



**A diagnostic desk review of Foot-and-Mouth Disease (FMD) situation
in Uganda.**

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Final report

Preface

The AgrInvest Initiative, funded by the European Union (EU) and Food and Agriculture Organization of the United Nations (FAO), and implemented by FAO Investment Centre, aims to increase private investments in the country's agriculture and agribusiness sectors through an enhanced capacity of Uganda Development Bank (UDB) and public-private policy dialogue. In partnership with UDB, AgrInvest will aim at (i) de-risking UDB agricultural lending; (ii) enhancing UDB portfolio in terms of quality and scope; (iii) making some of UDB operations and processes more efficient, and; (iv) enhancing the policy environment to enable responsible investments in agriculture and agribusiness around selected value-chains (VC). The project will help achieve UDB's High Impact Goals around poverty reduction, sustainable food systems, and industrializing Uganda.

AgrInvest, in partnership with UDB, FAO MAFAP program, and Uganda Agribusiness Alliance (UAA), has been working to advance the beef industry in Uganda. The objective is to improve the policy environment to attract responsible investments in the sector. Notably, previous reports by the FAO AgrInvest project highlighted the importance of controlling Foot-and-Mouth Disease (FMD) as a critical factor in developing Uganda's commercial beef value chain.

In response to this, the Beef Policy Advocacy Task Force of the National Beef Platform unanimously agreed to establish an FMD Subcommittee to improve the control and prevention of FMD. The subcommittee acknowledged the need for increased private sector involvement in planning, funding, and implementing FMD control measures. To facilitate this partnership, a diagnostic desk review report on FMD in Uganda was proposed as a tool to engage the Ministry of Agriculture Animal Industry and Fisheries (MAAIF) to collaborate with private sector stakeholders.

Introduction

The present study aims to produce a diagnostic desk review report on the FMD status in Uganda. The information will serve as a tool to provide evidence and engage MAAIF and other stakeholders within the livestock value chains in establishing a public-private partnership, utilizing the National Beef Policy Advocacy Platform as a first vehicle for collaboration, advocacy, sharing of lessons learned, and good practices to improve FMD control in Uganda.

To this effect, given the above context, Global APRI Service Limited has been contracted to undertake a desk review and field data collection using a mixed-method approach that includes quantitative and qualitative data collection and analysis techniques.

Executive Summary

FAO commissioned a diagnostic desk review study of FMD situation in Uganda. The study content was as follows:

Chapter 1 focused on FMD at global level. The report presents a short description of the Importance of livestock followed by General information about FMD including its significance, the causative agent, epidemiology, applicable prevention and control measures. The chapter further focuses on the picture of FMD in terms of Global geographical distribution, the Global pool of circulating Virus genome, the Global Official disease status and the global Control Strategy. The status of FMD in continental Africa is presented broadly followed by more detailed discussion on the Eastern Africa region including the challenges to the risk-based Progressive Control Pathway (PCP) for FMD. A validated and provisional FMD Eastern Africa Roadmap for 2022–2026 is used for reference.

Chapter 2 is an explicit presentation on FMD in Uganda. Covered are : FMD Geographical distribution and epidemiology status. The challenges alluded to include policy gaps and inadequate legal provisions hence weak veterinary governance as they relate to Prevention and Control of FMD in the country.

Chapter 3 discussed the Economic impact of foot-and-mouth disease control in Uganda including visible production losses and invisible costs due to FMD outbreak .

Chapter 4 introduced Commodity based Trade and Public Private partnership schemes as possible scenarios in the control of FMD. The presentation includes applicable Geographical Trade standards, non-geographic trade standards, the overview of the Public-Private Partnership with references to PPP current initiatives and Public-Private Partnership - EUFMD. Reference is further made to the GALVmed initiative, developing a Public Private Partnership Framework for FMD in Eastern Africa. The presentation highlights principles, elements and financing mechanisms as well as examples of existing sanitary mandate and PPP agreements. Legal provisions and Administration of PPPs in Eastern Africa were discussed.

The legislative and policy context of private-public partnerships in Uganda were analysed in relation to , the Constitution of the Republic of Uganda, The National Development Plan III, The Public-Private Partnership Framework Policy for Uganda, (2010) and The Local Governments Act Cap. 243.

The Benefits of PPP were addressed through examples of Public Private Partnerships (PPPs) in Kenya and Global Alliance for Livestock and Veterinary Medicines (GALVmed). The presentation covered key factors to be considered in analyzing options related to PPPs establishment in Uganda. Conclusions were made and recommendations drawn.

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List of acronyms

ALOP	Appropriate level of protection
ALPHA	African livestock productivity and health advancement
BMGF	Bill and Melinda Gates Foundation
CBPPP	Contagious bovine pleuropneumonia
CBT	Commodity based trade
CIRAD	French agricultural research centre for international development
COMESA	Common market for Eastern and Southern Africa
CoNAS	College of natural science
COVAB	College of veterinary and Animal Biosciences
CTTBD	Centre for ticks and tick-borne diseases
DVO	District veterinary officer
DVS	Director of veterinary services
ECF-ITM	East coast fever treatment method
ELISA	Enzyme-linked immunosorbent assay
EU-FMD	European commission for the control of foot and mouth disease
FAO	Food and Agricultural Organization
FAST	Foot-and-mouth disease and similar transboundary animal diseases
FMD	Foot-and-Mouth Disease
FMDV	Foot and-Mouth Disease Virus
FUNDASSA	Foundation of Animal Health Services
GALVMEDS	Global alliance for livestock veterinary medicines
GDP	Gross domestic product
GEMP	Good Emergency Management Practices
GF-TADs	Global Framework for progressive control of Transboundary Animal Diseases
GVS	Government veterinary services
HACCP	Hazard analysis and critical control point
HEARD	Health of the Ethiopian animals for rural development
KEVEVAPI	Kenya Veterinary Vaccine Production institute
LGA	Local government act
LMIC	Low and middle-income countries
LSD	Lumpy skin disease
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries

MAAIF	Ministry of agriculture animal industry and fisheries
MBN	Meat board of Namibia
MOBIP	Market oriented and environmentally sustainable beef industry
MOFPED	Ministry of finance planning and economic development
MOU	Memorandum of understanding
NADDEC	National Animal Disease Diagnostics and Epidemiology Center
NAHVSs	National animal health and veterinary services
NaLIRRI	National Livestock Resources Research Institute
NARO	National agricultural research organization
NGOs	Non-governmental organizations
NPS	National prevention system
NSP	Non-structural proteins
OCF	Official Control Programme
OIE	World Organization for Animal Health
PACEID	Presidential advisory committee exports and industrial development
PCP FMD	Global FMD Control Strategy
PCR	Polymerase Chain reaction
PIIP	Privately initiated investment proposals
PIP	Private initiated proposals
PPIAF	Public-private infrastructure advisory facility
PPP	Public-private partnership
PPPU	Public-private partnership unit
PPR	Peste des petits ruminants
PVM	Post vaccination monitoring
PVS	Performance of veterinary services
QENP	Queen Elizabeth National Park
R BSP	Risk Based Strategic Plan
RNA	Ribonucleic acid
RT-PCR	Reverse transcription polymerase chain reaction
RVF	Rift valley fever
SADC	South African development countries
SAT	South African Territory
SENACSA	Veterinary Services of Paraguay
SOPs	Standard operating procedures

SPs	Structural proteins
SPS	Sanitary and phytosanitary measures
SSA	Sub Saharan Africa
TADS	Transboundary Animal Disease
TAHC	Terrestrial animal health code
TRASE	Trade of agriculture safety and efficiently in East Africa
UBOS	Uganda bureau of statistics
UK	United Kingdom
UNDP	Uganda national development plan
USAID	United states agency for international development
USDA	United States Department of Agriculture
USP	Unsolicited proposals
UVRI	Uganda Virus Research Institute
UWA	Uganda Wildlife Authority
VSb	Veterinary statutory body
VVC	Vaccine value chain
WOAH	World Organization for Animal Health
WRL-FMD	World Reference Laboratory for Foot and Mouth Disease
WTO	World trade organization

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1.0 Foot-and-Mouth Disease (FMD), Global and Eastern Africa Situation

1.1 General information / Introduction

1.1.1 Foot and Mouth disease (FMD)

Foot-and-mouth disease (FMD) is a globally dreaded severe highly contagious viral disease that primarily affects cloven-hooved livestock and wildlife. FMD affects domestic animals which include cattle, swine, sheep, goats, and domestic cervids while affecting cloven-hoofed wild animals including deer, bison, pronghorn antelope, and feral swine (Ward et al, 2018). In the African and Asian contexts there have been incidences of wild bovids being affected by FMDV even if they may not readily show clinical signs of the disease (Gainaru et al, 1986).

1.1.2 Importance of livestock

The livestock sector plays a crucial role in the economies of many developing countries by producing protein-rich food supplies, generating vital income and employment, and earning much-valued foreign exchange. Cattle are the most important livestock species in Africa and account for approximately 70 per cent of the continent's domestic stock (Scholtz et al, 1991). For many farmers in the developing world, their animals are also a form of stored wealth, a cushion against starvation when food is scarce, a source of fertilizer, a means of transportation and a source of traction in crop production (Rendani Randela 2003)

1.1.3 Significance of FMD

Worldwide, FMD remains one of the most contagious and economically impactful disease to agriculture, livelihood, food security and the tourist industry (Knight-Jones et al, 2013; Rushton et al, 2003). More than 1 billion small farmers around the world depend on livestock for their livelihoods. However, outbreaks of foot-and-mouth disease (FMD) inflict an estimated annual global loss of billions of dollars and pose a continuous risk of disease spread into free areas. FMD severely affects livestock production and trade associated with animals and animals' products nationally, regionally and globally

(<https://www.woah.org/en/disease/foot-and-mouth-disease/#>)

Owing to its transboundary and devastating nature, FMD is a World Organization for Animal Health (WOAH founded as OIE)-listed disease and must be reported to the Organization, as indicated in the Terrestrial Animal Health Code (TAHC). It is also the first disease for which the WOAH established official status recognition. Members can also apply for official endorsement of their national control programmes.

FMD is not a public health risk, however, it is a transboundary animal disease (TAD) that deeply affects the production of livestock and disrupts regional and international trade in animals and animal products. The disease is estimated to circulate in 77% of the global livestock population, in Africa, the Middle East and Asia, as well as in limited areas of South America. Countries that are currently free of FMD without vaccination remain under constant threat of an incursion. Seventy-five percent of the costs attributed to FMD prevention and control are incurred by low- and middle-income countries. Africa and Eurasia are the regions which incur the largest costs, accounting for 50% and 33% of the total costs respectively.

In Sub-Saharan Africa, foot-and-mouth disease outbreaks still occur persistently while in the Eastern African region in particular, the disease is reported at least annually, leaving the region in no state to effectively participate in international livestock and livestock products trade markets. Uganda reported its first case of the disease in 1953 and since then, there have been an increase in the number of outbreaks reported with devastating economic consequences.

1.1.4 Causative agent

The organism which causes FMD is an aphthovirus of the family Picornaviridae. There are seven major immunologically distinct viral serotypes: O, A, C, SAT 1, (Southern African Territories) 1, 2, and 3, and Asia 1. There are different topotypes of the virus within each serotype and more than 80 subtypes of the virus which are endemic in different countries worldwide.

1.1.5 Epidemiology

FMD is found in all excretions and secretions from infected animals including the breath. Transmission is through direct contact with susceptible animals and /or contaminated material / fomites. Animals that have recovered from infection may sometimes carry the virus and initiate new outbreaks of the disease (WOAH Technical Disease Card). The intrinsic associated risk factors of FMD transmission are the age of the animal, sex, general health condition, and type of animal breed in the region, while the extrinsic factors are livestock farming system (intensive, semi-intensive, and extensive), herds/flocks configuration, size of herds/flocks, history of regional animal movement, livestock wildlife interface in the region, outbreak location, awareness of local farming communities regarding FMD, the agroecological status of the target region, and communal grazing and watering practices. Furthermore, in certain countries, during the annual spiritual festivals thousands of animals are transported sometimes with poorly regulated animal movement, therefore acting as contributing factors to disease spread.

1.1.6 Prevention and control

Early detection and warning systems and the implementation of effective surveillance in accordance with the guidelines detailed in the Terrestrial Animal Health Code (TAHC) are essential. Vaccination alongside other interventions can play a role in an effective control strategy for FMD. Guidelines support the choice of vaccines to use (WOAH, 2023) and, depending on the FMD situation, proper vaccination strategies, both can be designed to achieve mass coverage or be targeted to specific animal sub-populations or zones. According to the TAHC, Vaccination programmes carried out in a target population should meet several critical criteria, mainly:

- coverage should be at least 80%;
- campaigns should be completed in the shortest possible time;
- vaccination should be scheduled not to allow for interference from maternal immunity;
- vaccines should be administered in the correct dose and by the correct route;

Vaccination can play a role in an effective control strategy for FMD. Others tools that can be adopted are farm level biosecurity (preventive) measures and movement control of susceptible animals and fomites.

1.2 Global geographical distribution of FMD

FMD is present in approximately two-thirds of the countries in the world. The disease is endemic in several parts of Asia and in most of Africa and the Middle East. Countries found in North America, Central America, the Caribbean, Western Europe, Australia, or New Zealand and Indonesia are currently free of FMD without vaccination (WRL-FMD, 2023). The United States last experienced an FMD outbreak in 1929 while Canada has not had an outbreak since 1952; Mexico has not had an outbreak since 1954. However, between 2000 till present there have been incursions of the disease in parts of Europe and Asia; Cyprus (2007), Bulgaria (2011), Greece (2000), France (2001), Ireland (2001), Netherlands (2001), United Kingdom (2007) and Indonesia (2023) (WRL-FMD, 2023).

It has also been recorded that between 1985–2006, FMD had occurred 37 times in 14 European countries with the commonest serotypes recorded being serotype O, followed by A, C and Asia 1 (Valarcher et al, 2007). Despite the fact that a fore mentioned continents are FMD free without vaccination, there is a constant threat of incursions of disease from endemic countries, given that FMD is a trans-boundary animal disease that can occur sporadically in any typically free area.

Foot-and-mouth disease virus is still reported in many countries in Africa, Asia and parts of South America. Six out of the seven serotypes have been reported in the African continent, making it the continent with the highest FMDV serotype diversity. Serotype O has been the most prevalent, followed by A, SAT 2, and SAT 1. FMDV SAT 3 serotype has majorly been isolated and detected from buffaloes in South Africa, Zambia, Malawi, Botswana, Namibia and Uganda (Bastos et al, 2003). Spatially, serotypes O and A have had a wider distribution, and have been recorded in almost each FMD affected country whereas Serotypes SAT 1, SAT 2 and SAT 3 have been mostly confined to Sub-Saharan Africa, particularly Eastern and Southern Africa, with occasional incursions in North Africa due to export of animals and animal products (Di Nardo et al, 2011). The dominance of SAT serotypes in southern and eastern Africa has been attributed to the high density of wildlife in these parts (Bastos, 2003; Ayebazibwe et al, 2010).

Most recently, the common circulating serotypes documented in Uganda, are O, A, SAT 1 and SAT 2, with intermittent frequencies of occurrence of each serotype (Kerfua et al, 2020; Mwiine et al., 2019; Namatovu et al., 2015a). However, other studies have

demonstrated circulation of serotypes C and SAT 3. The former was probably imported from Europe and Asia into Africa with its evidence in Kenya, Ethiopia and Uganda (Sangula et al. 2010; Dhikusooka et al, 2015). In 2013, isolation of the SAT 3 FMDV was successfully carried out from a seemingly healthy calf from the western part of Uganda near a game park (Dhikusooka et al, 2015). Serotype C was last reported in Uganda between 1970 and 1971(WRL-FMD, 2023) and in 2004 in Kenya (Sangula et al, 2010) and appears to be extinct, however necessary steps have to be taken to declare it as such (Paton et al, 2021).

1.2.1 General overview of the Global pool of FMD virus.

Globally there are seven (7) virus pools. Endemic Pools represent independently circulating and evolving foot-and-mouth disease virus (FMDV) genotypes; within the pools, cycles of emergence and spread occur that usually affect multiple countries in the region. In the absence of specific reports, it should be assumed that the serotypes indicated below are continuously circulating in parts of the pool area and would be detected if sufficient surveillance was in place (WOAH 2023).

Table 1: FMD virus pools (WAHIS 2023)¹FMD

POOL	REGION/COUNTRIES	SEROTYPES PRESENT
1	<u>SOUTHEAST ASIA/CENTRAL ASIA/EAST ASIA</u> Cambodia, China, Hong Kong SAR, Taiwan Province of China, Indonesia, Democratic People’s Republic of Korea, Republic of Korea, Lao People’s Democratic Republic, Malaysia, Mongolia, Myanmar, Russian Federation, Thailand, Viet Nam	A, Asia 1 and O
2	SOUTH ASIA Bangladesh, Bhutan, India, Mauritius,1 Nepal, Sri Lanka	A, Asia 1 and O
3	WEST EURASIA & MIDDLE EAST Afghanistan, Armenia, Azerbaijan, Bahrain, Georgia, Islamic Republic of Iran, Iraq, Israel, Jordan, Kazakhstan, Kuwait, Kyrgyzstan, Lebanon, Oman, Pakistan, Palestine, Qatar, Saudi Arabia, Syrian Arab Republic, Tajikistan, Turkey, Turkmenistan, United Arab Emirates, Uzbekistan	A, Asia 1 and O, (SAT 2)
4	EASTERN AFRICA Burundi, Comoros, Djibouti, Egypt,3 Eritrea, Ethiopia, Kenya, Rwanda, Somalia, South Sudan, Sudan, Uganda, United Republic of Tanzania, Yemen	O, A, SAT 1, SAT 2 and SAT 3
	NORTH AFRICA² Algeria, Libya, Morocco, Tunisia	A, O and SAT 2

5	WEST/CENTRAL AFRICA Benin, Burkina Faso, Cabo Verde, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Sao Tome and Principe, Senegal, Sierra Leone, Togo	O, A, SAT 1 and SAT 2
6	SOUTHERN AFRICA Angola, Botswana, Malawi, Mozambique, Namibia, South Africa, Zambia, Zimbabwe	SAT 1, SAT2, and SAT 3 ,O ⁴ , A
7	SOUTH AMERICA Colombia, Venezuela (Bolivarian Republic of)	O and A

Outbreaks in 2016/21 due to O/ME-SA/Ind-2001 demonstrate close epidemiological links between Pool 2 and Mauritius.,²Long-term maintenance of FMDV lineages has not been documented in the Maghreb countries of North Africa and therefore this region does not constitute an Endemic Pool, but data is segregated here since FMD circulation in this region poses a specific risk to FMD-free countries in Southern Europe.,³Egypt represents a crossroads between East African Pool 4 and the Middle East (Pool 3). NB: Serotypes SAT 1 and SAT 3 have not been detected in this country.,⁴Detection of O/EA-2 in southern/western Zambia (2018-2021), Namibia (2021), Malawi (2022) and Mozambique (2022) represent a new incursion into Pool 6

1.2.2 Virus genome

Foot-and-mouth disease is caused by the foot-and-mouth disease virus, a ribonucleic acid (RNA) virus that is approximately 8.3 kilo bases long. The virus exists in seven serotypes; O, A, C, Asia 1, SAT 1, SAT 2 and SAT 3 with several subtypes within each serotype (Jamal et al,2013). The virion is a 140S particle that is single stranded and non-enveloped, Aphthovirus that belongs in the Picornaviridae family. The virus has 60 copies each of the four major capsid proteins namely (VP1 [1D], VP2 [1B], VP3 [1C], and VP4 [1A], called Structural Proteins (SP); the most immunogenic viral protein is the VP1 that has been used for development of vaccines and diagnostics for the disease. The virus additionally has non-structural proteins (NSP) which are relevant in the replication of the virus and other functional roles of the virion which include enzymes and other proteins (Jamal et al, 2013).

The FMDV genome (illustrated in Figure1), is translated as a single open reading frame into a polypeptide followed by a series of proteolytic cleavages to give rise to mature SPs and NSPs therefore, the FMDV genome is divided into four major regions based on the initial cleavage products. The L-pro which plays a role in inhibition of host protein synthesis and has been identified as a viral virulence factor, L region which is the P1 region and encodes for the four viral structural proteins VP4, VP2, VP3, and VP1.

Thereafter is the P2 region encoding three viral NS proteins, 2A, 2B, and 2C, and the P3 region, encoding NS proteins 3A, VPg, 3C_{pro}, and 3D_{pol}. The FMDV genome also has the untranslated RNA found upstream (5' untranslated region [5' UTR]) and downstream (3' UTR) of the ORF as illustrated in Figure 1. The 5'UTR segment has five functional elements that are important in viral translation and replication; the S fragment, the poly C tract, pseudoknots, cis acting element (CRE) and the internal ribosome entry site (IRES). The 3' UTR, follows the ORF termination codon, and has specific stem-loop structure, this is then followed by a poly(A) tract as shown in Figure 1 (Pilipenko et al, 1992) When viewed under an electron microscope, the FMDV appears round with a smooth surface and a diameter of about 25 nm. Unlike those of other picornaviruses, the FMDV capsid is dissociated at pH of below 6.5 into 12S pentameric subunits. The cycle of the FMDV is rather short with new virions appearing between 4-6 hours after infections (Bachrach, 1968).

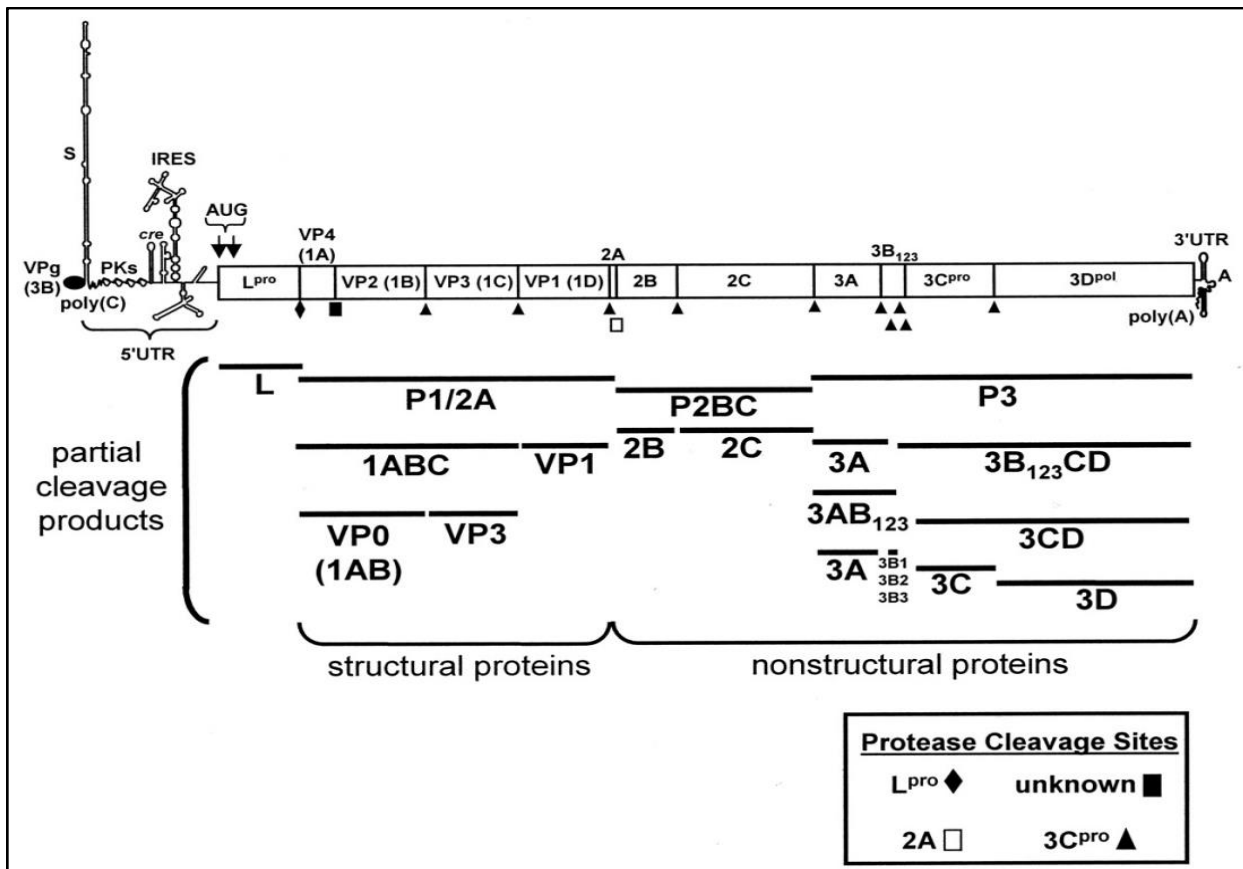


Figure 1: Schematic diagram of the FMDV genome. (Image adopted from Grabman and Barry, 2004)¹

¹ The ORF is shown in the boxed area, with the 5'UTR and the 3' UTR shown upstream and downstream of the ORF respectively. The viral proteins named according to the nomenclature of Rueckert and Wimmer

1.2.3 Global Official disease status

The WOAAH keeps record of global animal disease status and categorizes / lists member countries accordingly. Broadly there are those member countries that are FMD free and those that are infected. The list of FMD free members is in four categories viz (i) FMD free countries where vaccination is not practiced (ii) FMD free countries where vaccination is practiced (iii) FMD free zones where vaccination is practiced and (iv) FMD free zones where vaccination is not practiced. The details are provided below:

1.2.3.1 FMD free countries where vaccination is not practiced

The following 67 are Members recognized by WOAAH as FMD free where vaccination is not practised -according to the provisions of Chapter 8.8. of the Terrestrial Code.

Table 2:FMD free member countries without vaccination being practiced

Albania	Germany	North Macedonia (Rep. of)
Australia	Greece	Norway
Austria	Guatemala	Panama
Belarus	Guyana	Peru
Belgium	Haiti	Philippines
Belize	Honduras	Poland
Bosnia and Herzegovina	Hungary	Portugal ⁽⁴⁾
Brunei	Iceland	Romania
Bulgaria	Ireland	San Marino
Canada	Italy	Serbia ⁽⁵⁾
Chile	Japan	Singapore
Costa Rica	Latvia	Slovakia
Croatia	Lesotho	Slovenia
Cuba	Lithuania	Spain ⁽⁶⁾
Cyprus	Luxembourg	Suriname
Czech Rep.	Madagascar	Sweden

Denmark ⁽¹⁾	Malta	Switzerland
Dominican Republic	Mexico	The Netherlands
El Salvador	Montenegro	Ukraine
Estonia	New Caledonia	United Kingdom ⁽⁷⁾
Eswatini	New Zealand	United States of America ⁽⁸⁾
Finland ⁽²⁾	Nicaragua	Vanuatu
France ⁽³⁾		

Source: WAHIS 2023

(1) Including Faroe Islands and Greenland.

(2) Including Åland Islands.

(3) Including French Guiana, Guadeloupe, Martinique, Réunion, Saint Pierre and Miquelon.

(4) Including Azores and Madeira.

(5) Excluding Kosovo administered by the United Nations

(6) Including Balearic Islands and Canary Islands.

(7) Including Guernsey (incl. Alderney and Sark), Isle of Man, Jersey and Falkland Islands (Malvinas). (A dispute exists between the Government of Argentina and the Government of the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Malvinas) (see resolution 2065 (XX) of the General Assembly of the United Nations)..

(8) Including American Samoa, Guam, Northern Mariana Islands, Puerto Rico and US Virgin Islands.

1.2.3.2 FMD free countries where vaccination is practiced

Table 3: Member countries recognized as FMD free with vaccination practiced

1. Paraguay,	2. Uruguay
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Source: WAHIS 2023

1.2.3.3 FMD free zone where vaccination is not practiced

The following eleven (11) members have one or more FMD free zone where vaccination is not practiced (according to the provisions of Chapter 8.8. of the *Terrestrial Code*)

Table 4: Countries With one or more FMD free zone where vaccination is not practiced

Countries free from FMD where vaccination is not practiced		
1. Argentina,	2. Bolivia,	3. Botswana,
4. Brazil	5. China Taipei,	6. Colombia
7. Ecuador,	8. Malaysia,	9. Moldova,
10. Namibia	11. Russia	

Source: WAHIS 2023

1.2.3.4 FMD free zone where vaccination is practiced

The following nine (9) Members countries have one or more FMD free zone where vaccination is practised (according to the provisions of Chapter 8.8. of the Terrestrial Code)

Table 5: Countries With one or more FMD free zone where vaccination is practiced

Countries free from FMD where vaccination is not practiced		
1. Argentina,	2. Bolivia,	3. Brazil
4. Chinese Taipei,	5. Colombia,	6. Ecuador,
7. Kazakhstan	8. Russia	9. Türkiye (Rep. Of

Source: WAHIS 2023

1.2.3.5 Summary of Recent FMD outbreaks in the world October – December 2022

Table 6: Recent FMD outbreaks in the world October-December 2022

Virus Pool	Pool Cluster	Affected Country	Serotype
Pool 1	Southeast Asia/Central Asia/East Asia	Malaysia	O
		Mongolia	O
Pool 2	South Asia	Bangladesh	O
		India	A
Pool 3	West Eurasia and Middle East	Armenia	Post vaccination sera
		Azerbaijan	Post vaccination sera
		Georgia	Post vaccination sera
		Iran	O & A
		Iraq	O & A
		Israel	O
		Jordan	Post vaccination sera
		Palestine	O
		Pakistan	O, A, Asia 1
Turkey	O		
Pool 4	North and Eastern Africa	Sudan	O & A
Pool 5	West and Central Africa		No new outbreaks
Pool 6	Southern Africa	Comoros	
		Mozambique	
		Namibia	SAT 2
		South Africa	SAT 2 & 3

Virus Pool	Pool Cluster	Affected Country	Serotype
Pool 7	South America		No new outbreaks of FMD were reported in South America

WOAH World Animal Health Information System (event ID: 3738 & 4368)

In May 2023 FMD outbreaks were reported in South Korea central city of Cheongju and seven other adjacent regions, including Daejeon, Sejong and Cheonan

1.2.3. 6 Suspension/reinstatement of FMD status.

The WOAHA promptly suspends countries or zones from recognition of the FMD free status upon reporting an outbreak(s). The suspension is lifted upon fulfilling requirements of WOAHA to regain the FMD free status. Table 7 shows the global status from 2021 – 2023.

Table 7: The Global Suspension/reinstatement of FMD status the WOAHA from 2021 – 2023 is as tabulated in table below.

Country	Zone	Status	Time of suspension	Time of reinstatement
Botswana	Butale crush, Masungu,	FMD-free zone where vaccination is not practiced	18 August 2022	Pending
Kazakhstan	Zone 1 Zone 2 Zone 3 Zone 4	FMD-free zone where vaccination is not practiced	9 June 2022	Pending
	Zone 5	FMD-free zone where vaccination is not practiced	3 January 2022	Pending
Indonesia	Mojokerto, Sidoarjo, Gresik, and Lamongan districts	FMD-free zone where vaccination is not practiced	12 April 2022.	Pending

Source WAHIS 2023

1.2.4 Global FMD Control Strategy.

In order to decrease the impact of FMD worldwide, the FAO and OIE developed a Global FMD Control Strategy that was endorsed in 2012 by representatives from more than 100 countries and international and regional partners. The aim of the Global FMD Control Strategy (PCP FMD) is to reduce the global burden of FMD and the risk of reintroduction of the disease into free areas (WOAHA)

The FMD Global Control Strategy is applied at national level while the progress is assessed at regional level using roadmap platforms, which permit the formulation of harmonized programs and exchange of information on virus circulation, vaccination and other control initiatives. Regional roadmaps are organized based on coordinated actions within the seven major virus Pools and a long-term shared control vision under the Global Framework for progressive control of Transboundary Animal Diseases (GF-TADs), by the GF-TADs FMD working group in collaboration with OIE and FAO regional Offices, regional economic communities, regional organizations as well as EU-FMD.

1.2.4.1 WOAHA Global FMD Official Control Programme (Official Control Programme - OCP)

The FMD Official Control Programme (OCP) describes how the country intends to eliminate FMD virus circulation in the domestic animal population in at least one zone of the country. It uses the knowledge and outputs gained through the implementation, monitoring and evaluation of the activities outlined in the Risk Based Strategic Plan (RBSP). Completion of the OCP is the indicator outcome for entry into PCP-FMD Stage 3, as defined in the PCP-FMD guidelines.

The WOAHA endorses official control programme for FMD according to the provisions of Chapter 8.8. of the *Terrestrial Code*. The following 7 Members have endorsed official control programme for FMD, according to the provisions of Chapter 8.8. of the *Terrestrial Code*.

Table 8: Members with official FMD control programmes

1. Botswana	2. Kyrgyzstan	3. Namibia
4. China (People’s Rep. of)	5. Morocco	6. Thailand
7. India		

1.2.4.2 Progress in Implementation of Global FMD Control Strategy

Around 80 countries in the world are currently engaged, at various levels (updated map here), in the implementation of the PCP-FMD to reduce or eliminate FMD virus (FMDV) circulation. The Global Strategy thus far has been successfully implemented in 72 of 79 affected countries (including zones) where the majority of countries advanced to PCP-

FMD Stages 1 and 2 and few countries to Stage 3. A limited number of countries remain in Stage 0. Some countries have their official control programme endorsed by the WOA and some others have official recognition of FMD free status without vaccination. Countries in Stage 1 are assessing the FMD virus prevalence and identify high risk spots and those in Stage 2 have adopted and are implementing national risk-based strategies. Countries in Stages 3 and 4 are implementing aggressive strategies aimed at eradication of FMD virus circulation. The added value is that monitoring programs assist with generating the regional and global surveillance results needed to inform FMD virus status and inform the best approach for the control strategy.

For effective implementation of the Global FMD Control Strategy and to address some of the anticipated challenges, regional FMD roadmap platforms have been successfully established to assess progress in FMD control. (<http://www.gf-tads.org>)

1.2.5 FMD in continental Africa

FMD is endemic in continental Africa. There are 3 pools of FMD virus in Africa as shown below:

Table 9:Pools of FMD virus in Africa.

Pool no.	Region	Virus serotypes
4	<u>EASTERN AFRICA</u> Burundi, Comoros, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Somalia, South Sudan, Sudan, Uganda, United Republic of Tanzania, Yemen	O, A, SAT 1, SAT 2 and SAT 3
	<u>NORTH AFRICA²</u> Algeria, Libya, Morocco, Tunisia	A, O and SAT 2
6	<u>WEST/CENTRAL AFRICA</u> Benin, Burkina Faso, Cabo Verde, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Sao Tome and Principe, Senegal, Sierra Leone, Togo	O, A, SAT 1 and SAT 2
7	<u>SOUTHERN AFRICA</u> Angola, Botswana, Malawi, Mozambique, Namibia, South Africa, Zambia, Zimbabwe	SAT 1, SAT2, and SAT 3 (O ⁴ , A)

1.2.6 Status of FMD in Eastern Africa region.

1.2.6.1 Geographical distribution of FMD in Eastern Africa.

Foot-and-mouth disease is endemic in all continental countries of East Africa with five different FMDV. Viruses within four FMDV serotypes (O, A, SAT 1 and SAT 2) circulate within two overlapping ecosystems in the region (Table 10). Countries located in the northern part of Eastern Africa experience field outbreaks caused by three FMDV lineages (O/EA-3, A/AFRICA/G-IV and SAT 2/VII) that are also present in West Africa, highlighting the east-west inter-regional connectivity via livestock-dense regions south of the Sahara. These FMD viral lineages are distinct from those circulating in countries in southern parts of the region, where O/EA-2, A/AFRICA/G-I, SAT 1/I and SAT 2/IV predominate (D. King/Pirbright Institute on behalf of WRLFMD)

Table 10: Distribution of FMD virus lineages in East African countries within two overlapping ecosystems

Country	O			A/AFRICA		SAT 1	SAT 2	
	EA-2	EA-3	EA-4	G-I	G-IV	I	IV	VII
Eritrea		2017			2018			2019
Djibouti	No samples/sequences submitted for analyses							
Sudan		2017			2018			2017
S. Sudan		2017						
Ethiopia		2019	2019	2018	2019	2007		2018
Somalia		2007						
Uganda*	2020		2017	2016		2016	2016	2017
Kenya	2021		2010	2021		2020	2017	
Rwanda	2004							
Burundi	2003			2016		1999	2016	
Tanzania	2018			2017		2017	2018	
DRC	2021			2011				
Comoros	2019							

*SAT 3 detected in Uganda in Ankole cattle during 2013; DRC: Democratic Republic of Congo, S. Sudan: South Sudan, Source: WOA 2013

“For each country, the colored boxes denote samples that have been characterized in the last 10 years for each of 8 FMD virus lineages (where dates define the most recent FMD outbreak reported). Grey text represents older samples collected before 2012. NB: Only those FMD outbreaks in domesticated species are shown (SAT lineages 1–3 are also present in buffalo populations)”

Figure 2: Situation of foot and mouth disease in the region (WOAH 2023)

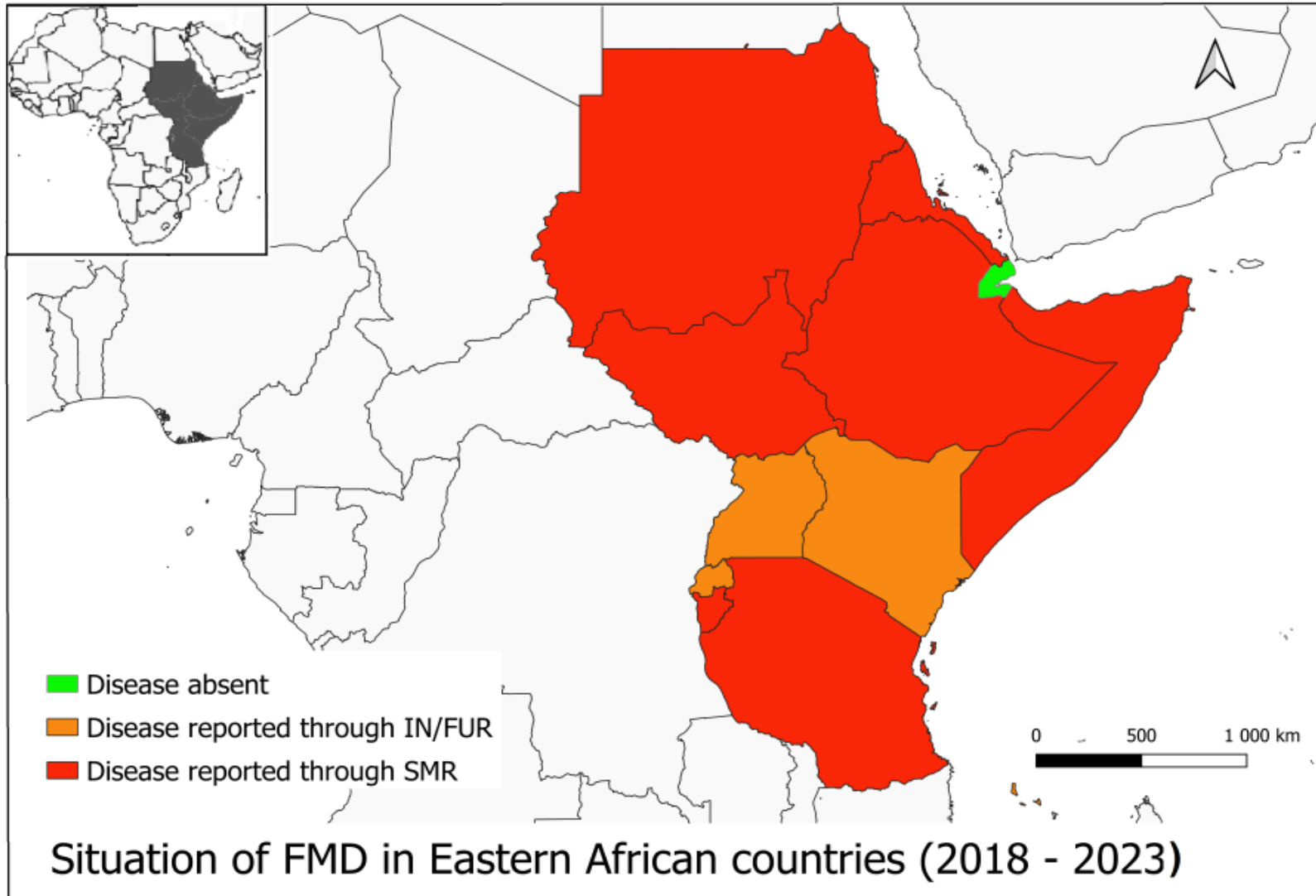


Figure 3: Status of FMD as submitted by country through the monitoring system:2018-2022 (WOA 2023)

			Jan-Jun-2018	Jul-Dec-2018	Jan-Jun-2019	Jul-Dec-2019	Jan-Jun-2020	Jul-Dec-2020	Jan-Jun-2021	Jul-Dec-2021	Jan-Jun-2022	Jul-Dec-2022	Jan-Jun-2023
Foot and mouth disease virus (Inf.	Burundi	Domestic	1	1	-	-	-	-	-	-	-	-	-
		Wild	9	9	-	-	-	-	-	-	-	-	-
	Comoros	Domestic	1	1	1	1	1	1	1	1	1	1	1
		Wild	9	-	-	-	-	-	-	-	-	-	-
	Djibouti	Domestic	7	7	7	7	7	7	7	7	-	-	-
		Wild	7	7	7	7	7	7	7	7	-	-	-
	Eritrea	Domestic	1	1	1	1	7	1	1	1	-	-	-
		Wild	7	9	9	9	9	9	9	9	-	-	-
	Ethiopia	Domestic	1	1	1	1	1	1	1	1	1	-	-
		Wild	7	9	9	9	9	9	9	9	-	-	-
	Kenya	Domestic	1	1	1	1	1	1	1	1	1	-	-
		Wild	7	7	7	7	7	7	7	7	7	-	-
	Rwanda	Domestic	7	7	-	-	1	1	1	1	1	1	1
		Wild	9	9	-	-	-	-	-	-	-	-	-
	Seychelles	Domestic	8	8	-	-	-	-	-	-	-	-	-
		Wild	8	8	-	-	-	-	-	-	-	-	-
	Somalia	Domestic	1	9	1	1	-	7	1	1	-	-	-
		Wild	9	9	9	9	-	9	9	9	-	-	-
	South Sudan (Rep. of)	Domestic	1	-	-	-	-	-	-	-	-	-	-
		Wild	9	-	-	-	-	-	-	-	-	-	-
Sudan	Domestic	1	1	1	1	1	7	1	1	1	-	-	
	Wild	7	7	7	7	7	7	7	7	7	-	-	
Tanzania	Domestic	1	1	1	1	-	-	-	-	-	-	-	
	Wild	7	7	7	7	-	-	-	-	-	-	-	
Uganda	Domestic	1	1	1	1	1	1	1	1	1	1	1	
	Wild	1	1	1	1	-	-	-	-	-	-	-	



1.2.6.2 Progress in implementation of PCP FMD in Eastern Africa.

As stated in 1.2.4 FMD Global Control Strategy is applied at national level while the progress is assessed at regional level using roadmap platforms, which permit the formulation of harmonized programs and exchange of information on virus circulation, vaccination and other control initiatives. Regional roadmaps are organized based on coordinated actions within the seven major virus Pools and a long-term shared control vision under the Global Framework for progressive control of Transboundary Animal Diseases (GF-TADs), by the GF-TADs FMD working group in collaboration with OIE and FAO regional Offices, regional economic communities, regional organizations as well as EUFMD (WOAHA - <https://doi.org/10.20506/GFTADS.3395>)

The Eastern Africa roadmap region belongs to the FMDV Pool 4. The Eastern Africa cluster under discussion is composed of the following member countries: Burundi, the Democratic Republic of Congo, Djibouti, Eritrea, Ethiopia, Kenya, Rwanda, Somalia, Sudan, South Sudan, Tanzania and Uganda.

As of February 2022 in the Eastern Africa Roadmap region, one country was in PCP-FMD Stage 0 (Burundi), four countries are in PCP-FMD Stage 1 (Eritrea, Ethiopia, Somalia and South Sudan) one country is in provisional PCP-FMD Stage 2 (Sudan), three countries are in PCP-FMD Stage 2 (Kenya, Rwanda, Uganda), while one country (Djibouti) has not been recently assessed.

Table 11 below, shows PCP-FMD stages for countries in the Eastern Africa Roadmap between 2012 and 2022, as well as the expected progression for 2023–2026.

1.3 Validated and provisional FMD Eastern Africa Roadmap for 2022–2026

Table 11: PCP-FMD stages for countries in the Eastern Africa Roadmap between 2012 and 2022, as well as the expected progression for 2023–2026

Country	Validated Stages											Provisional Stages			
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Burundi	1	1	1	1	1	1	0	0	0	0	0	–	–	–	–
Djibouti	1	1	1	1	1	2					1*	4	4	4	4
Eritrea	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2
Ethiopia	1	1	1	1	1	1	1	1	1	1	1	1	2	2	3
Kenya	1	1	1	1	1	1	1	1	1	2	2	2	2	3	3
Rwanda	1	2	2	2	2	2	2	2	2	2	2	–	–	–	–
Somalia	1	1	1	1	1	1	1	1	1	1	1*	2	2	3	3
South Sudan	0	1	1*	1*	1*	1*	1	1	1	1	1	–	–	–	–
Sudan	1	2	2*	2*	2*	2*	2*	2*	2*	2*	2*	2	2	2	3
Uganda	1	1	1	1	2	2	2	2	2	2	2	–	–	–	–

Legend:

PCP-FMD stages					
0	1	2	3	4	WOAH

1.4 Challenges to the PCP FMD in Eastern Africa

The Short report (<https://doi.org/10.20506/GFTADS.3395>) of the 4th GF-TADs Eastern Africa Roadmap meeting (29–31 March 2022) for Foot-and-Mouth Disease highlighted the following challenges:

- a) A range of FMD vaccines from commercial suppliers (such as IMUNAFT / Biopharma, Fortivax / KEVEVAPI, ME-VAC or BVI) are used in the region although there is very little vaccine matching data available to support the use of these vaccines for Eastern African field isolates.
- b) There is lack of knowledge regarding the complex epidemiology of FMD virus lineages that circulate in Eastern Africa, as well as a lack of empirical evidence for the selection and use of vaccines in the region.
- c) There is inadequate FMD surveillance, sampling and shipment of samples to reference laboratories to identify circulating strains and for vaccine-matching analyses. (donald.king@pirbright.ac.uk).
- d) There is no common policy approach among member states with regard to vaccinations.
- e) There is very low vaccination coverage. Therefore, the majority of livestock in the region are not protected (Two out of six countries reported their vaccination coverage to be as low as 6% for large ruminants: 6% and 3% to 10.2% for small ruminants:
- f) There is limited coordination of vaccination schedules between neighboring countries. No country reported taking their neighbors' vaccination schedules into account to plan their own vaccination programme.
- g) The majority of countries (Five out of six) indicated that funds in the national budget are not sufficient for FMD vaccines and vaccination.
- h) Post-vaccination monitoring is little practiced (One country reported conducting vaccine effectiveness studies (PVM) – but the results were not shared;
- i) There is limited use of laboratory diagnostic services in the region. As by 2022, two countries used national laboratories for FMD confirmation; four countries used both national and international laboratories; and four countries used enzyme-linked immunosorbent assay (ELISA) and reverse transcription polymerase chain reaction (RT-PCR).
- j) Public–Private Partnership: There is limited use of public–private partnerships in

vaccination campaigns (Only three countries reported using public-private partnerships in vaccination campaigns).

- k) There is inadequate vaccine matching and post-vaccination monitoring, to determine how well the vaccines protect against these strains.
- l) The Regional PCP FMD coordination is weak. There is the Eastern Africa Regional Laboratory Network and the Eastern Africa Regional Epidemiology Network to support the regional and national FMD control effort but glaringly weak.

2.0 FMD in Uganda

2.1 FMD Geographical distribution in Uganda

In Uganda FMD outbreaks occur at least annually (Ayebazibwe et al, 2010; Okello et al, 2022) and this is partly responsible for the stagnation of livestock production and trade despite the high potential to produce and trade animals and animal products. In as much as the disease has a low mortality rate in adults, the disease is dreaded because of its high speed of spread and its devastating injuries to affected animals that translate into high productivity losses, quarantine restrictions and impediment to trade (trade bans) (Otte et al, 2011, Knight-Jones et al, 2013).

FMDV was first detected in Uganda in 1953 (Ayebazibwe et al., 2010). Since then, there has been constant outbreaks of the disease throughout the country. Compared to the 1990s, the Ministry of Agriculture Animal Industry and Fisheries (MAAIF) reported an increase in FMD cases between 2000 and 2007 (Kasambula et al, 2012) while Ayebazibwe et al, (2010) showed 56 out of 80 districts had been affected by FMD between 2001 and 2008. Furthermore between 2010 and 2021, there was an average of 37 outbreaks of FMD reported per year, spread out in about 40% of the districts, an approximation of 407 outbreaks between 2010 and 2021. This reflects a rise in the number of FMD outbreaks compared to the period between 2001-2008 where Ayebazibwe et al (2010) reported 311 outbreaks.

Using data collected from NADDEC, Okello et al (2022) revealed that there was an increase of FMD cases with over 20,000 cases of FMD reported in the country between 2010 and 2021. Recent reports from the NADDEC (2023) show that in 2022, out of 1047

suspected cases of FMD, a total of 553 samples (52%) were submitted for laboratory analysis of which 169 samples turned out positive. As shown in Table 11, from July 2021 till June 2022, out of 411 suspected cases of the disease, 92 (22%) samples were submitted for laboratory analysis and 83 turned out positive for FMDV. About 98% of the samples submitted from July 2022 to June 2023 were from bovine (cattle) with under 2% of samples from caprine species of which one turned out positive. This shows that cattle may be the most clinically affected species in Uganda and are therefore the most sampled for FMD laboratory diagnosis. The observed statistics generally reflect low levels of submission of samples (most probably aggravated by a tendency of low reporting of suspected cases for fear of restricted animal movement and market closure) for laboratory analysis which may hinder timely disease management. The information on sampled species points towards the need for further studies on the role of other species e.g. caprine on the epidemiology of the disease in the country and raises questions on whether the other livestock species should be considered during vaccination programs.

Table 11: NADDEC Annual reports (June 2022 and June 2023)

Year	Number of FMD suspected cases	Number of samples analyzed	Number of positive samples
July 2021- June 2022	1047	553	169
July 2022- June 2023	411	92	83

a) Spatial distribution of FMD cases

Though, a number of FMD cases have been reported through the country, their distribution is uneven and concentrated in the eastern and western parts of the country (Ayebazibwe et al, 2010; Okello et al, 2022; Kerfua et al, 2020). Out of over 22,000 FMD cases reported by Okello et al, (2022), between 2010 and 2021 45% (10,211) were registered in eastern Uganda, followed by western Uganda, which had over 8,000 cases (38%), Central 11% (2,440) and least of all Northern Uganda with 6% (1,354). The most affected districts during this entire time were Bukedea and Kasese that registered over 6000 cases of FMD. Spatial distribution of FMD in Uganda has been majorly associated with selected border areas and districts located along the cattle corridor (Ayebazibwe et al, 2010; Okello et al, 2022; Kerfua et al, 2020). This information can be utilized to design strategic risk-

based vaccination programs and also to establish disease free zones in the country. Undoubtedly, the country still grapples with issues of under reporting of outbreaks by farmers because of the perceived negative consequences to them such as quarantine and trade restrictions, as such some of the figures may not reflect the actual situation.

The FMD spatial distribution as shown in the maps in Figure 4, emphasizes that the majority of the FMD cases between 2019 and 2023 occurred in the districts along the cattle corridor with Nakasongola district having recurrent cases. Between July 2022 and June 2023, it is observed that the disease spread to areas outside the cattle corridor, such as Arua and Moyo district in the West Nile region. Generally, the spatial distribution shows that most likely FMD spread from one district to another seeing that the districts that were closer to the one with outbreaks got affected the next year. An indication that there may be movement of livestock even during outbreaks thus spreading the disease even further.

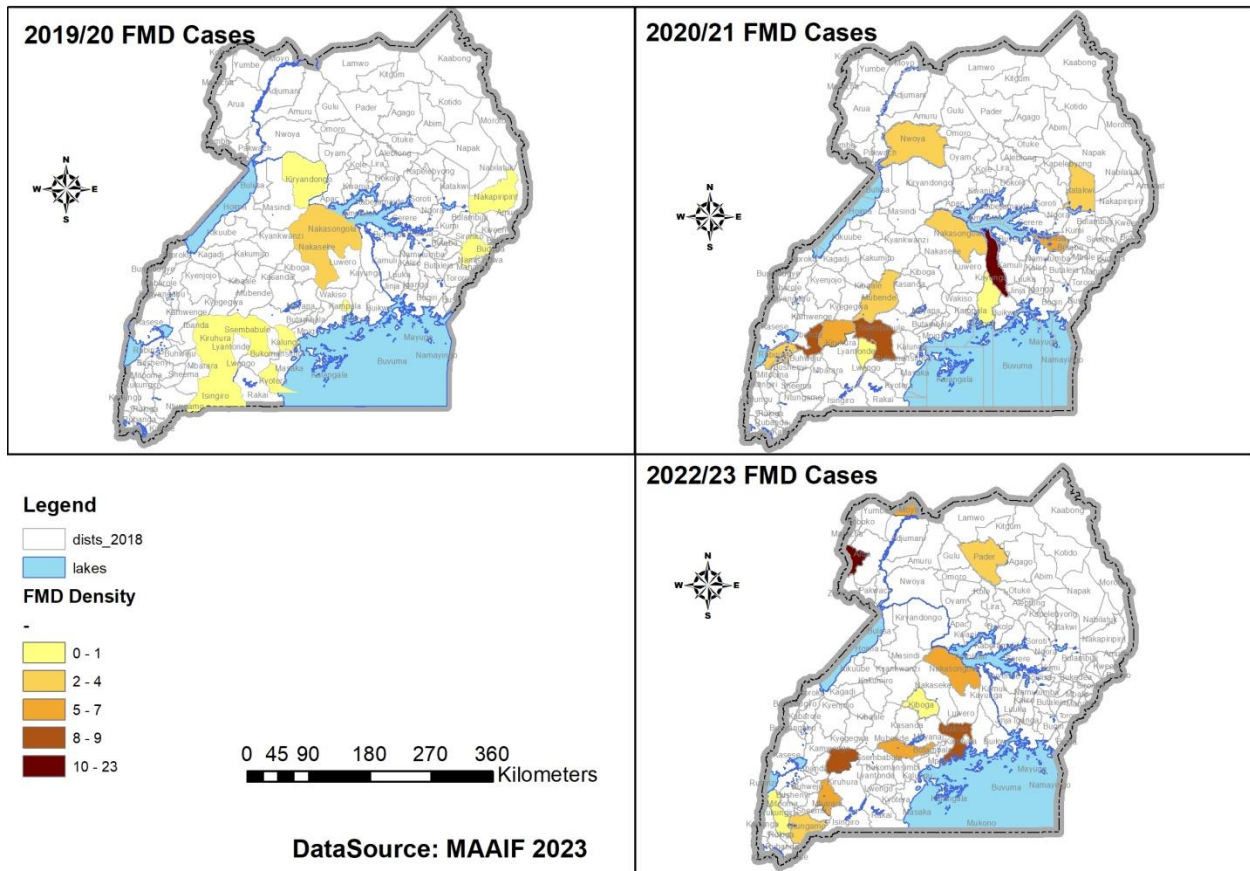


Figure 4: Spatial distribution of FMD cases

b) Temporal distribution of FMD

Temporal distribution of FMD shows that the disease is majorly reported during the dry month of the year with fewer cases reported in the wet months (Okello et al, 2022, Kerfua et al, 2018; Ayebazibwe et al, 2010). Most recent findings by Okello et al. (2022) revealed that most outbreaks occurred in the dry months of November, January, and February with fewer outbreaks reported during the rest of the years.

c) Capacity for laboratory diagnosis of FMD in Uganda

The National Animal Disease and Epidemiology Centre of the Ministry of Agriculture Animal Industries and Fisheries (MAAIF) is the national reference veterinary laboratory which performs FMDV surveillance and diagnostic activities (Namatovu et al, 2013). Other laboratory facilities in the country that perform FMDV diagnosis include the National Livestock Resources Research Institute which is part of the National Agricultural Research Organization, the Uganda Virus Research Institute (UVRI), the Uganda Wildlife Authority - Queen Elizabeth National Park Laboratory and the Molecular Biology Laboratory College of Natural Science (CoNAS) Although these facilities perform tests for FMDV, none of them are accredited for any FMD test. Majority of the facilities mentioned use ELISA test for FMD diagnosis. Information on the capacity of private laboratories to diagnose FMD remains limited.

Table 12: The laboratory facilities in Uganda and their capacity for FMD diagnosis

	Facility	Region	Analysis capability	Core function	Frequency
1.	NADDEC	Central	RT-PCR, AgELISA, Ab ELISA, Conventional PCR	Surveillance, Diagnostics	Routine
2.	NaLIRRI-NARO	Central	RT-PCR, AgELISA, Ab ELISA, Conventional PCR, Virus culture	Research	Occasional
4.	CoNAS	Central	AgELISA, Ab	Research	Occasional

	Makerere		ELISA, Conventional PCR		
5.	UWA – QENP	Western	Ab ELISA, AgELISA, RT-PCR, Conventional PCR	Diagnostics	Occasional

2.2 Epidemiology status of FMD in Uganda

In Uganda, serotype O has been reported as the most dominant followed by serotypes A, SAT 2 and SAT 1. Serotype O and A are mostly widespread throughout the country, whereas SAT 2 and SAT 1 are more confined to the south western region, with a few isolated cases in the central region (Kerfua et al, 2020; Mwiine et al, 2019; NADDEC Laboratory Reports 2022/2023). Cattle are reported as the most affected livestock species with five serotypes (O, A, SAT 1, SAT 2, SAT 3) having been reported in the cattle population (Ayebazibwe et al, 2010; Balinda et al, 2010; Kasambula et al, 2013; Namatovu et al, 2013; Dhikukusooka et al, 2015; Kerfua et al, 2019; Mwiine et al, 2017; WRL-FMD, 2023). Rarely have outbreaks been reported in small ruminants and pigs. The current FMD situation in the wild life is not updated, however, previous research shows the circulation of SAT serotypes (SAT 1, SAT 2 and SAT 3) in the Ugandan buffalo population (Ayebazibwe et al, 2010; (Kalema-Zikusoka et al, 2005).

The epidemiology of FMDV in endemic settings, Uganda inclusive, remains not very well understood (Di Nardo et al., 2015; Knight-Jones et al., 2016) and can as well compromise control strategies due to lack of evidence-based guidelines. However, in the last decade several Ugandan researchers have contributed to the increase in knowledge of FMD epidemiology in Uganda. Several factors have been associated with FMD outbreaks and could as well continue to be the leading cause in the increase of FMD outbreaks in the country.

Environmental factors such as temperature and rainfall have been very instrumental in FMD epidemiology. Although wind has been highly associated with the spread of FMDV aerosols, no such studies have yet been undertaken in Uganda. The majority of researchers have however, observed that higher temperatures or hotter months of the

year have been associated with more FMD cases whereas during the wetter/colder months a smaller number of cases/outbreaks were registered (Ayebazibwe et al, 2010; Okello et al, 2022; Kerfua et al, 2022).

The role of other livestock species such as goats, pigs, sheep and wildlife species has not yet been fully explored in Uganda and yet currently vaccination campaigns are targeted towards only cattle. Although, livestock species such as sheep and goats don't readily show clinical signs and symptoms, they shed the virus in their secretions, playing a critical role in the epidemiology of the disease. Occasionally, goats and sheep are seen grazing alongside with cattle, a common phenomenon among some farming communities in Uganda. While Balinda et al (2010), was able to demonstrate the presence of FMDV antibodies in goats that had been slaughtered in the abattoir after quarantine had been lifted, the question still stands as to what role the small ruminants play in FMD epidemiology. Additionally, Kerfua et al (2013) was able to report on the presence of FMDV in swine samples that were collected from Rakai district in 2010. Generally, a limited number of studies has been conducted on other livestock species, with most studies carried out on cattle. Therefore, more studies are required in the country to understand the role of other species in FMD epidemiology. The Table 14 below shows the different animal species and the different serotypes that have been associated with them in Uganda.

Table 13: Showing serotypes and animal species from which they were detected

Serotype	Animal species	Reference
O, A, SAT 1, SAT 2, SAT 3	Cattle	Ayebazibwe et al, 2010; Balinda et al, 2010; Kasambula et al, 2013; Namatovu et al, 2013; Dhikukusooka et al, 2015; Kerfua et al, 2019; Mwiine et al, 2017; Okello et al, 2022; WRL-FMD, 2023
A*	Goats	Balinda et al, 2010
O	Pigs	Kerfua et al, 2013

* Only antibodies to FMDV were detected

The role of animal movement in Uganda is very critical in the spread of the FMD. Studies have shown that disease spread can be propagated by increased animal movement networks (Hasashya et al, 2023; Di Nardo et al, 2011). Additionally, movement of animal products is also very important as well and has to be considered during control and surveillance programs. In Uganda, annual spiritual festivals of Christmas, Easter, Eid Quraban (Eid al- Adha), lead to intense and poorly regulated animal movements where thousands of animals are transported and act as the most contributing factors to disease spread and makes it difficult to control the disease.

The immunity and health status of the animal is very important in controlling disease spread. Studies have shown that animals that are generally healthier and have been vaccinated with an effective FMD vaccine, stand a better chance at protection from FMDV infection compared to those that are not. Vaccination coverage additionally aids to alleviate spread of disease, FMD vaccination coverage of about 80% is recommended to ensure controlled spread of disease.

The complex nature of FMDV complicates FMD epidemiology. The virus has seven serotypes of which each serotype will have several topotypes and lineages therein (Jamal et al, 2013). Furthermore, the virus is an RNA virus that is prone to mutations with a mutation rate of between $10^{-3.0}$ and $10^{-6.0}$ per round of viral replication (Smith and Inglis, 1987; Drake, 1993; Drake and Holland, 1999). Field mutation rates were found to be between 0.5 and 1.5% of sites changing per year. This presents challenges and opportunities for the control of FMDV (Haydon et al, 2001).

The presence of wildlife in Uganda presents a complex situation to FMD control given that buffalos have been found to be important in FMD epidemiology. Buffalos have been found to present no clinical signs of the disease when infected with the virus but are able to shed the virus and transmit it to any susceptible animals. Wildlife-livestock interphases present a challenge in the control of FMD given that local communities graze their animals in and at the peripherals of the parks. Dhikusooka et al (2013) was able to detect SAT 3 from a calf that had been grazing near Lake Mburu national park for a period of time.

2.2.1 Molecular Epidemiology of FMD virus in Uganda.

Evidently within the commonly circulating serotypes in Uganda, there are distinct lineages that belong to specific topotypes. This diversity may interfere with immunity induced by vaccination given that the FMD serotypes and strains may not be cross protective. Past studies since 2010 show that Uganda's main dominant serotype O virus strains belong to Topotype: EA-2, (lineages I, II, III, IV and V) (Kasambula et al, 2012; Mwiine et al, 2017, Balinda et al, 2010, Namatovu et al, 2015; Kerfua et al, 2019) and has been in circulation for over a decade. In 2017, virus strains that belonged to EA-1 and EA-4 were detected from FMDV isolates in Uganda (Mwiine et al, 2019; WRL-FMD, 2022). The 2017 FMDV strain that was isolated from Adjumani district belongs to lineage VI in topotype EA-1. The EA-1 topotype has long been in circulation in Kenya for over decades and this topotype has been constituted in the vaccine made from Kenya Veterinary Vaccine Production institute (KEVEVAPI). Thus, so far Uganda has three documented topotypes of serotype O; EA-1, EA-2 and EA-4. The presence of three topotypes of O serotype presents the country with new information on an additional topotype detected which has great implications for vaccination strategies.

The FMDV strains for Serotype A, for close to a decade (between 2013 to 2020) have been found to belong to one lineage in topotype AFRICA-GI (Namatovu et al, 2013; Mwiine et al, 2017; Kerfua et al, 2019). To note is that the serotype A KEVEVAPI vaccine strain K5/1980 also belongs to AFRICA-GI topotype however, there were significant differences in the Ugandan viral strains downstream of the RGD motif. Namatovu et al. (2013) and Kerfua et al. (2019) noted that these differences could affect vaccine efficacy and effectiveness.

SAT 1 topotype IV was first reported in 2013 by Dhikusooka et al. (2016) from FMDV isolates collected from Queen Elizabeth National Park. Thereafter, topotypes IV and I were reported in 2015 and 2016 respectively from isolates from central and western Uganda (Mwiine et al, 2017). This presents the country with two known SAT 1 topotypes, however, the current KEVEVAPI SAT 1 vaccine strain belongs to topotype I. This still presents implications for vaccine effectiveness.

Serotype SAT 2, lineage II that belongs to topotypes IV was detected in 2013 by Namatovu et al. (2015) from isolates from Wakiso district. Other virus strains belonging

to lineage II were isolated from Nakasongola (Mwiine et al, 2017). Lineage I that belongs to toptotype VII were isolated in 2016 and 2017. Most recently from Kiruhura, lineage III that belongs to toptotype X was isolated.

The FMDV SAT 3 virus that was isolated by Dhikusooka et al. (2013) was documented to belong to toptotype V. The current vaccines used in the country do not contain strains belonging to SAT 3.

Although several researchers have contributed to the increase in knowledge of FMD viruses circulating within the country and their epidemiology, there still remains a gap in regular research on the molecular epidemiology of the FMDVs as reflected in Table 15. From 2018 - October 2023, there have not been any further publications that reflected the molecular epidemiology of FMD in Uganda.

Table 14: Serotypes and toptypes in Uganda

Year	Serotype	Topotypes	References
2013	A	AFRICA G-I	Namatovu et al, 2015
2013	SAT 2	I	Namatovu et al, 2015
2013	SAT 3	V	Dhikusooka et al, 2015
2014	O	EA-2	Mwiine et al, 2017
2014	SAT 2	X	Mwiine et al, 2017
2015	O	EA-2	Mwiine et al, 2017
2015	SAT 1	IV	Mwiine et al, 2017
2016	O	EA-2	Mwiine et al, 2017
2016	SAT 1	I	Mwiine et al, 2017
2016	SAT 2	VII	Mwiine et al, 2017
2017	O	EA-1	Mwiine et al, 2017
2017	O	EA-2	Kerfua at al. 2019
2017	SAT 2	VII	Mwiine et al, 2017
2017	A	AFRICA-GI	Mwiine et al, 2017 Kerfua et al, 2019

2018	NA	-	-
2019	NA	-	-
2020	NA	-	-
2021	NA	-	-
2022	O	NK	NADDEC
2023	O	NK	NADDEC
2023	A	NK	NADDEC

Note: NK, Not Known; NA, not available

2.3 Policy and Legal Challenges

The following policies and regulations (among others) directly and indirectly influence FMD control in Uganda.

- The Constitution of the Republic of Uganda
- Decentralization Policy
- Privatization Policy
- Liberalization Policy
- National Agricultural Policy; and
- National Agricultural Extension Policy 2016.
- The National policy for delivery of veterinary services
- National Veterinary Drug Policy 2002;
- Animal Diseases Act 1964 Cap 218;
- The National Drug Policy and Authority Statute / Act (NDP&AA);
- The Veterinary Practitioner’s Bill;
- NARS Act
- The NAADS Act
- PPP Act

As of September 2023, Uganda is still at Stage 2 of the Progressive Control Pathway (PCP) as opposed to Stage 4 that was projected in the national Risk-Based Strategic Plan (of 2017) for Control of FMD. This delay is due to several challenges encountered in the effective control of FMD as various experts have severally identified and reported the key challenges surrounding effective control of FMD in the country (Rutebarika, 2012; Maree et al., 2014; Ayebazibwe (2010), Ingabire et al., 2014. Mwiine et al., 2010, Muleme et al., 2012; Kerfua et al., 2018; and Munsey et al., 2012, and Velazquez-Salinas et al., 2020). Some of the challenges reported include the following:

2.4 Challenges related to veterinary governance

Under sixth schedule of the Constitution of Uganda 1995 (article 189), the functions and services for which government is responsible are detailed. Among others central government is responsible for agricultural policy and the management of epidemics and disasters. The constitution also provides for decentralization/ devolution of governance. the Local Government Act 1997 is explicit on the functions of the local governments in relation to the delivery of agricultural services.

As noted by Dibungi Luseba & Paul Rwambo (Luseba Consultants (PTY) Ltd) 2015 “In each district, the local authority determines priority agricultural enterprises to be funded; thus, livestock could be a priority in one district and not in the neighboring district. This makes disease control very challenging and can affect the national economy through losses in export or food insecurity.”

Generally, one of the effects of the decentralization policy was and remains the breaking or interruption of the chain of command by a statutory authority between the technical central government officials and the local government technical officials who are supposed to implement decisions. Although central government is supposed to operate

through local governments, the immediate priorities of either party may not be in tandem. These circumstances affect control of FMD.

The governance of veterinary services is further split between many institutions reflecting points of weakness in coordination and implementation. Elements of research are under NARO, responding to the NARS Act and elements of extension services are under a separate agricultural extension service (formerly NAADS) under the Directorate of Agricultural Extension as dictated by the National Agricultural Extension Policy 2016.

2.5 Policy gaps

Although the National Veterinary Authorities in the country pronounced the PCP FMD strategy, all diseases control related policies and policy instruments need to be updated to implement the strategy. In particular, the FMD free zoning and /or compartmentalization initiatives are not yet backed up by an explicit zoning policy and legal framework as guided by the WOAHA TAHC.

One of the country's main objectives of controlling FMD has been to access very lucrative markets at regional and international level. However, the EU may demand the adoption of a slaughter and compensation policy which is not even under consideration at the moment as part of the national FMD control and eradication strategy.

The Policy on delivery of veterinary services is explicit on the importance of surveillance and reporting as well as the importance of laboratory and field diagnostic capacity. However, the Animal Diseases Act that legally operationalizes the policy on delivery of veterinary services is silent on whether conducting surveillance and reporting is mandatory and what must be captured and the penalties for non-compliance.

The country has neither an explicit laboratory policy nor a vaccination policy.

2.6 Challenges in the Prevention and Control of FMD in the country.

Since the first FMD outbreak in 1953, the country has continued to experience FMD outbreaks despite efforts to control it. As of September 2023, Uganda is still at Stage 2 of the Progressive Control Pathway (PCP) as opposed to Stage 4 that was projected in the national Risk-Based Strategic Plan (RBSP) of 2017 for Control of FMD. This delay is due to several challenges encountered in the effective control of FMD in Uganda. Various experts have specifically identified and reported the key challenges surrounding effective control of FMD in the country (Rutebarika, 2012; Maree et al., 2014; Ayebazibwe (2010), Ingabire et al., 2014. Mwiine et al., 2010, Muleme et al., 2012; Kerfua et al., 2018; and Munsey et al., 2012, and Velazquez-Salinas et al., 2020). The following have been the challenges in preventing and controlling FMD outbreaks:

1. **The movement of livestock** within and across borders is a significant risk factor for the spread of FMD. Uganda shares borders with several FMD-prone countries, making it vulnerable to cross-border transmission (Hasahya et al., 2023; Kerfua et al., 2018; Mugezi et al., 2020). Ineffectively controlled movements of livestock, internally and across borders, mainly for commercial trade or during customary and responsive transhumance is a huge challenge to effective control of FMD. The major international borders include the route from Northern Tanzania through Southern Uganda to other regions of the country. Additionally, animals move back and forth across the borders of Rwanda in the Southern region, Kenya in the Eastern and North-Eastern regions, and Southern Sudan in the North and North-Western regions and the Uganda-DRC border.
2. **Infrastructure deficiencies**, such as animal health laboratories, quarantine facilities, and cold chain storage for vaccines, hampers FMD control efforts. These shortcomings affect the timely and accurate diagnosis of FMD cases and the storage and

transportation of vaccines. Particularly poor infrastructure makes it difficult to reach remote or conflict prone areas to implement vaccination programs and surveillance activities. This leads to gaps in disease control efforts, allowing FMD to persist in certain regions of the country (Namatovu et al, 2015). Challenges related to laboratory and field diagnostic capacity: there are challenges of virus recovery from field samples. It is still difficult to harvest the virus and sequence from field livestock and wildlife samples. There is limited access to reagents.

3. **Shortage of skilled manpower** including veterinarians, laboratory technologists, other animal health care workers and epidemiologists, impede the execution of comprehensive FMD control strategies. The shortage of skilled personnel affects the quality and coverage of vaccination campaigns, disease monitoring and outbreak investigation and response (Namatovu et al, 2015).
4. **Research and development:** In all national research institutions, there has not been consistent research program focused on FMD control and eradication until recently where the government of Uganda has heavily funded vaccine development being implemented at NARO/NaLIRRI. Research efforts of individual scientists is often uncoordinated, unsustainable and not sufficiently aligned to PCP FMD.
5. **Cross-Border Cooperation:** FMD requires well-coordinated area-wide approach however, there are no harmonized approaches between neighboring countries in the control of FMD.
6. **Vaccine availability and distribution** are critical components of any Foot and Mouth Disease (FMD) prevention and control program. There is a general shortfall in vaccine supply in Uganda which is reflected by low vaccination coverage of 13% for large ruminants and 0% for small ruminants as per the Performance audit report of the Ministry of Finance and Economic Development, 2022. The coverage of cattle vaccinated annually falls far below that of over 80 percent required to prevent transmission. Although the number of doses procured has increased over the years

(as shown in Table 15 below), the vaccination coverage is still low with the current procurement process taking an average of 4 months as per the recent MAAIF Agro-Industrialization program performance report FY 2020/2021. Additionally, vaccine quality is a key factor in controlling FMD; therefore, there is need for continuous update on FMD circulating serotypes in order to match it with the vaccine being used. Vaccine matching is a precondition for successful vaccination programs but this is rarely done due to low capacity. Vaccination monitoring, which is a pertinent component of whether a vaccination program has been effectively conducted, is rarely performed.

Table 15: FMD vaccine doses procured (MAAIF)

Year	2018/19	2019/20	2020/21	2021/2022
FMD doses	1,150,880	2,500,000	1,572,000	1,753,000

7. **Genetic variability** One of the significant challenges in controlling FMD is the high genetic variability of the virus. Currently there are five different serotypes (A, O, SAT1, SAT2, and SAT3) in the region and numerous subtypes within each serotype. Additionally, there can be multiple genetic variants of each sub-type. This variability makes vaccine development and disease control more complex.
8. **Wildlife Reservoirs:** Uganda has diverse wildlife populations, and their role in FMD transmission, particularly African buffaloes (*Syncerus Caffer*) are reported as reservoirs for the Southern African Territories (SAT 1, SAT 2 and SAT 3) serotypes of FMDV, and transmitted among various species of both domesticated animals and wildlife (Ayebazibwe et al., 2010) . Evidence of circulation of FMDV serotypes A, O , SAT 1, 2 and 3 were reported in free ranging buffaloes in Queen Elisabeth National Park- QENP (Kalema-Zikusoka, Bengis, Michel, & Woodford, 2005). There is evidence of asymptomatic transmission of FMDV (SAT1) at the livestock-wildlife interface in QENP (Dhikusooka et al., 2016). There are incidences of farmers grazing their

livestock in game parks especially during the dry season as they search for pasture and water. After the dry season, the farmers return their cattle (which may be infected) to the communities. This further complicates control of FMD.

9. **Inadequate biosecurity measures** on and off farms and livestock markets related movements facilitate the spread of FMD. The movements of people, vehicles, and equipment between infected and uninfected areas introduce FMDV in clean areas. The country does not have a comprehensive biosecurity plan for FMD.
10. **Inadequate Surveillance system:** Uganda faces challenges in maintaining an effective surveillance system, especially in remote areas with limited access. Surveillance for FMD needs a robust surveillance system to detect outbreaks early. Consequently, FMD outbreaks are only reported and eventually responded to, only once the disease has escalated to a serious state. To note is that even then there is no guarantee that all the outbreak samples are submitted to the laboratories for analysis.
11. It is perceived by many actors that there is an **increasing reluctance by the community and livestock owners to notify clinical cases of FMD** due to the fact that animal movement restrictions, closure of markets and quarantines are perceived as punitive measures rather than appropriate and mandatory measures to control FMD outbreak.
12. **Challenges related to risk analysis.** There is limited capacity in the country to conduct detailed risk assessments (especially quantitative risk assessments) required to scientifically inform policy directions in FMD control.
13. **Inadequate policy and legal framework** for FMD control in Uganda: clear policies and effective coordination are essential for a successful FMD prevention and control program. However, the policy environment falls short of requirement. Owing to the gaps and weaknesses in the policy and the legal framework, the governance of veterinary services is split between many institutions reflecting points of weakness in coordination and implementation. This is mainly due to the decentralization policy.

There is no zoning/compartmentalization policy and compensation policy as advocated for by the key international trade bodies such as the WOA, WTO and trade facilitating bodies such as FAO. It is also a legal international trade requirement that declared FMD free compartments/zones are protected by legal provisions in a country. However, the Animal disease act which is the main legislation/law providing for disease prevention and control does not provide for zoning, compensation and does not have sufficient regulations to provide for effective control of FMD. Owing to the weak legal environment, it's not mandatory to have a national emergency preparedness and response plan for FMD control and eradication.

14. **Social, political and cultural challenges;** this arises from the measures the public authorizes take to contain the disease. This includes restriction of animal movements, quarantine declaration and closure of markets. Although there are usually restrictions on animal and animal product movement during FMD outbreaks because of imposed quarantines, sometimes because of social, political and cultural obligations, these restrictions may not be followed. Animals and animal products will therefore be moved for dowry payment, sale etc. increasing the risk of spreading the disease.
15. **Limited Resources:** One of the challenges for prevention and control of FMD in Uganda is the limited resources. Inadequate funding has been hindering the implementation of key activities such as vaccination campaigns, surveillance, research and emergency response. Shortage of funds negates the procurement and distribution of vaccines, diagnostic equipment, and other essential supplies.
16. **Vaccination practices:** Most of the FMD vaccinations usually done in Uganda are implemented in response to outbreaks due to limited resources. In addition to that, not prompt availability of vaccines in stock at the time of outbreaks and the time required for procurement and supply make the response often delayed allowing the disease to spread.

17. **A centralized vaccine management/distribution approach** managed entirely by the Government as it has been in the past, has showed a number of flaws and limiting elements in terms of time gaps in procurement/distribution (lags in procurement process and distribution), inefficient logistic support, vaccine allocation inefficiency occasioned by failure to follow sound epidemiological logic / trends and characterized by allocation of vaccine quotas which might not follow epidemiological guidelines and intelligence.
18. In certain cases, it might have followed the strategy of allocating high amount of vaccine doses to “big size farms” and /or “big ranches” in an attempt to reduce the logistic and transport costs, increase the number of cattle vaccinated and reduce pressure on Veterinary services instead of a risk-based approaches.
19. On the other side, as potentially any farm/ranch regardless of the number of animals, could represent an ideal focus for FMD outbreak and spreading in a large territory, if preventive measures such as vaccination are not taken in advance and a proper and prompt buffer zone with emergency vaccination is carried out as soon as possible and immediately at the first detection of the FMD outbreak, the disease can easily spread.
20. As a matter of fact, the farmers “flexibility” in accessing the FMD vaccine is actually dependent up to a certain extend on the size of the enterprise (and maybe by its economic/financial robustness) where big ranches might have a better chance of 1)- accessing FMD vaccine stock when available 2)- purchasing vaccine from manufacturing companies outside Uganda and not depending on supplies from the MAAIF. The same element of flexibility could be farther articulated by the fact that while beef ranches have a partial seasonal based system with different intensity of calving across the year so can manage better calendar vaccination in terms/costs of intervention, dairy farms tend to have less seasonality related event in an effort to distribute calving across the year to maintain a steady supply of milk to the market, therefore obliged to practice the vaccination more on a need/age group based

calendar.

3.0 Economic impact of FMD control in Uganda

Livestock farming significantly contributes to households' livelihoods and national foreign exchange earnings. However, FMD leads to reduced productivity, trade restrictions and increased veterinary costs. There are both direct and indirect costs associated with FMD outbreaks as summarized in Figure 3.

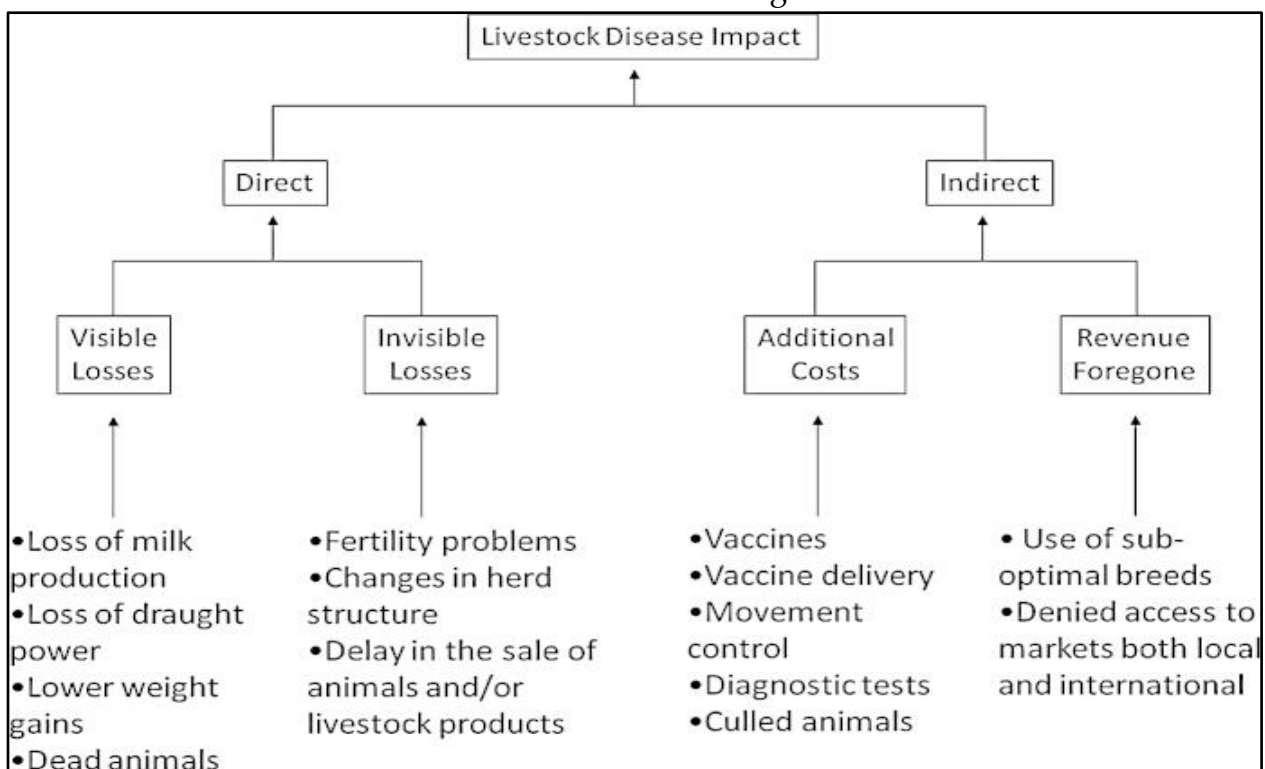


Figure 3: Impacts of foot-mouth disease (Rushton, 2009).

3.1 Economic implications of FMD

FMD disease is characterised by high morbidity rates and relatively low mortality rates. However, in some instances, young animals do die of FMD, estimated to be 20% (Knight-Jones & Rushton, 2013; Hoost, 2017). FMD causes substantial decrease in productivity in animals, which in turn has a considerable economic impact on all stakeholders within the livestock value chain (Knight-Jones & Rushton, 2013; Baluka, 2014 & et al., 2016; Hoots,

2017; Cristina de Menezes, 2022). The Ugandan cattle corridor is susceptible to numerous FMD outbreaks and bears the high costs associated with FMD outbreaks (Rutebarika, 2012; MAAIF, 2022; Garcia, 2022; Hasahya et al., 2023). Usually, in case of FMD outbreaks in Uganda, control practices include vaccination, isolation and ban of cattle movement (Kakuru, 2022). However, these practices have not been effective in eradicating FMD.

3.1.1 Visible production losses due to FMD outbreak

FMD leads to direct losses as a result of decreased productivity and alterations in the herd composition. Animals that are infected experience a decline in milk production, a decrease in body weight, a reduction in fertility and in some cases the death of the animals. These have a direct impact on the financial earnings and sustenance of those engaged in livestock farming and trade (Baluka, 2016; Kerfua et al., 2023). According to a recent study by Kerfua et al. (2023), an outbreak of FMD led to a reduction in sales of livestock by 63%, livestock and livestock products revenue by 70%, milk productivity by 49%, and beef consumption by 3%. These changes led changes in local market prices and household consumption patterns and livestock sales. Similarly, Baluka (2016) observed that FMD outbreaks do cause financial losses at the farmer level, district level, regional level, and national level. At the processing level, various actors lost income amounting to 77% (Baluka, 2016). At farm level, Baluka et al. (2014) found out that the expenses of FMD control per animal during outbreaks were significantly higher in smaller farms compared to larger farms. They estimated that the expenditures amounted to US\$123 for smaller farms, while larger farms incurred costs of just US\$17 per animal. Another independent study by UNDP (2022) showed that in the Karamoja subregion every household lost 696 USD annually due to the occurrence of FMD.

FMD causes reduced feed intake, decreased nutrient absorption and overall poor health resulting in lower weight gain in affected animals (Rutebarika, 2012; Knight-Jones, McLaws, & Rushton, 2017; Kerfua et al., 2023). The animal then loses its normal market value and productive potential. Smallholder farmers have been forced to sell their livestock at salvage prices (Baluka et al., 2014).

It has been observed that animals affected by FMD exhibit a reduced capacity for draught power (Okello et al., 2015). This means a weakened capacity of the animal to carry out its

usual work or tasks as a result of damage to the hooves and the debilitating consequences of the disease. FMD can exert substantial effects to farmers in areas where cattle are used for draught power - employed in traction and transportation of farm inputs and products (Okello et al., 2015). This, in turn, has had negative consequences on household income, labor availability, and ultimately food security. In one of the south-eastern district of Uganda, Okello et al. (2015) found that FMD causes financial loss of approximately \$245 per household due to loss of draught power. There is also an additional cost of USD 97.6 per household per year incurred as averted costs due to the cost of human labor that would be used to plough. Therefore draught animals remain important to many Ugandan households and their infection by FMD has significant economic consequences.

FMD leads to reduced milk productivity in cattle going far below the potential. Okurut (2012) estimated annual financial loss caused by FMD outbreaks per household to be USD 90 to USD 400 in agro-pastoral areas in eastern Uganda.

Also FMD causes abortion in in-calf cows (Ademun, 2012; Baluka, 2016). Abortions in in-calf cows causes disruptions of herd growth, undermining the objective of achieving one calf per year per cow (Baluka, 2016). According to Hoosts (2017) FMD triggers a sequence of abortions in cattle that often cause permanent drop in milk production, unthriftiness and chronic fertility problems in recovered animals. This makes it economically costly disease with its effects felt even beyond the disease outbreak period.

3.1.2 Indirect losses attributable to FMD

The indirect costs when assessing the economic impact of FMD control in Uganda include expenses on vaccines, vaccine delivery, ban on animal movement, diagnostic tests, opportunities foregone, culling of animals or any other third-party costs. These have financial implications for farmers, the government and the livestock industry as a whole.

There are indirect losses resulting from trade restrictions that disrupt the supply chain. In Uganda, like in other countries, when an outbreak of FMD occurs, the authorities implement measures to limit the movement of animals and impose trade restrictions. FMD restrictions disrupt livestock and livestock product distribution, leading to delays, increased costs and difficulties in fulfilling customer orders. These restrictions can also affect the availability of animal products in the market, affecting the transportation of animals from affected areas hence affecting market accessibility. The imposition of trade

restrictions has a significant negative effect on the export capacity of Uganda's cattle industry, resulting in diminished market entry opportunities and decreased financial gains (Baluka, 2016; Kerfua et al., 2023). Because of the huge estimated financial losses associated with marketing opportunities due to the FMD outbreak, Baluka et al. (2014) urged the government of Uganda to invest in preventive measures and control of FMD. Similar findings were echoed by another study done by Kerfua et al. (2023) across the Uganda-Tanzania border, which found 30% reduction of household incomes derived from livestock sales during FMD outbreaks.

Baluka et al. (2014) reported observed decrease of 31% in revenue for local government in cattle markets and 90-99% of revenue margins gained from meat sales by butchers and meat processors during FMD outbreak.. This means that the imposed restrictions, which are often implemented to control the spread of the FMD, have far-reaching effects that interrupt the entire livestock supply chain and human social and economic activities.

Additionally, there are indirect control costs extended to expenses related to disease management strategies, such as the implementation of vaccination programs, diagnostic testing, quarantine procedures and the adoption of biosecurity protocols. The imposition of these control measures increases the cost of FMD burden, exerting financial pressure on farmers and enterprises operating within the livestock sector. According to Kakuru (2022), to offer effective FMD preventive measures, 90% of the national cattle herd should be vaccinated twice annually. This is too costly for Uganda. It has been found that when FMD vaccines are available during outbreaks the prices were too high (UNDP, 2022). The vaccines were imported. Muleme et al. (2012) reported that the cost of FMD vaccines imported ranged from US\$ 58,000 in 2003 to US \$1,088,820 in 2009. However, these costs kept on increasing with the number of FMD outbreaks because whenever there was an outbreak, it was followed by vaccination campaigns. The FMD vaccine procurement was done by government. Mugezi et al. (2020) estimated the annual cost of FMD vaccine purchase by government was at US\$ 4.2 million USD.

In addition, during FMD vaccination campaign there are costs related to vaccine delivery and administration. In the process of administering FMD vaccines the additional costs, include labor, transportation, and costs of equipment. Vaccination campaigns require trained personnel to visit farms or communities, and therefore incur expenses related to their time, travel and logistical arrangements (Kakuru, 2022). Studies by MAAIF (2022)

show that the unit cost of logistics for vaccination campaigns are equal to the costs of the vaccine.

3.2. Analysis of FMD control costs

FMD has been confirmed to be a very expensive disease to manage globally. According to Fukase (2012), the estimated control costs of FMD at the national level considers a range of activities that are normally carried called Progressive Control Pathway (PCP). Every country follows a recommended PCP to control FMD (WOAH & FAO, 2020). The strategy starts with identification of risks, control options and to maintaining FMD freedom without vaccination. Uganda is currently at stage 2 in the PCP process (Ibd).

The number one control cost for FMD is the vaccination expenses. The whole process of procuring vaccines, distribution, and the process of administration requires financial inputs. Muleme *et al.* (2012) found that vaccine uptake from 2001-2010 was only 10.3% of the cattle population that got vaccinated.

In 2018, the Ministry of Agriculture, Animal Industry and Fisheries had acquired only 500,000 doses enough for 3.3% of the total cattle population. By this time vaccination was needed to cover 14.6 million cattle (UBOS, 2019), 4 million sheep, 15 million goats and 3.8 million pigs (MAAIF, 2018). The total costs of FMD vaccine procurements keeps growing annually corresponding to increase in livestock populations and number of outbreaks. The Chimp Report (2022) showed that Uganda's MAAIF used over 900, 000 doses of FMD in a single disease outbreak along the Ugandan cattle corridor. These statistics demonstrate the heavy cost that the government and farmers have to incur in trying to stop the spread of FMD through vaccination measures.

There were also costs incurred associated with FMD surveillance measures. These include the cost of implementing routine animal testing in districts with elevated risk, subsequent laboratory examination and the dissemination of findings through established reporting mechanisms. These expenses encompass laboratory fees, personnel remuneration, equipment expenditures, logistical requirements and disease awareness campaigns. Although there is no clear data about these costs from the MAAIF, Alleweldt (2009) reported that the Cost of National Prevention Systems (NPS) for animal diseases and zoonoses in developing and transition countries was highest in Uganda. He reported

that the average NPS globally is 43%, lowest being 20% in Turkey and highest 77 % in Uganda(the study covered Costa Rica, Kyrgyzstan, Mongolia, Morocco, Romania, Turkey, Uganda, Uruguay and Vietnam).

Vaccination costs notwithstanding, the Monitor (2021) reported that Ugandan shillings 9.2 billion was lost due to quarantine measures in Nakaseke district alone along the cattle corridor. This is a substantial amount of funds lost if projected to all the affected districts.

In addition, there are consequential costs which includes imposition of movement restrictions, the implementation of enforcement of control measures and the establishment of monitoring mechanisms (Kasambula, 2011, Rushton & Knight-Jones, 2015; Kerfua, Railey, et al., 2023). It is not until all these consequential costs have been computed and added to the direct cost of FMD controls that we could have a clear picture of the FMD control costs in Uganda.

3.3 Recent development on the roles and responsibilities in the control of FMD

Currently in Uganda, the public sector has been carrying the full cost and responsibility of the control of FMD with minimum involvement of the private sector. Latest development related to projects, GALVMED, TRASE, PACEIT have shown strong strategic directions towards the increased role and responsibility of the private sector. This was also confirmed and recommended in a recent stakeholder roundtable meeting on PPP held on 30th Oct 2023.

The Commodity Based Trade (CBT) approach implemented through PPP has been identified as a suitable alternative in the control of the FMD and to work as a driver for a national level implementation and contribute to the FMD control strategy. The approach envisages a co-management of possible compartment and/or commodity value chains to enhance disease control (specifically FMD) and market access.

From the recent study conducted on willingness to pay for the FMD vaccine, in five districts of Isingiro, Kiruhura, Kabarole, Nakasongola and Amudat; 80% of the household were willing to pay for the FMD Vaccine therefore substantially contributing to the full disease control measure. Of those not willing to pay at UGX 10,000 (roughly USD 2.2),

38% were willing to pay after the price was hypothetically reduced by half. Hence willingness on cost sharing is a significant factor in determining FMD vaccine cost sharing strategy. (Annex 1)

4.0 Commodity based Trade and Public Private partnership

4.1 Uganda, possible scenarios on Commodity based trade (CBT) approach in the control of FMD through PPP schemes.

In Uganda, the vast majority of cattle are located in areas not free of FMD, leaving owners of these cattle with limited access to internal, (due to the recurrent imposed quarantine and animals movement restrictions), regional and international beef markets. This situation constrains investment in cattle production and marketing, thereby limiting rural development, entrenching rural poverty, negatively impacting on job creation and overall economic development.

For decades this situation has been accepted as irredeemable because the type of FMD prevalent in the region is maintained by a number of factors which make it technically very difficult to properly control and eventually eliminate. Moreover, until recently, international trade rules and conventions were founded on the need for the locality of beef production to be free of FMD. Fortunately, this situation is changing, and options include, among others, management of risk of FMD along a particular value chain.

The management of risk of FMD along the beef value chain is a possible workable option in Uganda aligned with the concept of Commodity based Approach² (CBT)³, (

² *The Phakalane Declaration on Adoption of Non-Geographic Approaches for Management of Foot and Mouth Disease, http://www.wcs-ahead.org/phakalane_declaration.html) specifically targeting beef producers, cooperatives, enterprises and Government.*

³ *Commodity-based trade represents an array of alternatives that can be used to ensure the production and processing of a particular commodity or product are managed so that identified food safety and animal health hazards are*

The following part of this document provides an overview on the nature of these options/changes and specifically how, step-by-step, the value chain approach can now be assessed and potentially exploited to proceed on FMD control, broaden market access and thereby profitability through increased marketing and export of beef in Uganda.

4.1.a Geographical Trade standards (www.oie.int)

Historically there were only four options for exporting beef in respect of FMD risk:

- i. Country free of FMD without vaccination (TAHC Article 8.7.2);
- ii. Country free of FMD with vaccination (TAHC Article 8.7.3);
- iii. Zone free of FMD without vaccination (TAHC Article 8.7.4);
- iv. Zone free of FMD with vaccination (TAHC Article 8.7.5).

Requirements for beef intended for export under any of the 4 options above portray the need for a certificate provided by the exporting country's competent authority (i.e. the official veterinary service- VS) to show that the location from which the beef was derived had the designated status and that the animals were slaughtered in an approved abattoir (TAHC Articles 8.7.22 & 8.7.23).

A major problem for businesses based at locations within zones recognized by the OIE as free from FMD is that if FMD is detected in clinically ill or healthy animals within that zone, the status of that zone will be suspended for at least 3 - 18 months (Article 8.7.9 of the TAHC) unless the country concerned establishes a 'containment zone' in accordance with Article 8.7.8 in which case trade from the previously FMD-free zone (which then maintains its free status) may continue. The variation in the period of suspension is determined by the type of FMD freedom (as shown in the list above) and the control measures applied to eliminate the specific FMD occurrence. Interruption of business for such lengthy periods obviously presents a major problem for any commercial enterprise and specifically for beef producers, traders and exporters.

reduced to appropriate risk levels. OIE Terrestrial Animal Health Code guidelines (Article 8.5.25) now recognize a disease management scenario under which commodity-based trade could be effectively implemented

!

4.1.b Non-geographic trade standards

Unlike the cases for freedom of countries or zones from FMD (with or without vaccination), the OIE does not provide an official recognition process for non-geographic approaches to risk management; it simply provides the measures that need to be complied with in order to meet the overall standard. It is therefore incumbent upon the exporter to persuade the importer as well as the competent authority of the importing country, that the applicable international standard has been met. Conventionally that takes place by certification provided by the competent authority of the exporting country, i.e., the official veterinary service. <http://www.fao.org/fao-who-codexalimentarius/codex-texts/list-standards/en/>.

For most of the African countries, the standards associated with some non-geographic approaches (e.g., compartments and value chains) are problematic, therefore, adoption of these approaches is not straightforward. On the other hand, they are not insurmountable.⁴

Essentially there are three different non-geographic approaches for management of FMD trade-related risks associated with beef where the country or zone from which the beef is derived is not recognized as free from FMD:

- a. Processing that inactivates any FMD virus that could potentially be present;
 - b. Establishment of a 'compartment' free from FMD;
 - c. Management of FMD risk along value chains (specific to the structure of the value chain).
- a. Processes that inactivate FMD virus

Certain processes, namely canning, thorough cooking during which a core temperature of 70°C or higher is maintained for a minimum of 30 minutes, or curing by drying and salting are accepted by OIE to be effective in destroying FMD virus in meat (TAHC

⁴ Thomson, G. and Penrith, M.-L., 2015. Guidelines for Implementation of a Value Chain Approach to Management of Foot and Mouth Disease Risk for Beef Exporting Enterprises in Southern Africa. Technical Report to the Wildlife Conservation Society's AHEAD Program. 12 pp.

Article 8.7.34). Therefore, there is actually no reason why meat and meat products subjected to these treatments cannot be exported regardless of the FMD status of the area of origin.

b. Compartments (see definitions)

A compartment consists of one or more establishments within which animal health risks are managed using a common, i.e., integrated biosecurity system. Compartments may consist of a single farm, a group of farms, or one or more farms as well as relevant service providers such as feed and/or animal suppliers. As a matter of fact, the WOAHP provides principles and guidelines of zoning and compartmentalization to Member Countries wishing to establish and maintain different subpopulations with specific health status within their territory.⁵

In this regards some principles apply⁶:

- Biosecurity and surveillance are essential components of zoning and compartmentalisation, and should be developed through active cooperation between industry and Veterinary Services.
- These include the human and financial resources and the technical capability of the Veterinary Services and of the relevant industry and production system (especially in the case of a compartment), including for surveillance, diagnosis and, when appropriate, vaccination, treatment and protection against vectors
- In the context of maintaining the animal health status of a population or subpopulation of a country, zone or compartment, importations into the country as

⁵ https://www.woah.org/fileadmin/Home/eng/Health_standards/tahc/current/chapitre_zoning_compartment.pdf

⁶ 2022 © OIE - Terrestrial Animal Health Code - 10/08/2022 1 Chapter 4.4.- Zoning and compartmentalization.

well as movements of animals and their products, and fomites, into the zones or compartments should be the subject of appropriate sanitary measures and biosecurity.

- The Veterinary Services should provide movement certification, when necessary, and carry out documented periodic inspections of facilities, biosecurity, records and surveillance procedures. Veterinary Services should conduct or audit surveillance, reporting, laboratory diagnostic examinations and, when relevant, vaccination.
- The production sector's responsibilities include, in consultation with the Veterinary Services if appropriate, the application of biosecurity, documenting and recording movements of commodities and personnel, managing quality assurance schemes, documenting the implementation of corrective actions, conducting surveillance, rapid reporting and maintenance of records in a readily accessible form.

Compliance with the biosecurity plan also needs to be audited and certified by the competent authority of the exporting country. This implies that export of beef derived from the compartment could only take place following bilateral agreement between the competent authorities of the importing and exporting countries. This means that the competent authority of the importing country would need to be in agreement with the soundness and implementation of the biosecurity plan of the compartment concerned. (ibid).

c. Management of FMD risk along value chains (specific to the structure of the value chain).

It is to be considered that (Thomson et al, 2013) not only can FMD and other animal disease trade risks be managed along value chains, but that food safety risk management can also be incorporated into risk management along the value chain. This is possible because it was shown that HACCP (Hazard Analysis and Critical Control Point) and CBT

principles are similar and can readily be applied in parallel along a beef value chain (Figure 5). It needs to be considered that food safety risk management of infectious agents is universally non-geographic, i.e., is independent of whether specific infections are present in the locality of production or not.

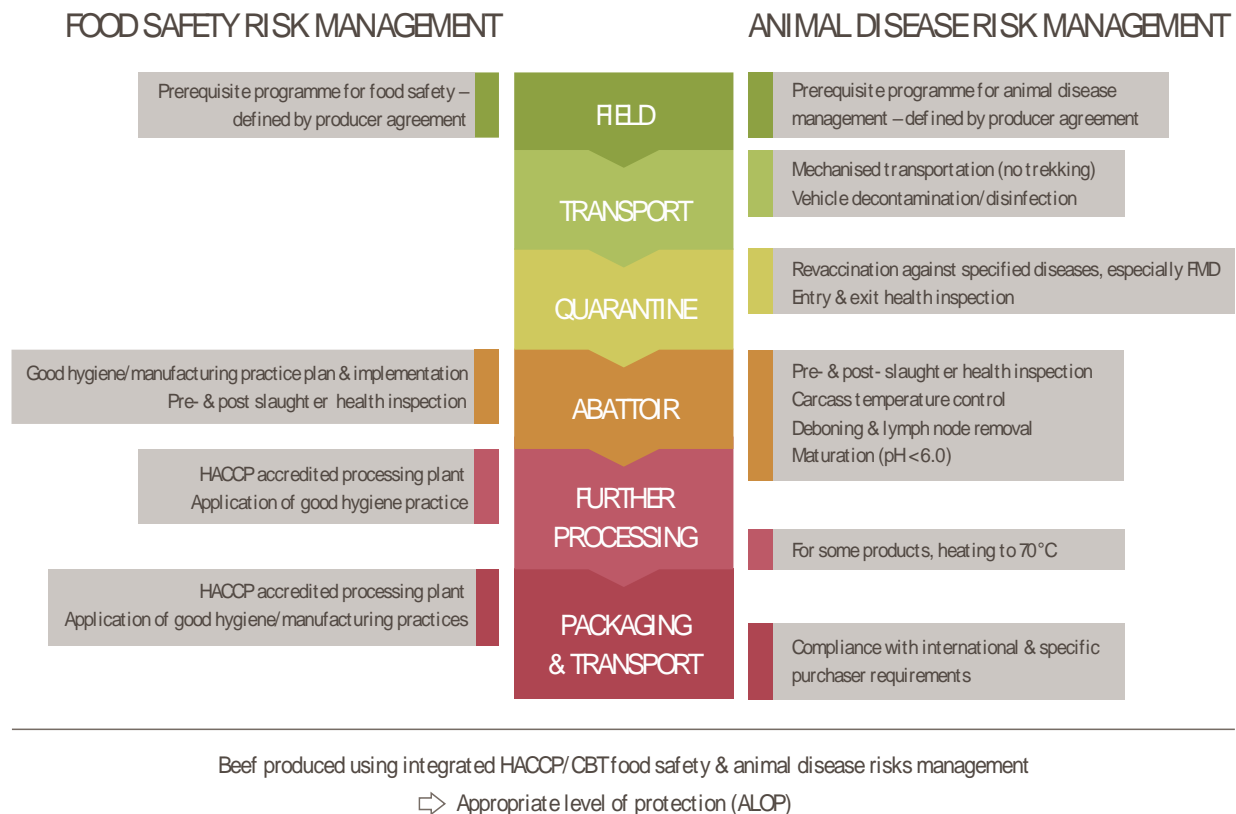


Figure 5: Application of food safety along the value chain Parallel application of food safety and animal disease risk management measures along a value chain for beef production in a location that is not recognized as free from FMD, namely the Zambezi Region of Namibia. It should be noted that quarantine of the animals prior to slaughter is not an international requirement but is implemented by the national veterinary services in the Zambezi Region, where it includes physical inspection and revaccination of cattle

Moreover, it has been known for many decades that matured, deboned beef from which visible lymph nodes have been removed does not contain transmissible quantities of FMD virus because the low pH (<6) of striated muscle attained during the maturation process inactivates FMD virus. In a qualitative risk assessment carried out on behalf of

the OIE in 2010⁷ it was determined that the FMD risk posed by such beef is 'very low'. The risk can be further reduced to 'negligible' by the implementation of additional risk mitigation measures applied along the value chain. This provided the technical basis for some of the clauses of Article 8.7.25. The Box 1 below clearly indicates recommendations for the importation of fresh meat from cattle located in FMD infected countries or zones with an official control programme for FMD, involving compulsory vaccination of cattle.

Veterinary Authorities should require the presentation of an international veterinary certificate attesting that the entire consignment of meat:

1. comes from animals which:
 - a. have remained in the exporting country for at least three months prior to slaughter;
 - b. have remained, during this period, in a part of the country where cattle are regularly vaccinated against FMD and where official controls are in operation;
 - c. have been vaccinated at least twice with the last vaccination not more than 12 months and not less than one month prior to slaughter;
 - d. were kept for the past 30 days in an establishment and that FMD has not occurred within a ten-kilometer radius of the establishment during that period;
 - e. have been transported, in a vehicle which was cleansed and disinfected before the cattle were loaded, directly from the establishment of origin to the approved abattoir without coming into contact with other animals which do not fulfil the required conditions for export;
 - f. were slaughtered in an approved abattoir:
 - i. which is officially designated for export;
 - ii. in which no FMD has been detected during the period between the last disinfection carried out before slaughter and the shipment for export has been dispatched;
 - g. have been subject to ante- and post-mortem inspections for FMD with favourable results within 24 hours before and after slaughter;
2. comes from deboned carcasses:
 - a. from which the major lymph nodes have been removed;
 - b. which prior to deboning, have been submitted to maturation at a temperature above +2°C for a minimum period of 24 hours following slaughter and in which the pH value was below 6.0 when tested in the middle of both the *longissimus dorsi*.

Box1 - Provisions of Article 8.7.25 in the OIE's Terrestrial Animal Health Code dealing with recommendations for the importation of fresh meat derived from cattle located in FMD infected countries or zones with an official control programme for FMD, involving compulsory vaccination of cattle.

⁷ <https://rr-asia.woah.org/wp-content/uploads/2020/02/seacfmd-manual-1.pdf>

It should be emphasized that the OIE standards are recommendations and their adoption by member states is voluntary. In deciding which standards to adopt, member states should be cognizant of the WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement), which was designed to facilitate safe trade in agricultural commodities and products while discouraging the unjustified application of standards as non-tariff barriers to trade. The SPS Agreement (https://www.wto.org/english/tratop_e/sps_e/spsagr_e.htm) recommends that commodities should be traded freely between countries of similar SPS status with regard to trade-sensitive diseases unless the importing country can provide scientific justification for applying a higher standard (Article 5).

The introduction of good SPS related practices along the meat export value chain will positively impact on animal health by contributing towards the prevention and control of transboundary animal diseases (TADs) and specifically FMD, prevention of zoonotic diseases and the control of food safety hazards. It will help to prevent the imposition of trade bans by recipient countries, align with their respective SPS requirements⁸ and ultimately boost the export of SPS certifiable meat products, from Uganda, both in volume and value. Expansion of exports will improve the income of poor livestock producers and other actors in the value chain. Therefore, introducing good practices would improve livestock productivity and health and facilitate market access, promote trade for income generation, raise the income of the Uganda investors and their communities and ultimately support employment creation, contribute to food security, improvement of livelihoods as well as contribution to national GDP.

Exporting meat as opposed to live animals creates opportunities for value addition, job creation and represents a lesser risk for disease transmission. Moreover, it can also help

⁸ <https://icpald.org/wp-content/uploads/2019/04/IGAD-Trading-Manual-Booklet-Design.pdf>

to capture the value of hides, skins and offal and generate additional foreign exchanges to the country.

Moreover, a different approach to sanitary risk management is consequently needed in Africa to facilitate regional and inter-regional trade. In November 2012 the so-called Phakalane Declaration was adopted by the SADC Livestock Technical Committee. This called for the adoption of CBT and other non-geographic approaches for FMD management as additional (i.e., alternative) regional standards for trade in animal products (http://www.wcs-ahead.org/phakalane_declaration.html). This followed adoption of the CBT concept by ministers of agriculture of COMESA⁹ (Common Market for Eastern and Southern Africa) member states in 2008.¹⁰

It has been indicated that a “commodity-based trade” approach is likely to be the most proactive and advanced in order to unlock of the production and export potential of African countries (and specifically Uganda) as it is based on the following principles:

- 1- The key issues affecting safe trade in livestock products is not the area of origin of the product, but the characteristics of the product itself.
- 2- If livestock products are derived from healthy animals and processed, the risk of spreading any disease can be reduced to an acceptable level for international trade. At the same time, the processing creates benefit such as local employment.
- 3- The commodity-based approach accords with the strictest principles of human food safety – any and all diseases animals are excluded as potential sources of human food¹¹

Commodity based trade accords with strict principles of human food safety, therefore this requires a joint approach by both the public and private sectors in what is called

⁹ COMESA Members States include Burundi, Comoros, Djibouti, Democratic Republic of Congo, Egypt, Eritrea, Ethiopia, Kenya, Libya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Somalia, Sudan, Eswatini, Tunisia, Uganda, Zambia, Zimbabwe.

¹⁰ <https://www.comesa.int/wp-content/uploads/2020/10/Livestock-Policy-Framework-En.pdf>

¹¹ <https://fic.tufts.edu/pacaps> Project/Livestock%20Trade/COMESA%20CAADP%20Policy%20Brief%201%20Livestock%20Commodities.pdf,

public-private partnership to ensure systematic implementation of the principles for efficient and effective outcome.

A commodity-based approach (focused on FMD and other diseases control) to support beef export was developed under the MOBIP¹² project in Uganda and presented internally for discussion¹³.

A schematic representation of the system of rolling quarantine and the possibility of a partial merging of quarantine stations with a feedlot system to finish animals for slaughtering is presented in the figure 6 below.

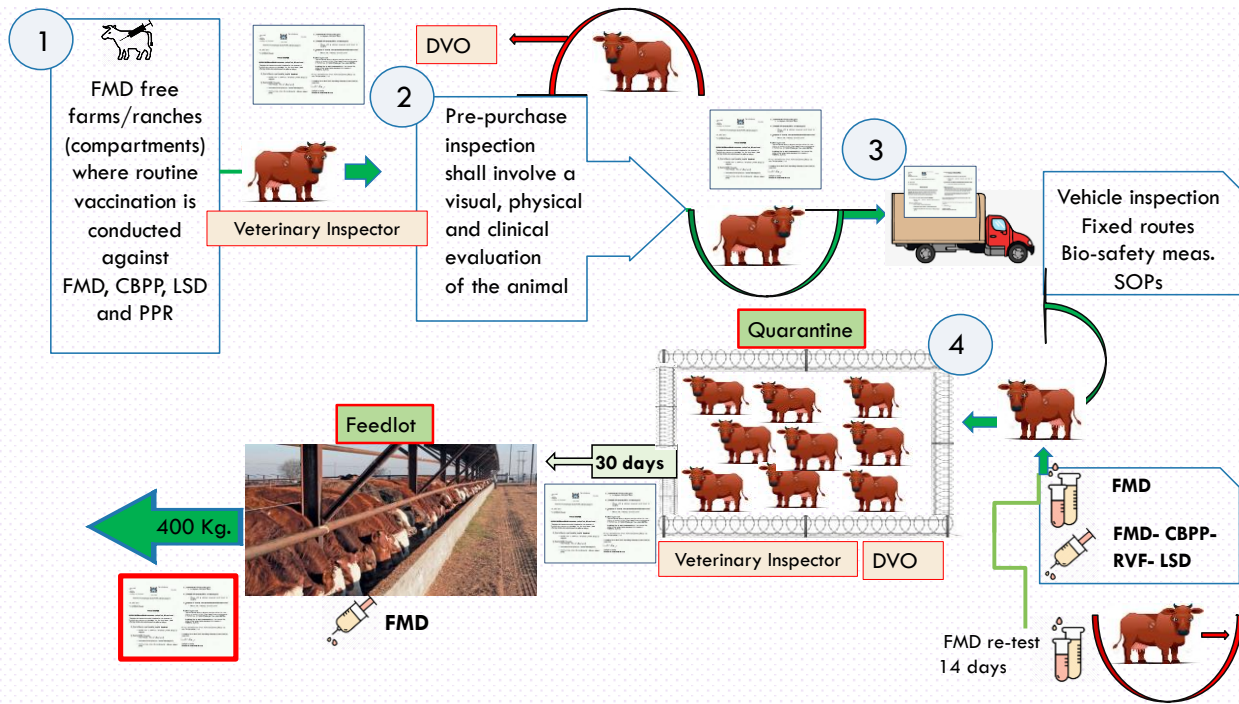


Figure 6: MOBIP proposed feedlot/quarantine system

¹² DEVELOPING A MARKET – ORIENTED AND ENVIRONMENTALLY SUSTAINABLE BEEF MEAT INDUSTRY IN UGANDA PROJECT (MOBIP)UG/FED 2018/397425. EU funded and implemented by MOEFD and MAAIF

¹³ MAAIF and Partners - INTERNAL MEETING TO DISCUSS SPS BASED PROCEDURES and CERTIFICATION REQUIREMENTS FOR BEEF EXPORTS, CREATION OF COMPARTMENTS, USE OF FEEDLOTS and QUARANTINE FACILITIES and other OPTIONS FOR THE UGANDA BEEF INDUSTRY- MOBIP TAT-PMU presentation based on ICPALD data

During the implementation of MOBIP, contracts were awarded to implementing partners for the implementation of specific activities to contribute to the achievement of the project result, specifically Makerere University was contracted to pilot the establishment of functional FMD free with vaccination compartments in both Disease control zones through Public-Private sector participation and support traders to establish private sector led holding grounds for animal inspection and FMD vaccinations and testing. At the time of the study MOBIP project was still operative therefore the final report and related documented achievements were not made available.

4.2 Public-Private Partnership overview

Over the last few years, different actors (governments, international organizations, NGOs, private companies, philanthropic foundations) have increasingly promoted the value of PPPs. In the veterinary domain, their importance was further emphasized in the OIE Performance of Veterinary Services (PVS) pathway diagram¹⁴, but a limited number of examples of PPPs in the veterinary domain¹⁵ are available.

The PPP initiated by the Gates Foundation and Zoetis in 2017 within the framework of the African Livestock Productivity and Health Advancement (ALPHA) initiative is one such example. The Gates Foundation pledged an investment of \$14.4 million over 3 years (later extended to 5 years until 2022) to bolster the sustainable growth and development of the livestock sector in SSA (primarily in Nigeria, Ethiopia, Uganda, and, more recently, also Tanzania)¹⁶ The partnership aims to improve access to veterinary drugs and services, provide training and education, and implement diagnostic infrastructure. Zoetis' role was to establish basic infrastructure; increase the reliable supply of quality veterinary drugs, diagnostics, and services; develop veterinary laboratory networks and

14 Galière M, Peyre M, Muñoz F, Poupaud M, Dehove A, Roger F, et al. Typological analysis of public-private partnerships in the veterinary domain. PLoS ONE. (2019) 14:e0224079. 10.1371/journal.pone.0224079

15 Veterinary domain: means all the activities that are directly or indirectly related to animals, their products and by-products, which help to protect, maintain and improve the health and welfare of humans, including by means of the protection of animal health and welfare, and food safety.

16 Zoetis . African Livestock Productivity and Health Advancement. Parsippany-Troy Hills, NJ: Zoetis; (2019)

dialogue with government stakeholders to understand local requirements and needs, including regulatory issues. The governments of these countries were not directly involved in the partnership, but this example shows how the PPPs can be complementary to public action, which could provide some of the efficiency, management capacities, and culture of evaluation more commonly associated with the private sector.

PPPs can strengthen veterinary services in SSA. The PPP signed in 2011 between the Gates Foundation and SIDAI Africa (a private company supplying livestock and crop inputs, and training to farmers and pastoralists across Kenya) pledged to build around 150 branded franchise outlets to facilitate the supply of good quality and affordable veterinary products to 300,000 livestock-keeping households in rural Kenya over a 4-year period¹⁷. While this is not a direct partnership with a government, this PPP demonstrates how the Kenyan government has enabled the private sector to complement its provision of veterinary services and provide veterinary products to rural areas¹⁸. Later on, SIDAI Africa through a transformative type of PPP with the Kenya Director of Veterinary Services, was appointed by the Director of Veterinary Services (DVS) to carry out field trial of first batch of ECF vaccine produced by the African Union Centre for Ticks and Tick-Borne Diseases (CTTBD) Malawi and contracted by county governments to provide vaccination services (mostly East Coast Fever – Infection Treatment Method (ECF-ITM) vaccination of dairy cows to be distributed to needy families).

Under the Public-Private Progress initiative the OIE conducted a large survey among its 181 Members in 2017 and recorded close to 100 success stories of PPPs in the field of veterinary services, reported by both public and private partners. From this large experience base, the typology of PPPs in the veterinary domain was determined, which revealed the wide scope for possible fruitful partnerships.

¹⁷ Leyland TJ. A Path to Prosperity: New Directions for African Livestock. Glob Alliance Livestock Vet Med. Edinburgh: GALVmed; (2012)

¹⁸ Thevasagayam SJ, Dieuzey-Labaye I, Tagliaro E. Partenariats public-privé: attentes des partenaires privés concernant la santé animale au niveau international et les programmes de développement de l'élevage. Paris: OIE; (2017).

Some examples of successful PPP in different forms could be mentioned as the one operating between the Meat Board of Namibia (State owned enterprise funded by producers of Namibia (Private Partner) and the Directorate of Veterinary Services (DVS) (Competent Authority and public partner) for the control of FMD in the country considered a collaborative type of PPP.

The established Public-Private Partnership allowed the development of an emergency animal health fund which could be mobilized during an FMD outbreak in 2015. As an emergency response, the Meat Board of Namibia (MBN) could quickly mobilize funds to assist the Directorate of Veterinary Services (DVS) to immediately set up disease control measures (procurement of control equipment and material). Through the platform of the Animal Health Consultative Forum, of which the MBN is the secretariat, the MBN also assisted the DVS through awareness campaigns country-wide; on the appointment of expert consultants in disease control and diagnosis; appointing and coordinating veterinarians to conduct post vaccination sero-surveys; on the provision of rations to temporary staff manning road blocks; and coordinating, via the farmers associations, the assistance of farmers bordering the Veterinary Cordon Fence to patrol, maintain and repair the fence where necessary also continuously assisting DVS with repairing and maintenance of the fence in areas where elephant movement regularly occur.

The clear and immediate outputs of the agreement are for the public sector the support of producers and immediate availability of funds to implement emergency disease control measures and for the private sector, a series of fast actions and containment of the outbreak and maintenance of livestock and meat export markets. The Public sector outcomes are related to the disease control and buy-in and support of livestock and meat industry for implementation of disease control measures while the private sector benefits in terms of profit / revenue.¹⁹

¹⁹ <https://tr-africa.woah.org/wp-content/uploads/2019/08/boshoff.pdf>

Tanzania also moved forward on a PPP agreement with the overall objective of controlling PPR in the country²⁰

The “Health of Ethiopian Animals for Rural Development” (HEARD) project is an additional example of an EU-supported program aiming at strengthening animal health services involving public and private sectors. The HEARD program aimed to increase sustainable livestock productivity and improve the marketing of livestock products through enhancing quality and reliability of integrated public and private veterinary service delivery. The project managed to pilot eight PPP novel models for veterinary service delivery involving public and private sectors. A recent (October 2022) midterm evaluation of the performance of the eight PPP models was conducted and considered the implementation positive as all the PPP models under testing were performing very well ²¹²²

The PPP management systems were applied in domestic and export slaughterhouses, live animal and meat and livestock markets, and in quarantine centers in Somaliland. ²³²⁴²⁵

The livestock vaccination and the sanitary mandate in Mali (transactional) For more than 20 years, Mali has established the Sanitary Mandate, by which private veterinarians are allowed to conduct activities delegated by the Veterinary Services, such as vaccinations against PPR or CBPP. In 2016, 544 professionals (including 157 mandated private veterinarians and their support staff) worked alongside 362 public veterinarians,

²⁰ <https://rr-africa.woah.org/wp-content/uploads/2023/02/20-ppr-session-tanzania-ppp.pdf>

²¹ https://cgspace.cgiar.org/bitstream/handle/10568/128300/PublicPrivatePartnership_HEARD.pdf

²² https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwi4r6v03oGCAxVMR_EDHTYYA-84ChAWegQICxAB&url=https%3A%2F%2Fcgspace.cgiar.org%2Frest%2Fbitstreams%2F60183a13-65ec-4e03-9424-46f9711b8e3d%2Fretrieve&usq=AOvVaw0-ExCA79h5shL31LUxiDjq&opi=89978449

²³ United States Agency for International Development (USAID) (2014). – Public-private partnerships for livestock service facilities: Lessons from Djibouti and Somaliland for the Mille Quarantine Center. <https://www.agri-learning-ethiopia.org/wp-content/uploads/2014/09/MoA-MoT-Livestock-Public-Private-Partnerships-Report.pdf>

²⁴ Castiello, Massimo, Wamalwa, Kinyanjui, Munyua, Solomon Muchina, PPP: An Appraisal of efficiency, effectiveness and Success in the Meat Sector in States Recovering from Civil Instability: A Case Study of Somaliland, <http://erepository.uonbi.ac.ke:8080/xmlui/handle/123456789/11208>

²⁵ <https://www.fao.org/3/I9308EN/i9308en.pdf>

therefore improving vaccination coverage of its livestock population, resulting in better animal health and food security.

Eradication and control of FMD and Brucellosis in cattle in Paraguay (collaborative). The collaboration between the Veterinary Services of Paraguay (SENACSA) and cattle producers through the Foundation of Animal Health Services (FUNDASSA) was initiated in 2003 to strengthen vaccination, certification and registration within the national program for eradication of FMD and control and prevention and eradication of brucellosis. FUNDASSA coordinates, co-develops and implements those strategies with the official authorization of SENACSA. This PPP has allowed Paraguay to reach FMD-free status with vaccination and opened export markets. Today, livestock contributes 12% GDP and employs 17% of the active population. The export of meat, offal and meat by-products has earned over \$1.2 billion.

Sanitary mandate in Tunisia (transactional). The Sanitary Mandate is an agreement between the Government Veterinary Services (GVS) and accredited private veterinarians. Yearly agreements are negotiated between the GVS, and individual private practitioners represented by the Veterinary Statutory Body (VSB) and Veterinary Syndicate. The agreements provide for undertaking specific prophylactic programmes, planned and subsidized by government, in a defined area and under specified conditions. The vaccination is free of charge for farmers. The practitioner receives vaccines from the GVS. The mandated veterinarians are paid for the activity performed and controlled by government veterinary inspectors. The Sanitary Mandate initiative in Tunisia started in 2006 in 6 pilot governorates (provinces) and with 10 private veterinarians. There are over 260 mandated veterinarians today and numbers are predicted to increase further. The implementation of the Sanitary Mandate in the different zones was successful and the results are very satisfactory.

Several examples of PPP in the Veterinary domain also exist in the Middle East in countries like the Kingdom of Saudi Arabia, Cyprus, Afghanistan and Kuwait and more

specifically, to progress against the FMD-PCP countries like Pakistan, Iran, Turkey and Kazakhstan have established PPP to systematically cover a number of activities such as surveillance, including sample collection and testing, certification and training of private veterinarians to conduct FMD vaccination, agreements with private vaccine manufacturers to meet the increasing demand for reliable vaccines, and with veterinary councils/ associations to train private veterinarians to implement animal identification programme²⁶

Globally, FMD control incorporates PPPs, especially in efforts to develop high quality vaccines, such as the GALVmed-managed AgResults FMD Vaccine Challenge project (AgResults, n.d.). These partnerships can establish and strengthen vaccine control programs, potentially leading to the attainment of 'FMD-free with vaccination' status which has significantly contributed to the growth and development of the livestock sector (WOAH, 2019).

Examples of effective PPPs from various contexts can inform contemporary approaches to the structure and focuses of PPPs in LMIC (Low- and Middle-Income Countries) along with consideration of literature on PPPs. PPPs can represent a diverse range of partnerships which can be summarized as three different approaches:

- (i) **transactional**, which focus primarily on delivery or procurement of discrete animal health or sanitary services by private veterinarians, Para veterinarians or veterinary organizations Ex. Mali, Tunisia, Afghanistan, Barbados, etc.
- (ii) **collaborative**, which are primarily driven by producer and trade associations aimed at developing policy and ensuring outcomes are achieved – e.g., cattleman's associations funding research that will benefit the industry and animal health policy nationally ex. Paraguay, Saudi Arabia, Namibia, Australia, Ireland, etc. and

²⁶ 2019-mo-ahmadi middle east.pdf

(iii) **transformational**, which are initiated and funded by private enterprises to establish animal health programs from which the entire livestock industry will benefit – e.g. feedlots or dairies providing vaccinations to feeder farms, and farms in proximity to their enterprise and subsequently reducing the disease burden in the population (Galière et al., 2019), ex ALPHA initiative of Zoetis in Nigeria, Ethiopia, Tanzania and Uganda, SIDAI in Kenya, Ethiochicken in Ethiopia, Hester in India, etc.

In countries where there is a lack of organized producer groups, the PPPs that governments should pursue are those that are transformational and transactional. However, these relationships must be transparent, with a high level of trust required from both sides. It is crucial that governments do not expect private enterprises to control critical activities which require a high level of transparency and accountability, such as quarantine inspection of livestock. Further, for transactional PPPs to be developed and successful, efforts need to be made to improve the governance of the National Veterinary Services and develop veterinary statutory boards to ensure standards and transparency are maintained.²⁷

4.3 PPP current initiatives

4.3.1 Public-Private Partnership, EUFMD

PPPs are collaborative relationships between the public and private sectors, sharing resources and costs to achieve common objectives and benefit, and have been identified as a practical solution to improve and support national animal health and veterinary services (NAHVSs) (Galière et al., 2019).²⁸

For the control and elimination of “*Foot-and-mouth disease and similar transboundary animal diseases*” (FAST)²⁹, innovative partnerships between governments and actors in the

²⁷ Bouda Vosough Ahmadi' Public-private partnerships (PPPs) for efficient sustainable animal health systems and veterinary services <https://dx.doi.org/10.20506/TT.2776>

²⁸ OIE PPP Handbook

²⁹ <http://rr-middleeast.woah.org/en/projects/foot-and-mouth-disease-and-similar-transboundary-animal-diseases-fast/>

livestock production chains are crucial. In its capacity as a catalyst organization, the EuFMD works with the livestock production industries in Member Nation countries and outside to encourage their collaboration with governmental agencies and non-profit organizations in order to jointly combat FAST diseases³⁰

In 2017, the OIE PPP Handbook was created by the OIE (World Organization for Animal Health) in cooperation with CIRAD (French Agricultural Research Centre for International Development) and with funding from the Bill & Melinda Gates Foundation (BMGF) that presents the PPP standards and typology in the veterinary field. These recommendations provide a chance to create effective and long-lasting PPPs to enhance veterinary care while developing reliable and long-lasting animal health systems that contribute to the health and welfare of people in general.

Subsequent workshops³¹ with public and private sector participants were organized at sub-regional level in Africa followed by others in the Middle East.

PPPs are used in FMD control on a global scale, particularly in projects like the GALVmed-managed AgResults FMD Vaccine Challenge initiative that aims to create high-quality vaccines (AgResults, 2021, see below in the text). As in Paraguay, where the introduction of PPPs between the NAHVSs (National Animal Health Veterinary Service) and the cattle producers in 2003 led to the attainment of "FMD-free with vaccination" status, which has significantly contributed to the growth and development of the livestock sector, these partnerships can establish and strengthen vaccine control programs. Examples of effective PPPs from various contexts can inform current approaches to the structure and focuses of PPPs in Low- and Middle-Income Countries along with consideration of literature on PPPs. There are cattle producer organizations in

30 (EuFMD: Beşinci Türkçe Çevrimiçi Şap Hastalığı Araştırma Eğitim Kursu © Food and Agriculture Organization of the United Nations / European Commission for the Control of Foot-and-Mouth Disease, n.d.).

31 The first regional workshop on public private partnerships in veterinary domain was held in Addis Ababa, Ethiopia, in August 2019 for English-speaking African countries: <https://rr-africa.oie.int/en/news/20190822.html>. The second regional workshop on public-private partnerships in the veterinary domain was held in Tunis, Tunisia, in September 2019 for French-speaking African countries: <https://rr-africa.oie.int/en/news/20190912.html>

many South American countries that have been able to lobby for PPPs and government action and have recognized the importance of providing these services to smallholder farmers as it protects the larger producers³²

In accordance with OIE description of PPPs, each partner would participate in the collaboration by investing their individual resources (such as their time, knowledge, and skills, funding, and key assets); recognizing reciprocal advantages as a crucial component of the interaction and sharing risks in order to accomplish a common goal. Partnerships typically entail some level of public communication and rely on mutually agreed-upon obligations (such as letters of intent; agreement, trade, memorandum of understanding, or other type of contract) even though the degree of formality or the degree of clarity may change (Maulidi, 2021). Everyone with an interest in a proposed PPP and the services or outcomes that it is intended to deliver is a stakeholder. Not all stakeholders have the same importance to the success of PPP, but this should be considered carefully according to the particular situation.

4.3.2 The GALVmed initiative, Developing a Public Private Partnership Framework for FMD in Eastern Africa

Though the PPP approaches in the veterinary sector is still an emerging concept, the AgResults Foot and Mouth Disease (FMD) Vaccine Challenge Project³³ has recently developed a new standardized PPP Framework that highlights the landscape, challenges, and opportunities of PPPs in the FMD vaccine value chain.

The FMD Vaccine Challenge Project is an eight-year, US\$17.68 million Pay-for-Results prize competition that encourages the development and uptake of high-quality FMD vaccines tailored to meet the needs of Eastern Africa in six target countries: Burundi,

³² I.B.J. Mac Phillamy, M.J. Nunn, T.S. Barnes, R Bush, J-A.L.M.L. Toribio, striving for long term sustainability – Is it time we changed our approach to animal health in low- and middle-income countries? *Acta Tropica*, Volume 244, 2023,

³³ <https://www.galvmed.org/wp-content/uploads/2021/09/PPP-Framework-FINAL-310821.pdf>

Ethiopia, Kenya, Rwanda, Tanzania, and Uganda. One of the project's goals is to develop a private sector model for buying and distributing FMD vaccines to complement public sector efforts in the region.

The FMD Vaccine Challenge Project team customized aspects of the OIE PPP Handbook into a practical framework, aimed at sparking commitments between partners to strengthen the FMD vaccine value chain in Eastern Africa.

The development process involved, seeks views and inputs from the groups in Eastern Africa that would use the tool: veterinarians, para-veterinarians, and representatives from vaccine manufacturers, importers, distributors, livestock enterprises, and farmer organizations. From October 2020 to August 2021, the team engaged these key public and private sector stakeholders to collate feedback on their perspectives and interests in PPPs.

With the PPP Framework finalized, the FMD Vaccine Challenge Project focuses on promoting its use in manufacturing, purchasing, distribution, and vaccination campaigns. This involves (1) identifying partnerships to promote the PPP Framework in target countries and (2) facilitating PPP MOUs, contracts, and/or informal partnership agreements in those countries. Making the framework relevant and accessible will hopefully catalyze future PPP arrangements in the FMD vaccine value chain and trigger PPPs in the general veterinary domain.

4.4 PPP agreements, principles, elements and financing

4.4.1 PPP Partners

To be effective, PPP initiatives must be supported by strategic and executive leaders as well as at the field level in both public and private sectors. The public sector, normally the veterinary authorities must ensure, amongst other things, that the service(s) to be delivered through PPP are within the existing law, fall within their statutory or political

mandate and meet the intention of that mandate. The private sector must identify benefits in the short or longer term, as well as business risks and how they can be mitigated.

There are many potential private sector partners, for example ranging from:

(i) individual veterinary professionals or paraprofessionals delivering a service directly for the Veterinary Authority, through (ii) producer associations cooperating in design of regulations or support to exports, to (iii) national or international companies bringing resource to deliver outcomes unattainable by the public sector alone.

Catalyzers.

PPP may be enabled by a variety of catalyzers, ranging from research and knowledge partners, facilitating discussions and agreements or providing capacity development for different actors involved, to resource partners and investors, such as national or international Non-Governmental Organizations (NGOs) or foreign Government development assistance programmes. These are key stakeholders, but not partners included in formal or informal governance arrangements and are referred to as “catalyzers” by the WOA. The nature and timespan of support from catalyzers are important to the feasibility of particular PPP projects, and public and private partners must ensure that their business case provides an exit strategy from catalyzer funding, if PPP is to be sustainable in the long term.

4.4.2 Principles of PPP

The following principles should be applied when creating Public-Private Partnerships (PPPs) to provide services to end users in the veterinary domain.

1. Public-Private Partnerships may be initiated by either the public or the private sector.

2. The public partner(s) must ensure that the service(s) to be delivered fall within their statutory or political mandate and meet the intention of that mandate.
3. The public partner must ensure that the PPP is lawful and that any legal obligations or constraints are understood and properly implemented by all parties.
4. All parties must ensure that any Public-Private Partnership is developed with appropriate transparency to all stakeholders and that relevant private actors have equal opportunities for engagement, for example by proposing new initiatives or competing in a tender process initiated by the public sector.
5. All parties must agree on the definition of the service(s) to be delivered, how they are to be delivered, and how that delivery is monitored, assured and evaluated.
6. The service(s) delivered by the PPP may have differing impacts and benefits to the public and private sectors.
7. The benefits and impacts of the service(s) delivered must be defined, understood and respected by both parties.
8. The duration of the partnership must be pre- defined by both partners, with the possibility to extend the period if deemed appropriate following joint evaluation and review.
9. All parties must commit the necessary resources to ensure strong joint governance of the PPP.
10. The private sector partner(s) must have the opportunity to capitalize on the benefits and impacts that accrue through the partnership. This must be transparent to the public partner and must not be to the detriment of the service delivered or realization of the expected benefits/ impacts for the public sector.
11. The terms of the partnership must be set out clearly, either in a formal contract or in an alternative form appropriate to the PPP and agreeable to all parties in the PPP.
12. The PPP must have an agreed stakeholder engagement and communication strategy which includes an appropriate approval process.

4.4.3 Elements of PPP

Goodwill and respect between partners must be supplemented by transparency of management, professional monitoring and evaluation of how and what the partnership delivers, with willingness and flexibility to adapt on the basis of the evidence gathered.

A national policy commitment to enable PPP, including through the appropriate legal framework, is essential, with senior leaders acting as champions to ensure effective and successful delivery.

4.4.4 Financing of PPPs

Public Private Partnerships are usually financed in three ways;

a) State Financed Model. Public sector fully finances the PPP and contracts the private sector to deliver the mandate of public goods/services. In this set up the public sector establishes the need for a PPP and the respective PPP framework to engage with the private sector.

b) Hybrid Financed Model. Both public and private sector partner in financing the PPP. This can be initiated by either party with mixed funding for the project and mutual agreements on recouping of investments.

c) Private Financed Model. Private sector fully finances the PPP and is given a mandate from the public sector. Recovery private sector investments comes from users provided with the public goods/service. This arrangement is mostly initiated by private sector through Unsolicited Proposals (USP)/Private Initiated Proposals (PIP)(Maulidi, 2021).

State Model	Hybrid Model	Private Model
<ul style="list-style-type: none"> • State funding (100%) • Infrastructure ownership by the state (100%) • Infrastructure operations and maintenance by the state • Private sector employed only as consultants • Government own skills base • Private sector retains its own skills base to maximize revenue and financial sustainability • Inefficient and prolonged projects (scope creep of projects) • Ineffective costing of projects - benefit to private sector or consultants • State both a referee and player 	<ul style="list-style-type: none"> • Mixed funding between the state and private sector • Infrastructure ownership by the state • Infrastructure maintenance outsourced • Knowledge and skills transfer between the private and public sector • Room for innovation and creativity • State focusses on the regulation of the private sector • Operational efficiency and cost optimisation are achieved • Projects are completed within scope, on time and within budget 	<ul style="list-style-type: none"> • Private funding (100%) • Private ownership of the infrastructure (100%) • Private sector carries the full costs and risks of the projects • State plays an effective regulator in the interest of consumers and users (public interest) • Private sector retains skills to maximize revenue, profits and future business (sustainability) • Strategic social infrastructure, i.e. water, energy, sanitation, etc., are controlled by the private sector

Source: <https://ppp.worldbank.org/public-private-partnership/agreements>

4.4.6 Legal and Administration of PPPs in Eastern Africa

The Public-Private Infrastructure Advisory Facility (PPIAF), a multi-donor technical assistance facility backed by the World Bank, was created to assist developing nations in enhancing the caliber of their infrastructure through the private sector. The establishment of PPP units in Eastern Africa has been assisted by the PPIAF. These are the offices or organizations in charge of promoting, enabling, and/or evaluating PPPs in their region. PPP units can be either fully or partially supported by the government, or they can be semi-independent groups. They regularly provide status updates on PPP performance and progress in their respective nations. Information currently available suggests that a feasible PPP is in the range of USD \$50M budget, but again this has been mostly in the infrastructure sectors. According to the PPIAF, the majority of PPPs implemented to date in Eastern Africa have been related to infrastructural development in the energy, transport, housing, and water sectors (Maulidi, 2021).

Table 16: PPP in IGAD countries. source <https://ppiaf.org/countries>):

Country	PPP Activity to Date
Burundi	2 PPP activities since 2013. No dedicated PPP unit. The Public-Private-Dialogue (PPD) Secretariat oversees PPP issues.
Ethiopia	6 PPP activities since 2013. The Public Private Partnership Proclamation No. 1076/2018 (“PPP Proclamation”) has an expanded scope to include all PPP procurements made by both public bodies and public enterprises. The PPP Proclamation establishes the PPP Directorate General (PPP-DG) to be located within the Ministry of Finance and Economic Cooperation.

Kenya	18 PPP activities since 2011. PPP policy statement first issued in 2011 and PPP Law Act established in 2013. The PPP unit, which acts the secretariat and technical arm of the PPP committee, is under the Ministry of Finance
Rwanda	7 PPP activities since 2011. Law N°14/2016 of 02/05/2016 governs PPPs in Rwanda and PPP unit is under the Rwanda Development Board.
Tanzania	13 PPP activities since 2012. National PPP policy drafted in 2009, PPP Act enacted in 2010. PPP unit is under Prime Minister’s Office – Tanzania Investment Centre.
Uganda	8 PPP activities since 2012. PPP Law (Act 2015) enacted in 2015. The PPP unit under Ministry of Finance – Planning and Economic Development.

4.5 The legislative and policy context of private-public partnerships in Uganda

4.5.1 The Constitution of the Republic of Uganda

The PPP Policy Framework (2010) derives its legal force from the Constitution of Uganda (1995) which provides the overall legal policy framework for the Central Government to plan and implement development program to benefit all the people in the country. It is in this light that the Ministry of Finance Planning and Economic Development developed the Public-Private Partnerships Policy.³⁴

The Constitution also mandates Local Governments to; a) prepare comprehensive and integrated plans within an agreed upon development planning cycle; b) to generate and apply locally generated revenues in accordance with established laws. It is in this connection that the Ministry of Local Government has undertaken to develop the Public-

³⁴ <https://www.pppunit.go.ug/sites/files/PPP%20Policy.pdf>

Private Partnership Guidelines to support implementation of the National PPP Policy Framework at the Local Government level.

4.5.2 The National Development Plan III

The vision of Uganda 's overarching planning framework is to: transform the Ugandan society from a peasant to a modern and prosperous country within 30 years. To realize this vision, the Plan sets out a number of development objectives under the overall theme of Growth, Employment and Socio-economic transformation for prosperity. In order to realize the development objectives, the NDP positions the private sector as the engine of growth, employment and prosperity with Government actively promoting and encouraging public-private partnerships in a rational manner. The NDP recognizes that for Uganda as whole and local governments in particular, to finance the proposed interventions there is need for financial resources mobilization. For this reason, a financing strategy through public-private partnerships (PPPs) was identified as one of the various viable options. PPP is defined by the Plan as the cooperation between the public and private sectors with the aim to improve the quantity, quality and efficiency of public services. Accordingly, PPPs will be encouraged and promoted in the provision of infrastructure and energy services as well as huge undertakings which require substantial financial resource outlay.

Recently, the Government of Uganda has put in place robust legal and policy frameworks including the National Trade Policy, National Industrial Policy, and a National Implementation Strategy aligned with the African Continental Free Trade Area (AfCFTA) Agreement and a continuum of relevant sector policies and strategies covering disciplines supportive of regional and international trade. The President of Uganda also established the Presidential Advisory Committee on Exports and Industrial Development (PACEID) whose objective is to increase Uganda's exports by USD 6 billion in the next five years by addressing strategic and operational bottlenecks that impede Uganda from fully harnessing its industrial and export potential. The Government also signed the

AFcFTA Agreement in March 2018 and subsequently deposited the instrument of ratification with African Union Commission in November of the same year.

4.5.3 The Public-Private Partnership Framework Policy for Uganda, (2010) ³⁵

In keeping with the above development strategy, the Government of Uganda adopted a policy of Public-Private Partnerships (PPP) as a tool for the provision of improved public services and public infrastructure based on the principle of better value for money, appropriate risk transfer and management and taking advantage of private sector innovations. It is also a tool for improved fiscal moderation and control of public debt. The Policy Framework, approved in March 2010, is expected to result into the following:

- i. better utilization and allocation of public funds
- ii. more efficient development and delivery of public infrastructure
- iii. good quality public services
- iv. Increased economic growth and foreign direct investments.

According to the policy, the implementation will remain with the relevant Government departments and state enterprises in charge of the provision of the public service or infrastructure in question and local government authorities shall be responsible for identifying, developing and managing PPP projects; nevertheless, they will have to consult with the Ministry of Finance Planning and Economic Development on the policy issues and the PPP Unit for appropriate project support.

The Public Private Partnerships Unit (PPPU) is an institution established by an Act of Parliament within the Ministry of Finance, Planning and Economic Development (MOFPED) of Uganda. The Unit has existed since 2015 and its major role is to serve as the secretariat and technical arm of the PPP Committee. The Unit also provides overall technical expertise and guidance to contracting authorities in development and implementation of PPP projects. The Unit reports to the PPP Committee for technical

³⁵ ibid

matters and to the Permanent Secretary/Secretary to the Treasury on Finance and Administrative matters.³⁶

4.5.4 The Local Governments Act Cap. 243

The Constitution of the Republic of Uganda ratified decentralization as a system focused on bringing services nearer to the people. Specifically, Chapter Eleven, Article 176 provides for local government system and decentralization is a principle applying to all levels of local government and in particular from higher to lower local government units to ensure people 's participation and democratic control in decision-making.

To operationalize the above constitutional mandate, the Government enacted the Local Governments Act in 1997, as Act 1 of 1997, now Cap. 243 as of 31st December 2010 to, among other things, give effect to decentralization and devolution of political, administrative, and financial decision-making powers to local governments and administrative units. In addition, the LGA enhances good governance and democratic participation in and control of decision making by the people within their communities; provides for revenue and the political and administrative set up of local governments, etc.

According to the LGA, the powers assigned to Local Governments include, but not limited to, (a) making local policies and regulating the delivery of services; and (b) formulating development plans based on locally determined priorities. With this understanding, and as stated under the PPP Policy Framework, Local Governments have direct responsibility in implementing the policy since they are mandated to deliver services and, to some degree, provide infrastructure to their residents.

The Local Government Finance Commission notes that enhancement of local revenue mobilization is a critical intervention provided for under the Decentralization Policy and referred to as Local Governments (Amendment) Act, Act No. 16/2010, Local

³⁶ <https://www.pppunit.go.ug>

Governments Finance Commission, Annual Report 2010. The Strategy Framework further notes that performances of the local revenue sources remain extremely poor, making it difficult for Local Governments to finance decentralized services'. The Commission further notes that there are innovative ways of enhancing revenue that had been recommended to Local Governments, including procedures for Public Private Partnerships for more effective revenue mobilization; and the development of a guide for prioritization and selection of revenue enhancement best practices based on Cost Benefit Analysis – CBA. (Ndandiko & Ibanda, n.d.).

4.5.5 Benefits of PPP

A public agency (federal, state, or municipal) and a private sector organization enter into a contract known as a public-private partnership. By way of this arrangement, the assets and abilities of the public and private sectors are combined to create a service or facility for use by the general public. Each participant shares the possible risks and profits associated with providing the public service and/or facility, in addition to the resources. Transportation, water/wastewater management, urban planning, infrastructure and utility development, financial management, and education are examples of industries where PPPs have been successfully implemented.

The most important advantages of PPP projects for the State are:

- a. Transfer of risks is the most important driver when the state looks at the advantages of PPP projects. In PPP projects, there is a possibility to transfer most or all of the risks to the private entity (for a price). Risk and opportunity go hand in hand. The private entities can and want to explore opportunities, even though they involve risks.
- b. Minimizing the government dominance by outsourcing non-core activities is another important advantage. One of the state's objectives is to reduce the government

bureaucratic processes and move as much as possible its tasks over to the private sector.

- c. Possibility for multiple uses of the facilities. The state is not stimulated to explore this possibility, since it does not compete on the market. The possibility for the private sector to use the facilities in multiple ways represents another advantage of PPP.
- d. Constant cash flow. The state budget is formed of fixed budgets for each Ministry. Major investments are temporary modifications of the budget of a ministry, and this problem can be difficult to deal with within the budgetary process. Avoiding major investments by having a constant cash flow is an important driver when the State looks at the advantages of PPP.
- e. Quicker execution of a project (once contract is signed). Successful PPPs are characterized by comprehensive planning, clear contractual rules and contingencies, competitive procurement and credible contract enforcement (Pirvu, 2017).

4.5.6 Public Private Partnerships (PPPs) in Kenya.

PPPs in Kenya were established under PPP Policy Statement 2011, and later revised in Act 15 of 2013 titled 'Public Private Partnership Act', which stipulates that; i) the government retains total strategic control on the service, ii) the government is mandated to secure new infrastructure which will become the government's assets at the end of the contract period, and, iii) allocation of project and performance risks is to the party best able to manage or mitigate. Kenya has one of the more mature PPP markets in Africa with a comprehensive legislative framework where recently in December 2021, the Public Private Partnerships (PPP) Bill 2021 was signed into law. The purpose of the Act was to address the shortcomings of the PPP Act 2013 by including a framework for streamlined project processes with clear timelines, expanded procurement options and robust processes for Privately Initiated Investment Proposals (PIIP)

<https://www.cytonn.com/topicals/public-private-partnerships-2>³⁷. Most of the PPPs in Kenya are for infrastructure but there is one for agriculture and livestock sector.³⁸

Table 17:PPP in the agricultural sector in Kenya

Name	Sector	County	Stage	Contracting Authority	Value (Million)	Last update
Development of an Export Quarantine Station and Livestock Export Zone	Agriculture, Livestock & Fisheries	Mombasa, Taita Taveta, Tana River	Pre-procurement	Ministry of Agriculture Livestock and Fisheries	1890 KES - 12.1 m.US\$	06/22

4.5.7 Uganda, PPP in the Veterinary domain, recent initiatives

4.5.7.1 Global Alliance for Livestock and Veterinary Medicines (GALVmed)

The AgResults Foot and Mouth Disease (FMD) Vaccine Challenge Project is an eight-year, US\$17.68 million prize competition that supports the development and uptake of high-quality FMD vaccines tailored to meet the needs of Eastern Africa, targeting in particular: Burundi, Ethiopia, Kenya, Rwanda, Tanzania and Uganda. The prize is structured as a cost-share that reduces the cost-per-dose for buyers, enabling public and private sector actors to better combat FMD through more consistent purchases of the new vaccines.

Specific objectives of the Project include:

- 1) Development of high-quality FMD vaccines, tailored for the needs of Eastern Africa

³⁷ <https://www.cytonn.com/topicals/public-private-partnerships-2>

³⁸ Kenya Public private partnership unit

- 2) Increased regional vaccine production and regional purchases to create greater market stability and reduce price.
- 3) Development of a private sector model for buying and distributing FMD vaccines, to complement public sector efforts.

A Public-Private Partnership (PPP) Framework was designed to complement the delivery of the three objectives of the Project. The main goal of the PPP Framework was to create awareness about the benefits that PPPs could bring to the FMD Vaccine Value Chain (FMD VVC) in Eastern Africa - from production, purchasing, distribution, delivery, vaccination and post-vaccination monitoring and evaluation - that would complement current public sector efforts, resulting in improved vaccine accessibility for farmers and greater market stability. The aim is for the framework to serve as a catalyst for future PPP arrangements in this domain.

The scope of the PPP Framework based on the customization of the OIE PPP Handbook into a practical framework that could be further developed into appropriate commitments by stakeholders in the FMD vaccine value chain (e.g., letters of intent; exchange; or agreement; memorandum of understanding or other legal agreements), even though the formality level, or its specificity, may vary. It addresses the challenges and opportunities of PPPs in the FMD VVC, relevant to the unique FMD control situation in each of the Project's target countries (Burundi, Ethiopia, Kenya, Rwanda, Tanzania and Uganda).

An overwhelming need for PPPs in the FMD VVC is established, for effective control and management of FMD in the Eastern African region. Several opportunities in the areas of production, purchasing, distribution, delivery, vaccination, and post-vaccination monitoring exist for PPPs.

AgResults Foot and Mouth Disease (FMD) Vaccine Challenge Project has analyzed the current model of direct FMD vaccine procurement in Eastern Africa as dominated by governments (public sector) who utilises tendering processes and ad hoc direct

purchase³⁹. The model presents several challenges that lead to inefficiencies in FMD control. The challenges described below are also key opportunity areas for PPPs.

1. Currently there is no fully registered, quadrivalent vaccine available that addresses all the regional risks. Need development, registration, and production of high-quality vaccines relevant to the region.

Opportunity Area: PPP arrangement between local (govt) manufacturer and an international vaccine manufacturer.

2. Challenges with serotyping and vaccine matching

Limited facilities, budgets, and infrastructural mechanisms to carry out effective virus serotype and vaccine matching.

Opportunity Area: PPP with vet labs (private and self-financing government lab) to help with capacity building and equipment upgrades.

3. Long vaccine supply lead times

FMD vaccine production process takes two to three months, and vaccine delivery adds another delay. This issue is exacerbated by the typically reactive approach to FMD control.

Opportunity Area: PPP with FMD vaccine manufacturer and distributor for preorder and supply of vaccines and/or supporting the process of demand forecasting.

4. Limited efficacious vaccine supply chains

FMD vaccines need a cold chain distribution process to maintain efficacy.

Opportunity Areas: (1) PPP with vaccine manufacturer(s) to invest in enhanced public sector cold chain, (2) PPP to outsource cold chain distribution to private sector (private distributors, private veterinarians, and VPPs) and (3) PPP with livestock producers or producer associations.

³⁹ GALVMED PPP-Framework-FINAL-310821.pdf

5. High costs of vaccination

Public sector vaccination campaigns typically carried out by government vets with high costs incurred to facilitate travel to remote areas.

Opportunity Area: (1) PPP with private veterinarians and VPPs and (2) PPP with livestock producers or producer associations.

6. Limited post-vaccination monitoring

Difficult to measure the effectiveness of the vaccination campaigns.

Opportunity Area: (1) PPP with VPPs (under supervision of private veterinarians, to ensure proper coordination, data analysis, and subsequent plan of actions) and veterinary diagnostic laboratories and (2) PPP with livestock producers or producer associations.

4.5.7.2 Land O'lakes, VENTURE 37 - Trade of Agriculture Safely & Efficiently in East Africa (TRASE) USAID funded

The five-year USDA-supported Trade of Agriculture Safely and Efficiently in East Africa (TRASE) project is implemented by Land O'Lakes Venture 37 (V37) and has a specific focus on enlisted quarantine pests and diseases posing emerging threats. To enhance compliance to regulatory and market requirements, TRASE project has invested in building capacity in both Animal Health, Plant Health and Food Safety Systems including support laboratory services.

The project carried out in Burundi, Kenya, Rwanda, Tanzania and Uganda the 'Assessment of SPS Legal/Regulatory Framework in the EAC Partner States' and 'Assessment of SPS Systems in the EAC Partner States.'⁴⁰⁴¹

To enhance compliance to regulatory and market requirements, TRASE project has invested in building capacity in both Animal Health, Plant Health and Food Safety Systems including support laboratory services.

In addition, training on the development of the public-private partnerships (PPP) framework and a national plan for surveillance, notification, and emergency response was held with authorities, research, and commodity trade associations from partner states. The project produced a diagnostic study/issue paper on implementation of PPPs for the control and management of animal diseases in Uganda and Tanzania in which a structured situational analysis on preeminent service gaps is identified in detail across the full veterinary value chain, and a detailed analysis of PPP opportunities was undertaken.

In July and August 2023, a comprehensive participatory review and a stakeholder validation process were undertaken leading to the draft of the "*Strategy paper on PPP*"⁴². The strategy paper is informed by WOAHO/OIE Handbook-curated PPP models, as well as by the agenda on PPPs established under the EAC Integrated Regional Coordination Mechanism for improved livestock sector engagements⁴³, which include the coordination

⁴⁰ <https://storcpdkenticomedia.blob.core.windows.net/media/idd/media/lolorg/publications/assessment-of-sps-systems-in-eac-partner-states-18th-march-2021-print-file-4th-june-2021.pdf>

⁴¹ <https://storcpdkenticomedia.blob.core.windows.net/media/idd/media/lolorg/publications/assessment-of-sps-legal-systems-in-eac-partner-states-4th-june-2021.pdf>

⁴² Recently submitted to the Ministry of Agriculture, animal industries and Fisheries, Uganda for signature

⁴³ THE LIVESTOCK DEVELOPMENT STRATEGY FOR AFRICA (LiDeSA) 2015 - 2035

<http://105.27.231.85/bitstream/handle/123456789/540/2015-LiDeSA.pdf?sequence=1&isAllowed=y> 7.1 Private Sector Actors The term private actors sector refers to an individual or a collective of participants in economic and social life who aim for profit. Effective Private Sector participation is a key driving force which needs to be encouraged and facilitated at all levels through the formation of functional public-private partnerships mediated by appropriate policies and engagement platforms such as the existing livestock policy and strategy hubs.

of the control and management of transboundary animal diseases and zoonoses, as priority interventions. It is also strongly guided by the policy prerogatives articulated by top ranking public officials from both Uganda and Tanzania, affirming a strong commitment to the pursuit of PPPs that deliver two fundamental public sector objectives:

- PPPs that promote disease control and treatment;
- PPPs that promote trade in livestock and livestock products.

During the consultative process which led to the formulation of the draft strategy paper, the following areas of interest/deficit were identified:

1. Early detection and reporting of disease outbreaks remain a challenge.
2. Collection and testing of samples to confirm disease presence and map the precise strain or serotype of the disease remains inadequate.
3. Thirdly, veterinary laboratory infrastructure is largely recognized to be insufficient, and relatively non-sophisticated and the physical location of diagnostic facilities inadequate.
4. Quarantine and geographic animal movement restrictions as disease control and containment measures remain weak and ineffective in various respect.
5. Poor or missing livestock identification, registration and traceability systems, as well as lack of surveillance data as evidence to claims of disease control efforts.
6. Vaccine acquisition policy and practice remains imperfect – with the current practice largely being defined as reactive.
7. The EAC region, including both Uganda and Tanzania does not yet have adequate vaccine manufacturing capabilities, meaning that both countries still depend for the

intermediate future on importation of critical drugs and vaccines for prevention and management of animal diseases.

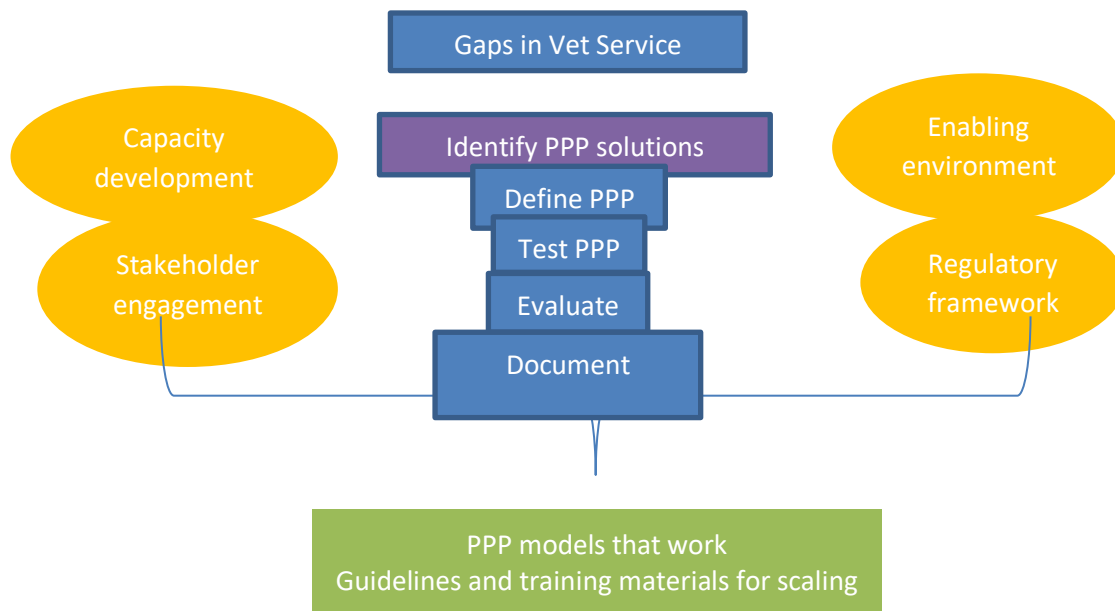
8. Weaknesses in their cold chain storage and distribution systems, defined by inadequate capacity for long-term stocking of drugs (which necessitates frequent vaccine and drug procurement cycles and may negatively impact vaccine efficacy), lack of electricity back-up systems for national storage facilities, and inadequate regional or district level storage facilities.
9. Vaccine coverage, when administered, is frequently incomplete in targeting all affected populations that need to be covered, either owing to deliberate (poor) vaccination practices, insufficient vaccine supplies, vaccination by ill-trained community animal health workers, or livestock keepers not presenting their animals.
10. Public sector field staff inadequacy remains a significant challenge in both countries – reported to be generally between 25 and 35% coverage across national regions.
11. Structured, consistent, and predictable post-vaccination monitoring of disease epidemiology is not happening currently in either country.

The analysis of the identified constraints led to the identification and recommendation of a PPP response agenda as identified priority interventions will unlock, promote and sustain livestock sector PPPs in Uganda and Tanzania. The proposed PPP engagement areas represent an effective answer to the dominant problem identified.

1. Laboratory Construction PPP
2. Laboratory Equipment Supply, Installation & Operation PPP
3. Surveillance, Disease Reporting and Emergency Response Project
4. Establishment of Border Livestock Infrastructure
5. Animal Identification, Registration and Traceability Project
6. Vaccine Production/Manufacturing Facility

7. Establishment of Disease -Free Compartments
8. Vaccine Purchasing, Distribution, Delivery Systems and Vaccine Banks
9. Livestock Vaccination and Related Actions

Both projects, Global Alliance for Livestock and Veterinary Medicines (GALVmed) and the TRASE have followed a systematic approach in the identification of the PPP options though the former is focused on the availability and distribution of quality vaccines while the latter is focused on a more systematic and holistic FMD control (with focus on the salient cross border FMD control). In any case the analytical approach is similar in its basic elements as in the graphic below (Wieland, B. 2019. Public-Private Partnerships (PPP) for veterinary service delivery. Presented at the HEARD Project Stakeholder Workshop-PPP Models for Veterinary Service Delivery ILRI, Addis Ababa, 20 June 2019. Nairobi, Kenya: ILRI. (EU11th EDF – NIP ETH - FED/2015/038-008)



An important cross-cutting theme across all PPPs, as identified by the TRASE project, is that ultimately, a PPP is neither a full public sector activity, to the exclusion of the private sector, nor a purely private undertaking (which would relegate the activity to the realm of licensed and regulated enterprises). An example of the former would be such things as border security or emergency preparedness, or regulation and enforcement of laws and standards, or zoonoses control.

These are nearly exclusively reserved to the public sector in terms of process autonomy. An example of the latter would be such operations as animal clinics and clinical services,

animal reproductive services, on-farm biosecurity measures, and similar undertakings. This second batch of activities can easily be licensed and regulated, as opposed to being implemented as PPPs.

Consequently, careful balance in the definition of the objectives of the PPP, its benefits and costs, and to the roles that would best be suited either the public or private partner, is a critical requirement for successful PPP structuring, be it in the livestock sector or outside of it.

4.6. Key factors to be considered in analyzing options related to PPPs establishment in Uganda

PPPs formulation and success depend on internal and external factors. Internal factors relate to internal project-level parameters and dynamics, while external factors refer to wider PPP surrounding systems and conditions. These factors are elaborated as follows. External factors include PPP supporting “external-to-the contract” or “surrounding the contract” tools and frameworks that allow PPPs to happen. They include;

- Existence of a national level policy, legal and institutional framework focused on PPP market development, presence of adequate policy implementation and enforcement mechanisms, quality and efficiency of the veterinary statutory bodies.
- Formal and operational linkages of the PPP governance system with other national agencies and development partners.
- Institutional organization on resourcing PPP activities – including availability of dedicated and knowledgeable staff to engage on the partnership preparation, packaging, structuring, negotiation, implementation and monitoring.

Internal factors related to the internal project-level dynamics, linked to the PPP structure and design, suitability, profitability and economic/social return of the opportunity under

consideration, how it will maximize the interests of both public and private sector partners,

- Clear problem definition
- Effective stakeholder mapping
- Objective appraisal of role and responsibility split between public and private sector players
- Objective appraisal of the potential partnership opportunity
- Objective assessment of benefits and costs
- Objective assessment of public sector supports required to make the partnership happen
- Staff (managerial, technical in both domains) competence upgrade programmes
- Partnership procurement modalities
- Partnership expression
- Partnership governance and implementation management
- Quality assurance and verification of compliance system against national and international standards (TAHC, SPS etc.)
- Disputes management
- Structured result-based monitoring and evaluation with M&E capacity enhancement programme

Conclusion

The desk review aimed at providing a clear situation analysis of Uganda in regards to the presence, circulation and control efforts on FMDV in the country and the level of

advancement of the country in finding additional or alternative ways to enhance FMD control capacity and results.

1. The occurrence of FMD in Uganda is still high and occasioned by the low effectiveness of applied control measures (limited capacity in responding to outbreaks). This situation is worsened by high cost of vaccines and logistics for vaccine administration and limited resources required to set up systematic and successful prophylactic programs. The policy framework is not comprehensive enough to minimize the challenges responsible for the actual FMD prevalence.
2. Based on lessons learned from other countries and secondary data analysis, it is evident that an increased effectiveness in the control of the disease could be achieved involving the private sector in a strategic way and following a Commodity-based trade approach- CBT (at least initially in the areas characterized by high concentration of cattle) with specific reference to beef as the most immediate and bankable livestock commodity to be commercialized as already documented in other African countries⁴⁴.
3. The recent establishment of the Presidential Advisory Committee on Export and Industrial Development (PACEID), the foreseen construction of new slaughter houses dedicated to export, the recently signed agreement with Algeria for the export of dairy products are all initiatives which can offer opportunity for dialogue over strategic decisions on the implementation of commodity-based trade approach along the livestock value chains.

⁴⁴ "A risk management system based on integration of HACCP and CBT approaches along a defined beef value chain documented equivalence with existing international trade standards" http://www.wcs-ahead.org/kaza Ahead_fao_workshop_2016/170614_cbt_workshop_proceedings_final_w_annex_lowres.pdf.

4. Specific primary data collected in selected districts to investigate the willingness to pay for FMD vaccine and probably in general to contribute to the costs of managing and control of FMD among Uganda cattle keepers, showed positive results and could sustain further discussion on the possible increased involvement of the private sector in diseases control.
5. A systematic involvement of the private sector through PPP contract schemes seems to be the most practical direction recently indicated by the Uganda Government and partners to progress effectively in the FMD control and overcome SPS related non-tariff measures (NTM)⁴⁵
6. At regional level, the review also showed that a number of existing PPPs, particularly transactional and transformational (some of them government and/or donor funded), and some examples of sanitary mandate, have been successfully implemented by contracting (or engaging in more structured PPPs) the private sector to deliver services related to animal health.
7. Uganda has recently engaged in constructive discussions over the possibilities of developing PPPs in the veterinary domain specifically targeting FMD control (e.g. Uganda-Tanzania border, TRASE project) which is already providing evidences that the level of governments-private sector inter-dependency is increasingly acknowledged subsequently leading to search for cooperation, joint decision making and private partnerships eventually creating a conducive environment for a paradigm shift from government to governance for profitable ventures.

⁴⁵ Non-tariff measures in agrifood markets are policy measures, other than ordinary customs tariffs, that can affect international trade by changing quantities traded or prices, or both. Governments use NTMs to address public concerns. For example, they are used to protect human, animal and plant health (sanitary and phytosanitary measures, or SPS). They are also used to regulate the technical characteristics of products, such as labelling and marketing standards, traceability of material, and the related conformity assessment and certification (technical barriers to trade, or TBT). SPS-related NTMs are more prominent for animal products, fruits and vegetables, and fats and oils, while TBT-related measures play a more important role when it comes to processed food.

8. In a number of consultative meetings held during the study, it appears that a collaborative and decentralized approach implemented by the public and private sector (similar to the one practiced in Namibia) where the vaccine is strategically pre-positioned and co-managed by cooperatives and the veterinary service (represented by the DVOs). This could ensure that preventive vaccination is carried out based on risk analysis / intelligence in the “hot spot” of the areas in which FMD historically occurs and an emergency response plan for FMD outbreak can be rapidly implemented as soon as an outbreak occurs, the option seems to be the most practical and recommended approach.
9. The immediate actions indicated in the recommendations below, foresee the possibility to establish a limited-in-scale but representative PPP with the aim of controlling FMD cases and proceed with the identification of a possible “compartment” (one or more) putting in place a collaborative agreement to implement a bio-safety set of measures to serve the final slaughterhouse outlet and eventually enhance market access.
10. The full development of the model might require additional data gathering, analysis and a high level of participatory discussions to explore the multiple angles a disease control programs entails. Several scenarios as examples are presented in the study from different countries providing a well contextualized instrument which can lead to a multi-partners consultation as already advocated for in the last two meeting held with the FMD sub-committee.

Recommendations and short-term actions

The recommendations provided by the study were based on the secondary data analysis carried out as the main element of the exercise, corroborated by primary data collected with the specific scope to evaluate the “willingness-to-pay” for the FMD vaccine by livestock keepers in selected districts in Uganda. Moreover, intermediate and final findings were discussed and shared in a number of consultative roundtables convening a number of actors involved (as implementers and beneficiaries) in FMD control, potential PPP development and CBT approaches.

Short term actions

Short term actions were identified in a participatory manner and indicated as follows:

- a. Under the leadership of the National Beef platform and its secretariat the Uganda Agribusiness Alliance, and with the technical support of FAO Uganda office, engage in discussion the TRASE project and support it in the signature of and in further discussion on the “Strategy paper on PPP” submitted by TRASE.
- b. Through the above-mentioned mechanism, present to the competent authorities such as MAAIF, the PPP Unit at the Ministry of Finance, planning and Economic development, the Private Sector Foundation Uganda, the Ministry of Trade and Uganda operative projects such as the PACEID an articulated proposal to engage the public and private sector in 1- FMD control (as an immediate de-risking strategy for selected compartments in Uganda) and 2- Uganda Beef regional and international market enhancement to support country’s discussion with potential importing authorities and commercial partners, (see Annex 9) developed based on last meeting request from the FMD sub-committee of the Uganda Beef Platform).
- c. The proposed approach, adopted through the engagement of local capable private partners (mainly cooperative and/or through the already existing UMPCU structure) in strong collaboration with MAAIF and local DVOs might represent a solid initial

and low investment entry point sharing duties, competences and costs utilizing a Uganda tailored model using as reference the ones analyzed in this study.

On the Commodity-Based Trade

- I. Continue engagement with the existing Uganda based initiatives such as the PACEID, TRASE, the Agro-Industrialization Program, the Uganda Export Promotion Board, the Private Sector Foundation (PSFU), the AgResults FMD Vaccine Challenge Project, the Uganda Agribusiness Alliance (UAA) through the existing Beef producer's platform (and its FMD subcommittee) and Uganda Meat Producers Cooperative (UMPCU) as the primary advocacy and operational entry points to advocate for the establishment of an enabling environment, including appropriate legislation and strategies to engage the private sector in the implementation of the CBT.
- II. Explore the option of forming multidisciplinary Private Public Stakeholder Platforms (PPSPs) to cater for a multi-partners approach to trade and FMD control involving government institutions, statutory bodies such as the Uganda Veterinary Board and veterinary associations as well as producers cooperatives in order to create consensus and advocacy over the adoption of sanitary mandate contracts and/or Public Private partnership projects and contracts.
- III. Carry out one or more studies, after the establishment of specific criteria, to evaluate potential markets for beef that could be produced by Uganda livestock keepers (keeping in mind the potential for CBT to help opening markets) in selected zones/compartments/value chains following a CBT approach
- IV. Initiation of robust self-assessments within Uganda, to review (i) the potential opportunity offered by CBT and PPP as possible implementation opportunities, including an evaluation of constraints or gaps related to conceptual understanding,

risk perception, technical capacity, human and financial resources, as well as governance and an enabling regulatory environment, and (ii) political willingness among ministries overseeing livestock, trade and finance to work together, and collaboratively with the private sector and civil society, to foster sustainable economic development that draws upon the region's unique cultural and environmental comparative advantages.

On the PPP

- V. Utilize the existing tools such as the WOAHP PVS Pathway missions' reports as the first potential source of information and entry point for potential areas for PPPs and identification of areas for mutual (public and private sectors) benefit. High consideration should be given to the implementation of the risk-based strategy plan (RBSP) and PCP.
- VI. Systematically pursue the agenda of PPPs and sanitary mandate in the veterinary domain and particularly in animal health services as it will increase the responsibilities of the private sector in safeguarding animal health and welfare and contribute to decreasing public expenditure on veterinary services. This creates great opportunities for the public sector in Uganda to utilize private sector service providers beyond what the public sector alone can directly fund and implement.
- VII. Pursue the establishment of PPPs as it could provide additional financial benefits to private veterinarians and veterinary paraprofessionals that increase the sustainability of their services particularly in the field of clinical and reproductive services, disease detection, disease reporting, surveillance and control activities that may be under-served in Uganda.

- VIII. Encourage and support multi-stakeholder engagement in creating an enabling environment⁴⁶, drafting and ratifying veterinary legislation, particularly in the following areas: monitoring of animal health and diseases control and prevention services; trade regulation of livestock and livestock products; regulation of the production, import, supply and use of veterinary pharmaceutical products, including vaccines.
- IX. Cognizant of the fact that the institutional arrangements for animal disease prevention and control needs to consider, and be sensitive to, the objectives of the public and private sectors within the different components of livestock production systems, advocate for the establishment of appropriate open platforms to facilitate the development of constructive collaboration between public and private actors in the livestock sector (for example Uganda beef platform supported by Uganda Agri-Business Alliance (UAA)).
- X. Advocate for the concept that strengthening of public–private partnerships requires that harmonization of the specific agendas of the public and private sectors to be leveraged as a public good, and re-examining of key legislation and regulations to facilitate the engagement of the private sector in national animal health services and disease control strategies and policies.
- XI. Advocate and support the Government’s decision regarding the shifting of its role from direct implementation of veterinary services to facilitation & regulation of selected veterinary service delivery by the private sector. A careful consideration needs to be paid to the fact that an effective use of the private sector requires strong

⁴⁶ Enabling environment: The ‘environment’ refers to the underlying setting or context, in this case in which animal production occurs, FMD circulates and control measures are applied. The ‘environment’ includes the socio-economic status of the country, the laws and norms that govern all aspects of the country (including animal production and trade), the proficiency and resources of the Veterinary Services. An ‘enabling environment’ indicates that this underlying setting and conditions are favourable to the control of FMD.

legislation & enforcement mechanisms for proper delegation of authority to ensure the quality & performance of private sector actors. Overall success of veterinary services depends on quality veterinary education & effective veterinary statutory bodies.

- XII. Support and advocate for the provision of adequate and formalized co-ordination mechanisms as the de-centralization of the VS without adequate provision for coordination of the control of major transboundary animal diseases and low involvement of the private sector in livestock service delivery is a real challenge that needs to be tackled.
- XIII. Support every aspect of shifting responsibility and training and authorizing the private sector to act as a strategic partner of the public sector as it is a key to leverage and excel in using the capacities and resources of both parties in controlling animal diseases.
- XIV. Support the analysis and identification of mitigation measures of financial risks for the private sector in investing in PPPs in the veterinary domain. Providing the assurances and guarantees that are at the heart of any PPP agreement will greatly encourage investments by the private sector in this area. This has to be adapted to the Uganda context based on its particularities in terms of the characteristics of its farming systems and market infrastructure and potential outlets, taking into account socio-economic, political and cultural and environmental considerations.
- XV. To advocate and support vaccine security especially about ensuring a sufficient quantity (predict demand generated through a customized VADEMOS model) and a high standard of quality; private sector involvement in the development of vaccines for use in national disease control programs must be encouraged and utilized. Alternatively, as recently indicated by the Government of Uganda, should the in-country capacity be developed for the production of FMD vaccine in line with the Nagoya Protocol on vaccine development⁴⁷, explore additional options to involve

the private sector in the distribution/commercialization/cold chains. Linkages with the existing Multi Stakeholders platform for FAST vaccines convened by EuFMD will be instrumental

- XVI. As the Serotype O appears to be the most prevalent (>80%) in the Uganda context, an option of adopting a monovalent vaccine with lower costs implication to provide to higher farmer's engagement, could be investigated further by MAAIF and its technical partners.
- XVII. Regional coordination and a regional approach to vaccination will be essential in promoting vaccine security through agreement on the choice of strains and vaccines that are suitable for use following the epizoonal approach.

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Annexes

Annex 1. Summary of Willingness to Pay for vaccine findings

Annex 2. TRASE project Report WORKSHOP Draft- 3rd Sep 2023 (1)

Annex 3. Trace project Report of Virtual Training-TRASE PPP workshop on PPPs for the control and management of animal diseases-August 2023- copy (1)

Annex 4. List of people consulted

Annex 5. Annex 5. UNDP Uganda National planning authority - Animal Vaccines Commercialization Feasibility Report 28.06.2022.

Annex 6. COVAB Meeting attendees

Annex 7. Forest cottages Meeting attendees

Annex 8. FMD sub-committee attendance lists

Annex 9. PPP/CBT Concept note