1	1
Butambala	1	9	6
Dokolo	12	10	0
Gomba	11	12	12
Gulu	3	1	1
Hoima	12	3	8

District	Monthly passive reports to MAAIF		
	2011	2016	2019
Ibanda	0	5	1
Iganga	0	0	12
Isingiro	11	12	12
Jinja	12	3	9
Kaabong	7	2	0
Kabale	7	6	5
Kabarole	12	0	1
Kaberamaido	10	10	1
Kalangala	12	10	8
Kaliro	6	4	1
Kalungu	3	4	0
Kampala	4	12	0
Kamuli	8	0	0
Kamwenge	12	12	5
Kanungu	0	10	0
Kapchorwa	0	0	0
Kasese	11	12	12
Katakwi	1	0	0
Kayunga	11	11	0
Kibaale	8	11	1
Kiboga	12	0	10
Kibuku	2	0	0
Kiruhura	6	8	3
Kisoro	0	1	0
Kitgum	0	1	0
Koboko	12	1	5
Kole	5	1	0
Kotido	8	10	6
Kumi	3	1	0
Kween	10	0	1
Kyankwanzi	12	0	6
Kyegegwa	1	10	8
Kyenjojo	12	12	12
Lamwo	12	0	0
Lira	12	2	0
Luwero	0	8	12
Lwengo	10	12	7
Lyantonde	6	0	2
Manafwa	9	0	0
Maracha	12	5	0
Masaka	2	0	9
Masindi	7	12	3

District	Monthly passive reports to MAAIF		
	2011	2016	2019
Mayuge	0	12	5
Mbale	12	12	10
Mbarara	6	0	0
Mityana	12	12	0
Moroto	0	0	12
Moyo	12	4	4
Mpigi	9	8	0
Mubende	3	0	0
Mukono	3	3	3
Nakapiripirit	9	0	1
Nakaseke	8	0	0
Nakasongola	12	0	1
Namayingo	8	0	2
Namutumba	0	9	9
Napak	6	9	0
Nebbi	8	0	1
Ngora	8	11	0
Ntoroko	12	11	5
Ntungamo	3	11	0
Nwoya	3	0	0
Otuke	11	0	1
Oyam	0	0	3
Pader	8	0	5
Pallisa	4	9	0
Rakai	12	9	3
Rubirizi	4	0	0
Rukungiri	12	0	2
Sembabule	11	0	0
Serere	12	0	8
Sironko	5	0	5
Soroti	12	0	0
Tororo	11	12	10
Wakiso	0	6	2
Yumbe	0	11	8
Zombo	8	0	0
Total received	770	517	354
Total expected	1,284	1,284	1,284
Percentage received (%)	60	40.3	27.6

Appendix 8. District PPR status in Uganda—extrapolated from various data sources

	District with at least 1 PPR positive sample 2007–2020_ Laboratory	Districts that ever vaccinated against PPR (2016–2020) _Vaccination	Districts that ever-reported PPR through EMA-i	Districts considered PPR affected 2020 based on laboratory, EMA-i and vaccination records 2007 to 2020
1	Abim	Abim	Moroto	Abim
2	Adjumani	Amudat	Nakapiripirit	Adjumani
3	Alebtong	Amuria	Kotido	Alebtong
4	Amudat	Buikwe	Kaabong	Amudat
5	Amuria	Bukedea	Amudat	Amuria
6	Arua	Bulambuli	Amudat	Arua
7	Budaka	Bunyangabu	Napak	Budaka
8	Bugiri	Bushenyi	Isingiro	Bugiri
9	Bukedea	Butambala	Kabale	Buikwe
10	Bukwo	Buvuma	Kampala	Bukedea
11	Bulambuli	Gomba	Katakwi	Bukwo
12	Bushenyi	Hoima	Luwero	Bulambuli
13	Busia	Isingiro	Lyantonde	Bunyangabu
14	Butambala	Kaabong	Mbarara	Bushenyi
15	Gomba	Kakumiro	–	Busia
16	Isingiro	Kanungu	–	Butambala
17	Jinja	Kassanda	–	Buvuma
18	Kaabong	Katakwi	–	Gomba
19	Kaberamaido	Kayunga	–	Hoima
20	Kalungu	Kibaale	–	Isingiro
21	Kamwenge	Kiboga	–	Jinja
22	Kanungu	Kiruhura	–	Kaabong
23	Kapchorwa	Kotido	–	Kabale
24	Katakwi	Kumi	–	Kaberamaido
25	Katakwi	Kween	–	Kakumiro
26	Kiruhura	Kyotera	–	Kalungu
27	Kiryandongo	Lamwo	–	Kampala
28	Kisoro	Luwero	–	Kamwenge
29	Kitgum	Lwengo	–	Kanungu
30	Kotido	Lyantonde	–	Kapchorwa
31	Kumi	Madi Okollo	–	Kassanda
32	Kween	Maracha	–	Katakwi
33	Lamwo	Mbarara	–	Katakwi
34	Lyantonde	Mitooma	–	Kayunga
35	Mbale	Moroto	–	Kibaale
36	Moroto	Mpigi	–	Kiboga
37	Moyo	Mubende	–	Kiruhura
38	Mubende	Nabilatuk	–	Kiryandongo
39	Nakapiripirit	Nakapiripirit	–	Kisoro
40	Nakaseke	Nakasongola	–	Kitgum

41	Nakasongola	Napak	–	Kotido
42	Napak	Omoro	–	Kumi
43	Nebbi	Pakwach	–	Kween
44	Ngora	Rakai	–	Kyotera
45	Ntungamo	Rubirizi	–	Lamwo
46	Pader	Sembabule	–	Luwero
47	Palisa	Serere	–	Lwengo
48	Rakai	Sheema	–	Lyantonde
49	Rubanda	Soroti	–	Madi Okollo
50	Sembabule	Tororo	–	Maracha
51	Sironko	Yumbe	–	Mbale
52	Soroti	–	–	Mbarara
53	Tororo	–	–	Mitooma
54	Wakiso	–	–	Moroto
55	Yumbe	–	–	Moyo
56	—	–	–	Mpigi
57	–	–	–	Mubende
58	–	–	–	Nabilatuk
59	–	–	–	Nakapiripiriti
60	–	–	–	Nakaseke
61	–	–	–	Nakasongola
62	–	–	–	Napak
63	–	–	–	Nebbi
64	–	–	–	Ngora
65	–	–	–	Ntungamo
66	–	–	–	Omoro
67	–	–	–	Pader
68	–	–	–	Pakwach
69	–	–	–	Palisa
70	–	–	–	Rakai
71	–	–	–	Rubanda
72	–	–	–	Rubirizi
73	–	–	–	Sembabule
74	–	–	–	Serere
75	–	–	–	Sheema
76	–	–	–	Sironko
77	–	–	–	Soroti
78	–	–	–	Tororo
79	–	–	–	Wakiso
80	–	–	–	Yumbe

Appendix 9. Terms of reference (TORs) for the national PPR control and eradication committees in Uganda

Context and rationale

The livestock sector in the Intergovernmental Authority on Development (IGAD) region has substantial potential to contribute to food security and general economic viability and integration within the Greater Horn of Africa (GHOA). However, the sector is seriously constrained by animal diseases. The trade bans often imposed on the IGAD region by the major importing countries of the Middle East and Europe, on livestock imports due to concerns over trans-boundary animal diseases (TADs), have had significant impacts on the livelihoods of livestock dependent communities and livestock-related business enterprises. It is, therefore, imperative that the IGAD region strengthens disease prevention control efforts and find ways of sustaining and enhancing livestock-based trade and its benefits. As PPR and SRDs are trade-sensitive diseases, the IGAD Centre for Pastoral Areas and Livestock Development (ICPALD) plans, under STSD, to support non-SHARE member states to establish national PPR control and eradication committees.

This follows the development of the regional and national strategies for the control and eradication of PPR and the establishment of IGAD regional control and eradication committee (PPR-CEC) for the control of PPR and SRD. This will ensure harmonization of PPR/SRD control programs with SHARE countries (Djibouti, Ethiopia and Kenya) and will, complement and fast-track the implementation of the PPR control programs in the region.

STSD recognizes that the focus of SHARE country program is on pastoral areas of only three IGAD member states, which has necessitated that more emphasis should be given to areas and member states (MS) not covered under SHARE initiative, in relation to PPR control and surveillance.

In a bid to address the challenges posed by inadequate responses and interventions to the control of endemic TADs and zoonoses in the IGAD region, the African Union–Inter-African Bureau for Animal Resources (AU–IBAR), in partnership with IGAD and with financial support from the European Union (EU), has developed a regional project entitled 'Improving animal disease surveillance in support of trade (STSDs) in IGAD member states.' The overall objective of the STSDs project is to reduce the impact of TADs and zoonoses on food security, trade and resilience of livestock farmers. The two result areas of the project include: (1) Systems for animal identification, traceability and health certification improved and (2) Surveillance systems and disease control strategies at national and regional levels improved.

During the 3rd regional PPR-CEC and PPR-TEC meeting held in Naivasha, Kenya on 15–16 November 2016, it was recommended that MS, IGAD and AU–IBAR work to ensure adequate resources are mobilized, at national and regional levels, to meet the needs for PPR eradication program and that the MS be encouraged to involve the private sector, NGOs, research and teaching institutions; and invest more in the livestock sector to help strengthen disease control, including PPR eradication. In the developed regional PPR eradication program, a nationally coordinated communication and advocacy for awareness creation and involvement of all stakeholders has been highlighted and emphasized. The aim is to increase the visibility of PPR program achievements and to ensure effective communication of program activities, results and goals with target beneficiaries, partners and key national and international stakeholders. In the same regional PPR eradication program, the establishment of functional coordination frameworks that serve as PPR national fora for coordination, planning and implementation of PPR control programs, at national and subnational levels, within the ministries in charge of livestock development, has been recommended.

It is against this background that the ICPALD undertakes to establish and operationalize national PPR control and eradication committees, in selected non-SHARE member states, to enhance coordination of PPR control and eradication efforts and bring those non-SHARE countries to the same level as SHARE countries in the control of PPR and other SRD. This will facilitate harmonization of approaches, exchange good practices, lessons learnt and propose solutions for encountered challenges.

II. Functions

- The national PPR control and eradication committee's objective is to spearhead PPR control and eradication efforts at the national level, national coordinate efforts and provide strategic guidance while ensuring harmonization for PPR control and eradication national programs. The following are the proposed functions of the committee:
- Operate as a national task force that will guide overall coordination of PPR control and eradication;
- Identify and address gaps and challenges in the control of PPR and other SRD;
- Review and endorse the national framework, strategies and action plan for the control of PPR and other small ruminant diseases and other relevant recommendations;
- Ensure harmonization of PPR/SRD control programs in the region and between neighbouring countries;
- Organize cross-border and other regional meetings for sharing on PPR control;
- Coordinate and exchange information on good practices and lessons to improve complementarities on the control of PPR and other SRD in the region;
- Mobilize resources and play an advocacy role for buy-in and timely actions to control and eradicate PPR in the country.

III. Composition and membership

The national PPR control and eradication committee shall be made up of the following, comprising of representatives of key national institutions, NGOs, technical partners, donors, private sector and non-state actors or civil societies.

Director Animal Resources	Dr Sentumbwe Juliet
Department of Animal Health	Dr Ademun Rose Okurut
Department of Animal Production	Dr Mbabazi Mary Concepta
Department of Planning	Dr Mukama Charles
Division of Animal Health Division of Veterinary Regulation and Certification	Dr Kiconco Doris
Division of Extension and Communication	Dr Tumusime Dan
National Epidemiology Unit	Dr Deo Ndumu
National Epidemiology Unit	Dr Mwebe Robert
National Diagnostic Laboratory	Dr Erechu Sam Richard
National Diagnostic Laboratory	Dr Mwanja Mose
National Animal Resources Livestock Research Institute	Dr Moses Dhikusoka
College of Veterinary Medicine, Animal Resources and Biosecurity	Prof Frank Mwiine
Uganda Veterinary Association	Dr Sylvia Baluka
Uganda Veterinary Board	Dr Dominic Mundrugo
Uganda Meat Producers Cooperative Union	Dr Joshua Waiswa
FAO	Dr Ayebazibwe Chrisostom
PENU	Dr Joseph Sserugga

IV. Meeting frequency

The national PPR control and eradication committee shall meet once a year, or more, as may be needed.

V. Coordination

The Directorate of Animal Resources will coordinate the committee

Appendix 10. Specific recommendations to pursue indicators for PPR progressive monitoring and assessment tool (PMAT) indicators

- Uganda is pursuing activities to achieve relevant PMAT outcomes. To progress to PPR GCES Stage 3, the desired PMAT scores (FAO and OIE 2016) need to improve to fully achieved criteria, hence:
- Strengthen country's capacity to perform biomolecular tests in compliance with international laboratory standards, ensure a good understanding of circulating PPR strains and their distribution and that LIMS is the central repository of PPR laboratory network and information exchange system (**timeline: mid-term; 3–5 years**)
- Strengthen the national animal health surveillance system, mainly the passive component, to cater for network of slaughterhouses (and slabs), wildlife events, susceptible wildlife species, participation in regional epidemiology surveillance network, uniform paraveterinary training, basic national animal disease reporting system, ante mortem inspection/collection of disease information as per OIE standard and formal external coordination mechanisms (**timeline: mid-term; 3–5 years**)
- Implement targeted vaccination campaigns, based on risk-based control strategy, vaccine distribution and delivery system regularly monitored, vaccine quality conforms to OIE requirements, veterinary, paraveterinary/technical posts almost filled by qualified professionals, internal coordination mechanisms/clear chain of command for veterinary services and veterinary service has a system in place for resource availability at all levels and system in place for the replenishment of obsolete items (**timeline: mid-term; 3–5 years**)
- Institute additional measures are in place to ensure the success of the vaccination campaign, including a further understanding of PPR epidemiology through systematic outbreak investigations, vaccination measures further consolidated, unregulated movements of small ruminants not affecting control measures in Stage 2, veterinary services regularly analyse records and documented procedures to improve efficiency and effectiveness (**timeline: mid-term; 3–5 years**)
- Provide for a legal framework is strongly supportive of the control and prevention activities including evaluation of the impact of control measures, provisions that support envisaged control activities, financing, the defined role of veterinarians and paraveterinarians and prosecution powers in case of non-compliance (**timeline: mid-term; 3–5 years**)
- Ensure that different stakeholders fully contribute to the control efforts foreseen in Stage 2, including the livestock keepers and other actors to act as sentinels for early detection of outbreaks. Livestock keepers should actively contribute to early detection of clinical outbreaks (**timeline: mid-term; 3–5 years**)
- Widely disseminate and implement the national PPR control and eradication strategy as per current disease trends and developments (**Short term: 1–2 years**)
- Specifically, operationalize and strengthen regular PPR coordination activities at MAAIF to link up with districts, institutions, farmers and development partners through the empowerment of the office of the national PPR focal coordinator, the national PPR control and eradication committee and technical working groups (**Short term: 1–2 years**)
- MAAIF to develop a specific policy paper to inform cabinet memo on the national PPR control and eradication, including the required political will and financial resource allocation (**immediate**)

Appendix 11. Specific recommendations relating to animal health systems and coordination mechanisms

Animal health systems and coordination mechanisms depend on an efficient national animal disease surveillance system (FAO 2018). The recommendations of the 2018 surveillance system evaluation need to fully implement recommendations shown in Table 10. Additional evaluation of the national animal health surveillance system is possible after 3–5 years.

Table 10. Priority recommendations for the national surveillance system in Uganda

Recommendations		Short-term 1–2 years	Mid-term 3–4 years	Long-term 5–10 years	Comment/progress
Priority 1	Identify and appoint surveillance focal point (FP) at district veterinary offices	X			Achieved
	Operationalize the One Health platform and increase preparedness for zoonotic disease outbreak response	X			Partly achieved
	Ensure quality surveillance reporting by promoting training programs that reinforce the importance of proper surveillance techniques	X			Partly achieved
Priority 2	Institute steering and technical committees to coordinate surveillance efforts at national and field levels	X	X		Not achieved
	Upgrade disease reporting tools to improve timeliness and compliance	X	X		Partly achieved
	Develop a national surveillance plan that brings together active and passive activities	X	X		Partly achieved
	Increase internal and external stakeholders' participation in surveillance activities through the development of a surveillance communication plan	X	X		Partly achieved
	Develop capacity for advanced epidemiological analyses	X	X		Not achieved
Priority 3	Enhance budgetary autonomy of surveillance activities at the central level	X	X	X	Not achieved.
	Develop a laboratory strategic plan/network to coordinate laboratory work	X	X	X	Partly achieved
	Implement a Quality Management System (QMS) and Quality Assurance (QA) in laboratories	X	X	X	Not achieved

Appendix 12. General recommendations to improve the efficiency of the national veterinary services/PPR control

A multitude of recommendations for effective control of PPR at local, national, regional and international levels are given (Table 11). The country has to ensure an effective chain of command for the national veterinary services as per gaps indicated in the country gap analysis.

Recommendation	Short-term 1–2 years	Mid-term 3–4 years	Long-term 5–10 years
Need to carefully evaluate the application of vaccination strategy against PPR since new animals are continuously being born at shorter intervals	X	X	X
Evaluate the application of thermostable vaccines in resource-constrained settings	X		
Harmonized local and cross-border regulatory disease control activities	X	X	X
Need to conduct national surveillance for PPR and improved disease reporting (parish level)	X	X	X
Need to collect baseline and socio-economic data for improved disease control	X	X	X
Need for more research on the role of different domestic animals and wildlife in the epidemiology of PPR in Uganda	X	X	X
Need for sustained control activities –much bigger regional projects for holistic animal disease control.	X	X	X
Create public awareness and farmer sensitization on planned GCES of PPR by 2030	X	X	X
Enforce animal disease control legislation	X	X	X
Undertake continuous surveillance for PPR and other small ruminant diseases	X	X	X
Budgetary provision for PPR control and eradication	X	X	X
Increase staffing in districts	X	X	X
Strengthen control of animal movement	X	X	X
Continuous professional development courses on disease outbreak investigation and reporting	X	X	X
Strengthen interagency collaboration between MAAIF, DLGs and other players	X	X	X
Routinely vaccinate over 85% of shoats	X	X	X
Support districts with laboratory equipment and reagents for PPR detection	X	X	
Provide sufficient vaccines for annual vaccination of goats and sheep	X	X	X

Recommendation	Short-term 1–2 years	Mid-term 3–4 years	Long-term 5–10 years
Rapidly confirm and respond to suspected outbreaks	X	X	X
Build staff capacity—training on PPR epidemiology	X	X	X
Quarantine/isolate or screen animals before supply	X	X	X
Develop a PPR preparedness (contingency) plan, including a multi-disciplinary approach	X	X	
Develop and fundraise for PPR dedicated projects	X	X	X
Strengthen central unit PPR coordination, including high level decision-making	X	X	X
Develop consensus with different stakeholders (farmers, involve women)	X	X	X
Improved PPR diagnostics, surveillance and disease confirmation, including veterinarians and paraveterinarians through CPDs	X	X	X
Develop partnerships with specific organizations to spearhead public sensitization on PPR, including public, private partnerships	X	X	X
Integrate export promotion programs to facilitate disease control and trade in goats and sheep	X	X	X
Improve the productivity of goats and sheep through better genetics	X	X	X
Develop a national vaccination program required to harmonize district interventions	X	X	X
Develop a regional vaccination program required to harmonize actions at the regional level	X	X	X
Mobilize stakeholders along the small ruminant value chains and ensure they are ready and willing to participate	X	X	X
Devise tactical pathways for PPR control and eradication—understand the local situation	X	X	X
Undertake active animal disease surveillance based on standard protocols (SOPs)	X	X	X
Strengthen regional/continental approaches to PPR control	X	X	X
Map out hotspots and apply regular biosecurity measures	X		
Advocate for political will for PPR control and eradication	X	X	X

Recommendation	Short-term 1–2 years	Mid-term 3–4 years	Long-term 5–10 years
Define incentives for farmers to participate in PPR control activities—reactivate trade in small ruminants	X	X	X
Explore the use of combination/bivalent vaccines	X	X	X
Enforce animal movement control at all times, including the LITs	X	X	X
Implement vaccination against PPR in specific areas	X	X	X
Evaluate impact of PPR vaccinations	X	X	X
MAAIF to regularly supervise field activities	X	X	X
Need public–private partnerships to enhance uptake	X	X	X
Train and empower communities and other players to improve animal health, in collaboration with agricultural extension programs	X	X	X
Ensure that the PPR vaccine is readily available on the private market through multi-stakeholder innovation platforms	X	X	X
Government should subsidize PPR vaccinations	X	X	X
PPR vaccines should be packaged in smaller doses than for 100 animals	X		
Support control of other goat/sheep diseases	X	X	X
Empower lead farmers (those with big stock) to influence others	X	X	X
All incoming/outgoing goats should be treated (farm level)	X	X	X
Develop business models for different value chain actors to determine incentives and profitability	X	X	X
Vaccinate goat kids at 6 months	X	X	X
Ensure vaccine availability all the time—not only when there are outbreaks	X	X	X
Support farmer associations and networks—some groups have not taken off	X	X	X
Support laboratory capacity development—train laboratory technologists	X	X	X
Avail vaccines closer to farmers	X	X	X
Provide facilitation to CAHWs	X	X	X
Provide vaccination infrastructure like crashes and dip tanks	X	X	X
Train more paraprofessionals and CAHWs	X	X	X
Implement long-term sensitization programs to avoid communal grazing	X	X	X
Work closely with local council authorities (LCs) to ensure compliance with vaccination programs	X	X	X

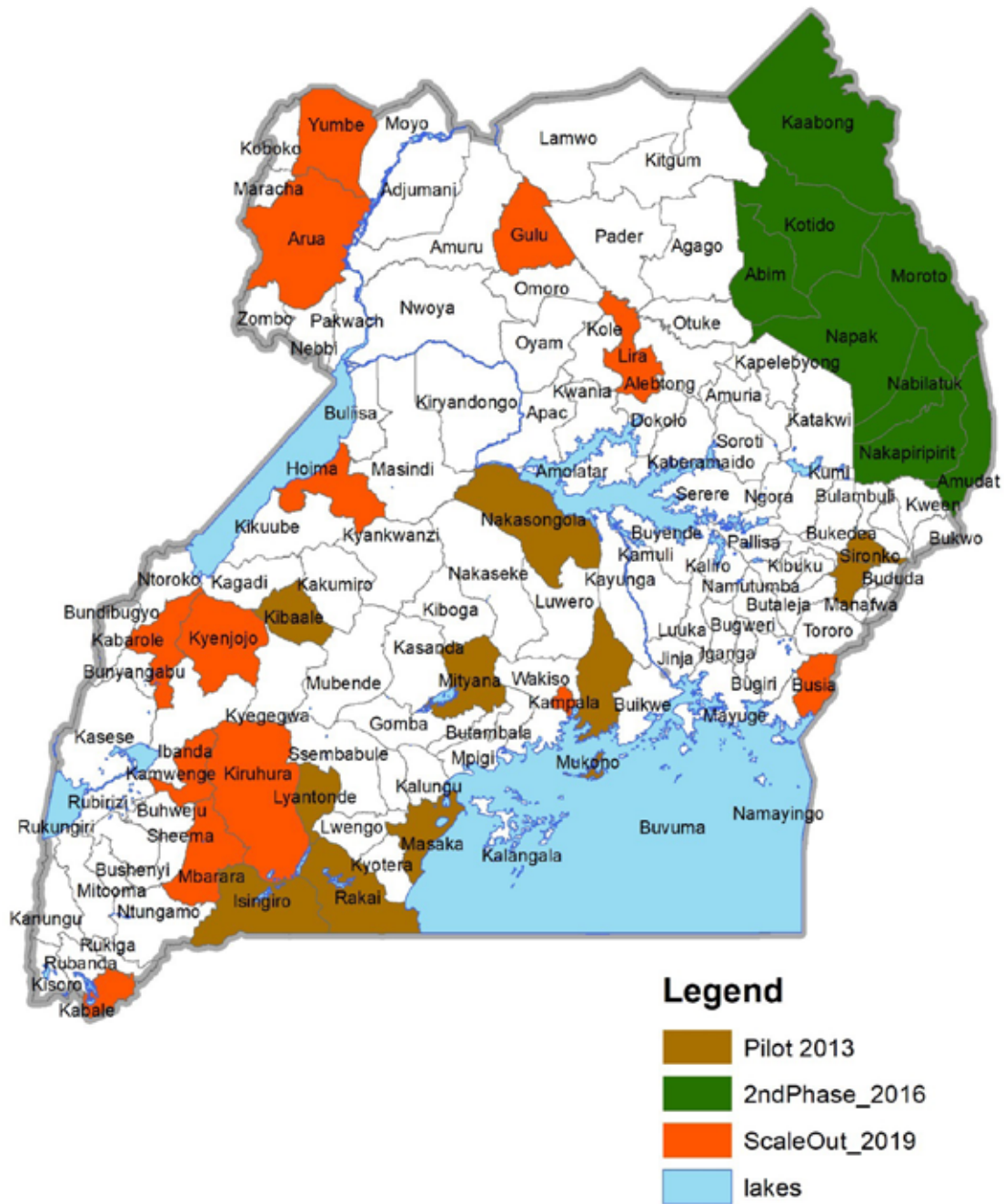
Recommendation	Short-term 1–2 years	Mid-term 3–4 years	Long-term 5–10 years
More support supervision of CAHW activities by district veterinary staff	X	X	X
Provide incentives for animal disease reporting by CAHWs	X	X	X
Improve animal health service delivery—form more farmer groups and PPPs in villages to support training, sensitization, treatment and vaccinations	X	X	X
Support women groups and include lady CAHWs in operations	X	X	X

Appendix 13. Cumulative progress on PPR vaccinations under VACNADA project in Uganda 2011

Region	District	Total estimate no. of goat and sheep	Target vaccinations (PPR)	Achieved
Eastern	Kapchorwa	84,925	18,000	32,211
	Kween	48,000	40,000	30,000
	Katakwi	130,443	110,000	111,459
	Kumi	199,881	40,000	39,444
	Ngora	56,850	20,000	51,910
	Mbale	101,725	15,000	16,041
	Sironko	88,947	30,000	61,226
	Bulambuli	30,000	10,000	25,130
	Amuria	149,052	20,000	26,662
	Bukedea	64,823	33,000	25,718
Northern	Bukwa	25,449	10,000	16,163
	Kitgum	66,324	11,000	23,287
	Lamwo	62,757	30,000	61,361
	Lira	174,460	25,000	53,145
	Alebtong	80,000	62,000	35,904
	Pader	64,105	30,000	19,298
	Otuke	30,400	10,000	18,457
Agago	54,347	30,000	14,858	
Northeastern (Karamoja)	Kotido	1,090,826	120,000	170,081
	Nakapiripirit	937,041	61,000	106,762
	Amudat	159,000	108,000	265,548
	Abim	45,610	25,000	64,656
	Kaabong	950,118	125,000	229,568
	Moroto	687,200	250,000	96,768
	Napak	250,000	363,690	247,555
	Total	6,026,516	1,461,690	1,831,514

PPR vaccine sources and dates of receipt: Jovac (758,500 doses)—11 October 2010; Egypt (800 thousand doses)—15 August 2011. 167,695 doses from other projects (source not specified).

Appendix 14. Map of Uganda showing the location of districts using EMA-i to report animal diseases (2013–2020)



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