CMC-AH Crisis Management Centre Animal Health

THE REPUBLIC OF UGANDA
"Rapid assessment for the prevention and control of Foot and Mouth Disease (FMD)"

Cows in Sironko District

MISSION REPORT

13–24 July 2014

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ACRONYMS AND ABBREVIATIONS

BSL3	Bio-security level 3
CAHWs	Community Animal Health Workers
CMC-AH	Crisis Management Centre – Animal Health
CVO	Chief Veterinary Officer
COVAB	College of Veterinary Medicine, Animal Resources and Biosecurity
DFID	Department for International Development
DVO	District Veterinary Officer
ECTAD	Emergency Centre for Transboundary Animal Disease
DRC	Democratic Republic of the Congo
ELISA	Enzyme linked immune-sorbent assay
FAO	Food and Agriculture Organization of the United Nations
FAOR	FAO Representative
FMD	Foot-and-mouth disease
HPAI	Highly pathogenic avian influenza
KEVEVAPI	Kenya Veterinary Vaccine Production Institute
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
NADDEC	National Animal Disease Diagnostics and Epidemiology Centre
GEMP	Good emergency management practice
MoU	Memorandum of Understanding
NLRRI	National Livestock Resources and Research Institute
OIE	World Organisation for Animal Health
PCP-FMD	Progressive Control Pathway for FMD
PRDP	Peace Recovery and Development Programmes
RAHC	Regional Animal Health Centre
RDT	Rapid deployment team
TAD	Transboundary animal disease
TOR	Terms of reference
UN	United Nations
UNDP	United Nations Development Programme
USDA	United States Department of Agriculture
UVA	Uganda Veterinary Association
UWA	Uganda Wildlife Authority
WHO	World Health Organization

EXECUTIVE SUMMARY

The first outbreak of foot-and-mouth disease (FMD) in the Republic of Uganda was recorded in 1953. Since then, outbreaks have regularly occurred in cattle. Since 2006, serotype O has been the predominant serotype detected, and has been largely limited to the south-west region of the country. Over the last decade, reported outbreaks were reduced to less than ten per year, and mostly limited to the southern part of the country. However, 2013 had been marked by a change in the epidemiology of the disease, seeing outbreaks being recorded in the north-eastern part of Uganda, specifically in the Karamoja region. Many of the outbreaks since then occurred between May and July 2014.

The Government of Uganda requested assistance from the Food and Agriculture Organization of the United Nations (FAO) on 8 July 2014. In response to this request, the Crisis Management Centre – Animal Health (CMC-AH) fielded a rapid deployment team (RDT) to Kampala, Uganda from 13 to 24 July 2014 with the following mission objectives:

- assist the Veterinary Services of Uganda to assess the current FMD, including control measures, and suggest enhancements to prevent further spread with a special focus on the Karamoja region;
- examine and advise on strategic interventions to be implemented, and future coordination for the control of FMD in Uganda; and
- develop a detailed short and medium term action plan that may assist with resource mobilization at national and regional levels, including necessary funding and possible funding sources in order to meet the needs identified.

At present, the control methods implemented could only be expected, at best, to slow the progress of the epidemic. There is a serious shortfall in vaccine supply and the proportion of cattle vaccinated[1] falls far below that required to prevent transmission and effectively eliminate the disease.

Unless intensive control intervention is implemented, including surveillance and "smart vaccination", the infection is expected to continue to circulate in the susceptible population. In addition, there is a potential risk of introduction of other serotypes. It is probable that pockets of infection will remain and serve as the source of future epidemics as susceptible populations build up again, especially in densely stocked areas with large numbers of livestock.

To address the current FMD situation, the team recommended two critical intervention strategies: 1) To immediately control the outbreak by implementing an emergency response focusing on (i) setting up a national FMD control centre authorized to coordinate all the control activities; (ii) establishing an effective disease surveillance program; and, (iii) applying a "smart vaccination" strategy based on the subdivision of infected and non-infected areas; and 2) To address the longer term progressive control of FMD by developing a national strategic plan in synchrony with the Progressive Control Pathway (PCP) on FMD, i.e. PCP-FMD.

[1] 110 000 doses of vaccines provided; 2 253 960 cattle population estimated in Karamoja (2012).

1. INTRODUCTION

1.1 Background

FMD is one of the major diseases affecting global livestock production and market. The causative agent is an *Aphtovirus* from the *Picornaviridae* family, with seven different serotypes, including O, A, C, Asia A, SAT 1, SAT 2 and SAT 3. The disease affects cloven hoofed animals, both domestic and wild.

The first FMD outbreak in Uganda was recorded in 1953. Since then, FMD has been endemic in the country and outbreaks have occurred regularly in cattle. Since 2006, serotype O has been the most predominant serotype, largely limited to the south-west region. The reports provided by the National Disease Diagnosis and Epidemiology Centre (NADDEC), note that outbreaks had been reduced to less than ten per year until 2011. During 2012-2014, the following changes were observed in the epidemiology of FMD in Uganda:

- SAT 1 has been isolated in asymptomatic cattle at the livestock-wildlife interface in cattle in 2012;
- serotype SAT 2 had been identified in the 2013 outbreaks;
- serotype SAT 3 had been identified for the first time in asymptomatic cattle at the livestock wildlife interface in 2013;
- serotype A was identified in one outbreak in 2013; and
- SAT 1 has been isolated in buffalos in 2013.

In May 2014, NADDEC was alerted by the District Veterinary Officers (DVOs) of FMD outbreaks occurring in several districts of the country especially, in the north and north-west parts (in the Teso and Karamoja sub-regions). Karamoja is predominantly populated by pastoralists who continuously move between the Republic of Kenya (Turkana, West Pokot) and Uganda. The outbreaks could have occurred following the movement of animals from neighbouring countries (Kenya and the Republic of South Sudan), but also from restocking programs taking place with animals being sourced from the southern and eastern regions of the country. About ten outbreaks had been reported in the month of June 2014, with significant socio-economic losses.

In July 2014, the Ministry of Agriculture Animal Industry and Fisheries (MAAIF) fielded a mission team to collect samples in the districts of Napak, Moroto, Kaabong and Mbale. Using the FMD antigen Enzyme Linked Immuno-Sorbent Assay (ELISA) test, serotype O was confirmed. At the time of the rapid deployment team mission, the disease had spread considerably in Karamoja, and also to neighbouring districts, with more than 20 districts infected.

Currently, the government has imposed quarantine restrictions and has undertaken selective vaccination to contain the outbreaks. So far 110 000 doses of trivalent vaccines (serotype O, SAT 1 and SAT 2), largely procured from the Kenya Veterinary Vaccine Production Institute (KEVEVAPI), have been applied.

A regional approach for the control of FMD is apparently not advancing, despite a Memorandum of Understanding (MoU) signed between the Governments of Uganda and Kenya in April 2013. This MoU targeted transboundary animal disease (TAD) control

between Turkana, West Pokot and Karimojong communities, as they have similar livelihoods characterised by frequent cross border movements of animals and animal products for trade, markets and customary and transhumance reasons.

1.2 Mission request, composition and duration

FAO received a request for assistance from MAAIF, sent through NADDEC on 8 July 2014 (Annex 1). In response to this request, the CMC-AH fielded a RDT consisting of a response veterinarian, an FMD field control expert and a veterinary epidemiologist (for the terms of reference (TORs) see Annex 2) to Uganda, from 13 to 24 July 2014.

This mission was supported by funds from the United States of America (USAID).

1.3 Mission objectives

The overall objective of the mission was to support the Government's emergency response to the current FMD outbreaks.

The specific objectives of the mission were to:

- assist the Veterinary Services of Uganda to assess the current FMD, including control measures, and suggest enhancements to prevent further spread with a special focus on the Karamoja region;
- examine and advise on strategic interventions to be implemented, and future coordination for the control of FMD in Uganda; and
- develop a detailed short and medium term action plan that may assist with resource mobilization at national and regional levels, including necessary funding and possible funding sources in order to meet the needs identified.

2. FINDINGS AND CONCLUSIONS

2.1 Mission activities

The three mission team members arrived in Kampala on 13 July 2014 and held preliminary discussions on the FMD situation, mission objectives and the planned agenda for the mission with the FAO Representative (FAO-R) of Uganda and the FAO National Livestock Programme Officer. A preliminary meeting was held with the Assistant Commissioner for disease control in MAAIF and staff from NADDEC. The team discussed the disease events occurring and the reporting system in place. They were shown the data entry system and records obtained from districts reports. The team also visited the national laboratory and discussed laboratory capability, vaccine supplies and cold chain, as well as the limitation in conducting virus characterization of the circulating strains. The team was also shown the bio-security level 3 (BSL3) containment facility that is under construction.

Subsequently, the team met with government officials from the following entities:

- the Uganda Wildlife Authority;
- the Uganda Veterinary Association; and
- National Livestock Resources and Research Institute (NLRRI).

The team also met with members of the private sector represented by the Uganda Meat Producers Cooperative Union, to discuss their role in FMD control, as they have direct contact with farmers. That same afternoon, the mission team travelled to the Iganga district and met with NLRRI. From this meeting, the team gained an understanding on proposed future research on FMD and other TADs in Uganda.

From 16 to 18 July, the team conducted field visits to Kotido, Moroto, Kapchorwa, Nakapiripirit, and Abim districts of Karamoja. The team had several meetings with DVOs, District Chief Administrative Officers, local NGOs, Animal Health and Production Officers, Community Animal Health Workers, livestock traders, police officers at the road blocks and the pastoral community. The team assessed the epidemiological situation, the response measures for each visited district and the extent to which they have been implemented.

On 17 July 2014, the team met with the local FAO office in Moroto and were briefed on the Karamoja Resilience Programme, a Department for International Development of the United Kingdom (DFID) funded project which is being carried out by FAO and has a large component on disease control for major TADs, including FMD in that region.

On the morning of 21 July 2014, the team met with a senior lecturer in the College of Animal Resources and Biosecurity (COVAB) at Makerere University in order to discuss the ongoing research on FMD carried out in partnership with the United States Department of Agriculture (USDA). In the afternoon, the team met with the United Nations Development Programme (UNDP) Country Director and briefed her on the mission's preliminary findings and recommendations. The team also discussed the possibility for future funding under the umbrella of the Karamoja Resilience Program, in partnership with the Office of the Prime Minister.

During the morning of 22 July 2014, the team met with a representative of DFID and had an extensive discussion on the current situation, the shortage of government funding to stop the spread of the disease and possibilities to re-allocate DFID funds for immediate response.

In the afternoon of 22 July 2014, a visit was made to Entebbe to brief government officials from MAAIF and NADDEC. The team discussed the action plan for immediate, medium and long term activities for FMD control.

On 23 July 2014, the team met with the FAOR of Uganda to discuss future actions.

2.2 Mission findings and conclusions by objective

2.2.1 Evolution of the FMD Epidemic

It is difficult to determine the exact geographic distribution of the FMD epidemic evolving in north-eastern Uganda due to lack of recorded surveillance information. FMD was probably not present in Karamoja in 2013, but there is evidence that it was indeed present in Teso (districts near Soroti) in 2012.

The epidemic was first reported to NADDEC in May 2014, but it clearly commenced prior to that date. However, there is little accurate evidence that FMD was present from statements received during the mission in Kotido and Nakapiripirit in February 2014. By May 2014, FMD had reached Abim and the western side of Nakapiripirit, and was probably also established in Soroti and neighbouring districts. Cattle returning from grazing in Soroti and neighbouring districts in April/May most likely brought FMD with them. It is uncertain how it reached Soroti originally, but the very high cattle density affords an excellent substrate for FMD transmission once introduced. It is also likely that by May 2014, movements of cattle in trade and restocking introduced FMD into Nakapiripirit and Moroto.

Livestock movements are very extensive and dynamic in the region, with cattle moving for transhumance reasons, restocking programmes or in trade within Uganda and cross-border to southern Sudan and Kenya. These are factors that have contributed to the introduction and spread of the disease in Karamoja.

Multiple reports indicate that FMD was introduced into Amudat (and Moroto) by movement of Kenyan cattle to the Moroto district. Historically, this has been an important source of TAD movement. Substantial movement of hundreds of thousands of Kenyan cattle into eastern Karamoja has been caused by the extensive drought recorded this year. Reports indicate that FMD was also introduced into Moroto by interaction of cattle herds across the border with Nakapiripirit; traders were also bringing cattle from Kotido prior to the first outbreaks in Moroto. By June 2014, the disease was reported to have moved as far south as the Mbale and Bugiri districts.

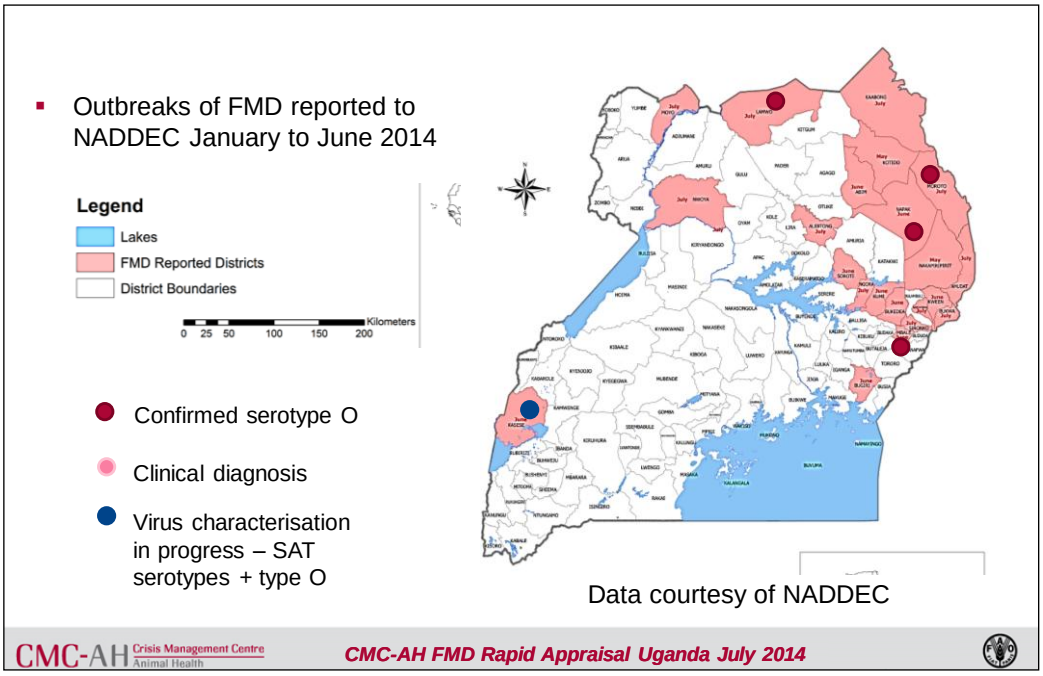
Cases of clinical FMD have been observed in free-range swine, goats and sheep in several districts. It is highly probable that swine and small ruminants are not involved in the maintenance and spread of FMD viruses, but this needs to be verified.

Serotype O FMD virus was found by NADDEC in samples collected in July 2014 from Napak, Moroto, Kaabong and Mbale districts. However, the number of samples tested was

very small and the results might not be indicative of all the viruses circulating in Karamoja. It is imprudent to assume that the current epidemic is being caused by a serotype O FMD virus alone.

Data kindly provided by the Kenyan authorities provide clear evidence of widespread FMD infection throughout Kenya in 2014. Serotype O is the predominant recorded serotype but it is of considerable importance to note that both serotypes SAT 1 and SAT 2 have been detected on numerous occasions, including the former in West Pokot, bordering Karamoja, in January 2014. On two occasions, two serotypes were detected in the same outbreak. There is no available information concerning the FMD situation in southern Sudan.

Whether or not the outbreak reported from the Lamwo district on the South Sudanese border is related to the Karamoja outbreak is uncertain. Similarly, the virus serotype causing the outbreak reported in June 2014 in the west, and its provenance, is unknown, so no possible relationship to the Karamoja epidemic can be drawn. The events in Karamoja probably represent the Ugandan element of a regional epidemic involving southern Sudan and Kenya (Turkana, and West Pokot). It is possible that there have been several incursions across the borders over the last six months. By June 2014, the epidemic was reported to have moved as far south as Sironko, Mbale and Bugiri Districts.



FMD situation in Uganda January-June 2014

Outbreaks reported from Kasese, in the west of Uganda are currently being studied at NADDEC. Preliminary findings suggest the presence of all SATs and O serotype viruses. This outbreak is most likely a separate and unrelated event, probably caused by cross border movements between the Democratic Republic of Congo (DRC), or potentially by buffalos in an adjacent National Park.

2.2.2 Consideration of control as currently implemented

a. Veterinary Governance

The team found that there are serious deficits in the allocation of financial resources to the systematic control of TADs, and that there is no emergency funding provision for control. Arguably, this reflects a lack of appreciation by the authorities that FMD is a disease which seriously affects the livelihoods of a significant number of the Ugandan population[1]. This resource deficit is reflected in the lack of disease prevention systems, in a failure to detect epidemics promptly and in a failure to implement effective controls once epidemics are recognised. NADDEC is mandated to conduct disease control but has not been provided the resources to successfully accomplish this mission.

Many agencies are involved in the control of major diseases, but coordination between them is severely lacking. For example, research studies are conducted independently at NADDEC, Makerere University and the National Livestock Resource Research Institute. The team learned that during this outbreak, both NADDEC and COVAB collected and tested field samples from the same districts, appearing to duplicate efforts, and improperly utilizing scarce resources.

b. Surveillance capacity

A passive animal disease reporting system exists, but it has many deficits, as does the associated emergency reporting system. The livestock owner/veterinary interface is weak in terms of disease reporting. It seems that, although there is a large body of "community animal health workers" (CAHWs), their potential contribution to the animal disease surveillance system is under-utilized. This could be due in part to the fact that few receive any remuneration for their services[2]. Many districts do not report outbreaks in a timely manner, as some DVOs are discouraged from doing so. Consequently, it is generally the case that FMD outbreaks are only reported once the disease has escalated to a serious state.

There is lack of essential data collected on the current outbreak (i.e. number of localities affected, circulating strains) and this does not allow for a proper epidemiological assessment, resulting in an inability to determine the proper control measures which need to be applied.

The lack and delays in reporting disease outbreaks, and the lack of enforcement of control measures noted from some districts, made it apparent that that decentralisation of veterinary services to District and County levels has had a very deleterious impact on the surveillance[3] and control of transboundary animal diseases. The lack of a systematic national approach to detection and control of TADs was noted.

[1] It is often stated that FMD is of very little significance in pastoral livestock systems. Although international trade in the region is little impacted by FMD because of the lack of zoo-sanitary measures to control transboundary movement of FMD in trade, Karamajong pastoralists describe significant losses from reduced productivity (growth and milk), abortion and mortality, especially in young stock, and loss of livelihood from constrained sales due to the quarantine.

[2] The concept guiding the activities of CAHWs in Uganda differs from the original concept used elsewhere in eastern Africa. The original intention of establishing CAHWs was to have a cadre of experienced para-professionals, respected by the communities they served, able to generate their income by charging for basic services. At the same time, they would be able to make a significant contribution to surveillance. This method of organisation was intended to provide a sustainable service independent of payment of salaries.

[3] Surveillance refers to the systematic monitoring of a population (or populations) of livestock to detect epidemiologically significant events in a timely manner and enable control measures to be implemented.

c. Livestock movement

It was evident to the team that massive and dynamic movements of livestock, internally and across borders, mainly for commercial trade or during customary and responsive transhumance, has rapidly spread FMD, and has overwhelmed the current control measures in place. In addition, the team observed that internal movements of livestock were essentially uncontrolled even when quarantines were in place.

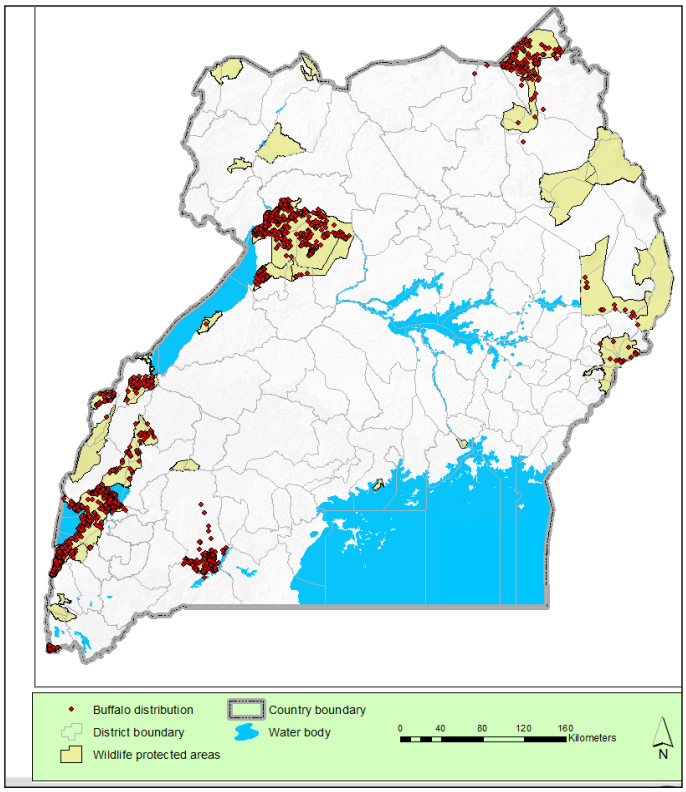
The previous imposition of quarantines (i.e. enforced prevention of livestock movements) for months at a time has caused serious stress to communities which rely on selling livestock to generate income for daily needs. As a result, the restrictions are flagrantly ignored despite the establishment of road blocks and police reinforcement. Informal markets are being held in full public view, in proximity to closed formal markets and road blocks, without any action being taken by authorities. The movement restrictions damage the veterinarian/farmer interface and alienate the livestock owners whose cooperation is essential for effective control. One possible solution could have been to allow livestock owners to slaughter cattle for local consumption, but the farmers indicated during the community interviews that the local capacity to absorb the meat was very low and this would not solve the problem.

Namalu Market in Nakapiripirit District

It was reported that the restocking programme implemented under the under the Peace Recovery and Development Programmes (PRDP) under special projects for Karamoja, had not been coordinated with MAAIF, and ran without regard to the health status and origin of the animals, without vaccinations. Consequently, it is believed that these may have contributed to the incursion and spread of FMD.

d. Wildlife

There is a general misunderstanding amongst field staff that transmission of FMD from wildlife to cattle is a frequent cause of outbreaks, and they overplay the significance of wildlife in the current epidemic. While it is well understood that buffalo herds carry and can transmit viruses of serotype SAT 1, 2 and 3 to cattle in close contact with them, this is not the case with other serotypes where persistent virus carriage does not occur in an epidemiologically significant manner. Thus, wildlife, and buffalo in particular, are unlikely to be playing a significant role in an epidemic caused by serotype O.



Distribution of buffalo populations in Uganda

It was reported that the buffalo populations in Karamoja (and elsewhere) have increased considerably in recent years and continue to grow. This does present an increased risk of future outbreaks as there is no control over the cattle/wildlife interface. Hence, there is a need for better understanding of the epidemiology of FMD in wildlife in the country. Figure 2 illustrates the distribution of African buffalos in Uganda (data courtesy of the Uganda Wildlife Authority (UWA)).

e. Emergency preparedness

The lack of timely emergency response and provisioning of adequate resources clearly demonstrates the gaps in the country's emergency preparedness planning. As a consequence, the current response relies on inadequate national resources and untimely international assistance.

f. Diagnostic capacity (laboratory)

Although NADDEC is well equipped, technically, to carry out sero-typing of the various FMD viruses within the country, reagent supplies would become a limiting factor if demand increased. The same applies to Makerere University and the NLRRI. As mentioned above, the major constraint in laboratory capacity appeared to be insufficient coordination between these institutions and the Department of Veterinary Services.

BSL3 Laboratory under completion in NADDEC

The work being carried out by the three organizations, which clearly compete for resources, appeared not to be well coordinated despite the presence of a national laboratory network that is supposed to share such important outcomes within their operational frameworks.

There is a satellite laboratory in Moroto district, but it is inadequately equipped to conduct FMD diagnostic essays. However, it could be used as a collection and storage point for surveillance/diagnostic samples prior to shipment to the national laboratory in Entebbe.

g. Vaccine and vaccination

Reports provided by NADDEC indicated that 110 000 doses of vaccine (trivalent - SAT 1, SAT 2, O) were provided to the Karamoja region, and 114 000 doses to neighbouring and Kasese districts. At the time of the mission, some districts had received vaccines but had not initiated animal inoculation.

The team discovered that in some areas, vaccine had been distributed to owners to inoculate their cattle. It was observed that some districts did not have their own refrigerated storage.

This casts serious doubts to the effectiveness of the cold chain in preserving vaccine, and insuring sufficient immune response.

The team was unable to ascertain the quality control of vaccines supplied by KEVEVAPI, utilized in Uganda. However, anecdotal evidence from the field suggests that the vaccine has been effective in preventing infection and this is supported by experimental data from NADDEC.

h. Risk communication

Risk communication appeared to be insufficiently addressed, as the key stakeholders (farmers/pastoralists and traders) were not clearly informed on the importance of the disease. Good communication would contribute to gaining their cooperation on implementing control measures.

3. RECOMMENDATIONS

In addressing the current FMD situation in Uganda, two separate issues need to be addressed, and the mission team found it imperative to differentiate between them:

(1) immediate control of the epidemic situation: an emergency response plan needs to be developed and implemented rapidly; and
(2) long-term planning and action for progressive control of FMD: a national strategic plan for FMD control is needed, and should be linked to regional initiatives.

3.1 Immediate control

This section concerns the FMD epidemic which has developed in Karamoja and its spreading to contiguous districts.

Rapid strengthening of control measures is needed. This requires a number of actions to be put in place promptly:

3.1.1 Recommendation 1 – Establish a National FMD control centre mandated to coordinate all activities related to FMD control

Based in NADDEC, this unit would be responsible for coordinating surveillance and all of the following activities relating to the implementation of control measures:

- immediately conduct a rapid epidemiological assessment of the FMD situation by fielding two or three teams to work with surveillance officers, DVOs, animal health and production officers, CAHWs and other stakeholders, in order to determine the current status of the epidemic and monitor its evolution. This could be done in consultation with pastoralists in key areas using participatory techniques, and with other key informants;

- disease surveillance in the field must be strengthened as surveillance is a key component to ensure the rapid identification of, and response to, outbreaks. For this, surveillance officers, supplied with transport, should be established in each district (or group of districts where appropriate), out-posted from NADDEC and responsible for:
    - ensuring that all aspects of the surveillance system function well at district level;
    - seeking and receiving disease reports and their communication to the NADDEC epidemiology unit;
    - facilitating and/or conducting preliminary investigations of outbreaks;
    - mapping and monitoring the movements of livestock (a longer term activity); and
    - collecting and transporting samples to NADDEC.;

- a long term activity should be established as a system within the epidemiological facilities that will map and monitor the movements of livestock, and will:
    - immediately direct field outbreak investigations to maximise sample collection, virological examination, and epidemiological analysis;

- organise the collection of samples from each new outbreak for virus characterisation; and
- assure that representative samples will be routinely submitted to the FAO World Reference Laboratory for FMD, for full characterisation, to at least variable protein (VP)1 sequencing. Field epidemiological studies should also be conducted in order to clarify the determinants of the epidemic and monitor its progress.

- strengthen NADDEC to ensure that the required virological, epidemiological and risk analysis services can be provided. This requires the provisioning of materials and supplies for FMD virus characterisation, and possibly, the provisioning of technical training;

- review guidelines for restocking programmes including insuring vaccination prior to distribution. Standards need to be set to safeguard the health of cattle and other livestock moved for the purposes of restocking, and to safeguard the livestock communities into which they are moved; and

- provide emergency funding from governments, and through a coordinated approach to donors.

3.1.2 Recommendation 2 – Develop and implement a "smart vaccination" strategy

First, infected and not yet affected areas must be defined (using county or sub-county divisions as the livestock epidemiological unit), enabling a "Smart Vaccination" plan to be drawn up. Two sets of vaccination teams are required to operate at county or sub-county levels, one vaccinating in infected foci and the other in areas believed to be free from infection. This new approach would be phased in as the following preparations are completed:

- procure and distribute adequate cold chain equipment and use data loggers to monitor the distribution chain to the point of animal inoculation;

- once the viruses have been defined, procure adequate supplies of appropriately matched vaccine with suitable specifications. A first tranche of 1 million doses is required initially. If the Karamoja outbreak can be confidently ascribed to the serotype O virus, then a monovalent vaccine could be used to control the epidemic, but only if the viruses causing disease in the field are intensively monitored to detect the possible emergence of other serotypes. If this cannot be guaranteed, it would be wiser to use a trivalent vaccine (serotypes O, SAT 1 and SAT 2);

- establish strong collaboration between the national diagnostic laboratory and the vaccine producers/suppliers in order to improve vaccine matching;

- improve the use of vaccines. With respect to FMD, a very important component of control, both systematic and emergency, is the use of vaccines. Vaccines approved for use

by the World Organisation for Animal Health (OIE) are those inactivated by aziridine compounds[1], and not formaldehyde. It is now generally accepted that oil emulsion adjuvants are immunologically superior to aqueous adjuvants. To be effective in emergency FMD control, vaccines should ideally be of enhanced potency supplying at least 6 PD50 per dose of vaccine[2]. Detailed specifications should be communicated to vaccine suppliers, and bids need to be assessed. They should provide credible evidence of virus provenance and characterisation, methods used for inactivation and potency.
Vaccines used should be:

- produced in accordance with OIE standards;
- of adequate potency (>6 PD50 per dose of each component);
- ideally, with oil adjuvant; and
- vaccine viruses must be well matched to the current field strains by molecular and antigenic characterisation; and

- organize refresher training for the CAHWs and field veterinary officers who will support surveillance efforts, the vaccination campaign and other animal health delivery systems.

3.1.3 Recommendation 4 – Mount a communication campaign to alert all stakeholders to the required actions and why they are being put in place

The following actions should take place:

- working with communities, developing zoo-sanitary measures which would include a re-evaluation of the need and mechanisms used for movement controls, including allowing for safe movements**;**
- a public awareness campaign on the clinical signs of FMD for stakeholders (private veterinarians, farmers, traders, CAHWs, etc.) targeting community elders in community mobilisation should be drafted;
- awareness in affected and unaffected areas on the importance of early reporting of clinical disease suggestive of FMD should be raised, in order to increase rapid detection to effectively tackle and contain any potential outbreak of the disease; and
- communicate information on FMD through print and electronic media and using a variety of methods including, but not limited to: workshops, drama skits, posters and use of community radio stations and rural meetings.

3.1.4 Recommendation 5 – Establish a training programme for the orientation of veterinary and ancillary staff.

[1] Aziridine compounds such as binary ethyleneimine inactivate virus by first order kinetics whereas formaldehyde, which has been used extensively in the past, follows second order kinetics resulting in a risk of residual live virus being present in the vaccine.

[2] The 50 per cent protective dose (PD_{50}) content of a vaccine refers to the strength of a vaccine such that when a dose of vaccine is given to each of a group of cattle 50 per cent of the cattle will be protected against infection; a 6 PD_{50} should produce a highly effective immune response in all cattle immunised.

The subject matter for the training is to include: the basic epidemiology and clinical course of FMD; principles of disease control; zoo-sanitary measures.

3.2 Recommendations for future FMD policy

A long term national strategic plan for the progressive control and protection against FMD, linked to a regional initiative, is urgently needed.

Elements of a National Strategic Plan for FMD[1]

- An emergency preparedness plan which ensures a chain of command from the Department of Veterinary Service to field animal health staff and action plans for implementation of disease control activities. Components will include: the establishment of a permanent National Animal Disease Control Centre and provisioning to establish Local Animal Disease Control Centres in emergencies; an emergency fund for disease control; and stores of equipment for use in emergency.

- Ensured provisioning of adequate virological and epidemiological services to include monitoring of virus strains and liaison with neighbouring countries.

- Active and passive surveillance systems providing real-time warning of epidemiologically-significant disease events.

- A training and professional development programme for all animal health staff, including training in basic disease recognition and epidemiology, preparedness (i.e. early warning procedures), good emergency management practice (GEMP), emergency response procedures and surveillance with disease reporting.

- A research programme including commissioned socio-economic studies on the impact of FMD on different livestock-dependent communities[2].

- Develop a communication strategy: a concerted effort should be made to continue educating all stakeholders in the pastoral and agro-pastoral areas to address efficient disease reporting and appropriate biosecurity measures.

[1] This would have the potential to be expanded to include other TADs.

[2] It is often stated that FMD is of very little significance in pastoral livestock systems. Although international trade in the region is little impacted by FMD, because of the lack of zoo-sanitary measures to control transboundary movement of FMD in trade. As in other pastoral communities, Karamajong pastoralists describe significant losses from reduced productivity (growth and milk), abortion, and mortality, especially in young stock. Losses in small ruminants can be very high. There is little information available on the socio-economic impact of FMD in absolute terms and relative to other diseases in African pastoral systems. This information is urgently required in order to inform future policy. Similar findings were recorded in Borena, Ethiopia by Jibat et al. Pastoralism: Research, Policy and Practice 2013, 3:5 http://www. pastoralismjournal.com/content/3/1/5.

- Develop a resource mobilisation strategy: lobby for an increase in resource allocation for the livestock sector in general, and specifically, for the Karamoja region.

- Commission research as needed to examine practical issues related to surveillance and control;

ANNEXES

Annex 1: Official request

Terms of reference for Technical Support Missions on FMD surveillance, diagnosis and control in Uganda

In Uganda, FMD is endemic and outbreaks are largely noticed in cattle compared to other animal species. Since 2006, serotype O has been the most predominant serotype and largely limited to South Western region. Reported outbreaks had reduced to less than 10 per year. However, in 2012/2013, there has been change in epidemiology of occurrence of FMD in Uganda as follows;

- Serotype SAT 2 has been identified in outbreaks (2013)
- Serotype SAT 3 has been isolated for the first time in asymptomatic cattle at the livestock wildlife interface (2013)
- Serotype A has been isolated in one outbreak (2013)
- About 10 outbreaks have been realized in one month of June 2014 and spreading massively with significant socioeconomic issues
- SAT 1 has also been isolated in asymptomatic cattle at livestock-wildlife interface in cattle (2012)
- SAT 1 has been isolated in buffalos (2013)

The government has imposed quarantine restrictions and undertook selective vaccination to contain outbreaks. There is a draft FMD control policy and FMD control strategy in place but this requires up scaling so as to ensure that FMD receives a special budget for immediate containment of outbreaks. This requires rapid outbreak investigation, sample collection, laboratory analysis and efficient serotyping, notification, efficient vaccine procurement, vaccination, stakeholder sensitization and quarantine. It has been noticed that the average response time between outbreaks occurring and introduction of vaccines is 7 weeks. Vaccination is largely adhoc and often following reports of outbreaks. The commonly used vaccine is trivalent (serotype O, SAT 1 & SAT 2) largely from Kenya (KEVEVAPI). Vaccine matching is critically lacking.

It has been noticed that FMD reoccurrence is so much along the National borders and in very rare circumstances along the livestock-wildlife interface. Lack of a constant budget, prolonged supply chain management system and delayed FMD reporting and investigation are so much contributory to the establishment of FMD outbreaks.

The government is grappling with emergent strains and outbreaks and requires an emergency action to reverse and contain the trend if Uganda is to be progress well along the Progressive Control Pathway for FMD eradication by 2020. About 3 million head of cattle are sick and it is believed that over 80,000 have so far died or are seriously affected. Most households depend on cattle for food and income and already there is significant pressure. It is on this background that a specific mission is urgently required to undertake the following:

1. Assess the National Veterinary Service System and make the best recommendations for effective FMD control through a Technical Cooperation Project (TCP) Proposal
2. Backstopping the National and District Veterinary Service system and providing skills to manage emerging FMD outbreaks
3. Backstopping the National Animal Disease Diagnostics and Epidemiology Centre (NADDEC) and setting up a sustainable system for rapid outbreak reporting, investigation, diagnosis and serotyping.

4. Developing a regional framework for control of FMD in Eastern Africa region and initiating a TCP.

The specific TOR's will include;

1. **Assess the National Veterinary Service System and make the best recommendations for effective FMD control through a Technical Cooperation Project (TCP) Proposal**

   - **Local Expert**
     - Office visits to MAAIF and Veterinary Institutions
     - Field visits to non-outbreak areas
     - Field visits to FMD outbreak areas
     - Literature review
     - Data Analysis
     - Report Writing and dissemination
     - Proposal Writing (TCP)

2. **Backstopping the National and District Veterinary Service system and providing skills to manage emerging FMD outbreaks**
   - **International/Local Expert**
     - Assist the Government in its efforts to control the present outbreaks of FMD in order to stop any further spread of the disease;
     - Support a well-planned immediate vaccination exercise;
     - Initiate a field investigation to clearly map out the infected zones and the zones that are at high risk;
     - Support control action in the infected and high risk areas;
     - Build up capacity for effective surveillance of the disease;
     - Build up logistical and technical capacities (particularly the establishment of emergency preparedness and diagnostic capacities) to react to any future outbreaks should they occur
     - To train staff in database management as a tool in planning and implementing disease management and control.
     - Train field Veterinarians, Animal Husbandry Officers and Technicians in sample collection and submission

3. **Backstopping the National Animal Disease Diagnostics and Epidemiology Centre (NADDEC) and setting up a sustainable system for rapid outbreak reporting, investigation, diagnosis and serotyping.**

   - **International Expert**
     - Assess the Animal Disease Information Management System and assist in streamlining operations including software set up and management
     - Assessing the FMD diagnostic techniques in place including serology, cell culture, PCR and sequencing. Assisting to improve and streamline techniques to enable rapid serotyping.
     - Assess the reagent, materials, equipment and personnel requirements for efficient FMDV diagnosis
     - Assessing FMDV serotype profiles in Uganda including wildlife
     - Recommending the best strategy for FMDV serotype matching

4. **Developing a regional framework for control of FMD in Eastern Africa region and initiating a TCP.**

International Expert

- Organizing a needs assessment meeting for Regional Laboratory Network for FMD
- Organizing cross-border meetings
- Assessing the requirements and FMD control framework of different countries in Eastern Africa
- Literature review – epidemiology of FMD in Eastern Africa
- Assessing the laboratory capacity for control of FMD in Eastern Africa
- Data Synthesis and proposals for Regional FMD framework
- Submission of the draft Regional FMD control Harmonization Framework to the East African Community (EAC) for consideration and eventual adoption
- Initiating a regional TCP for FMD control

Annex 2: Terms of reference

Terms of Reference
FMD Field Control Expert
The Republic of Uganda

Crisis Management Centre – Animal Health (CMC-AH)
Emergency Centre for Transboundary Animal Diseases (ECTAD)
Under the general guidance of the FAO Chief Veterinary Officer (CVO), the general collaboration of the leader of TCE Team 2 and the direct supervision of the Manager of the Crisis Management Centre-Animal Health (CMC-AH), the technical guidance of the Head of EMPRES, and in close collaboration with the FAO Subregional Office for Eastern Africa (FAOSFE) in Addis Ababa, the ECTAD regional manager and the FAO representative for the Republic of Uganda, the FMD field control expert will be responsible for assisting the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) of the Government of the Republic of Uganda, with the objectives listed below relative to the control of Foot-and-Mouth Disease (FMD).

General objectives

1. Assist the Veterinary Services to assess the current FMD situation in Uganda, including control measures, and suggest enhancements to prevent further spread with a special focus on the Karamoja region;
2. Examine and advise on strategic interventions to be implemented and for future coordination for the control of FMD in Uganda
3. Develop a detailed short and medium term action plan that may assist with resource mobilization at national and regional levels, including necessary funding and possible funding sources, in order to meet the needs identified.

Scope of the work

1. Provide advice on FMD control, especially in relation to surveillance programs and vaccination campaigns;

2. Assist the Government of the Republic of Uganda in updating contingency plans and appropriate control measures for a rapid response to FMD outbreak;

3. Undertake field visits in FMD outbreaks areas;

4. Assess the short and medium term training needs of the Veterinary Services in order to ensure an effective prevention and control activities for the FMD;

5. Contribute in developing a detailed action plan including short and medium term needs of the Veterinary Services in order to ensure a timely effective response to foot and mouth disease and future prevention measures;

6. In collaboration with the other mission team members:
a. contribute to the production and the submission of Situation Reports (SITREPs) to be sent to the Event Coordinator, with copy to the Deputy Event Coordinator, as agreed;

a. assist with the preparation and presentation of preliminary findings and recommendations of the mission to the officials of the Republic of Uganda. The findings and recommendations should be submitted no later than 24h prior to presentation to officials via e-mail to the Event Coordinator, with copy to the Deputy Event Coordinator for clearance by CMC-AH;
b. assist and contribute to the preparation and finalization of the mission report with findings, conclusions and recommendations for follow-up actions. The mission report will be submitted by the

Team Leader via e-mail to the Event Coordinator, with copy to the Deputy Event Coordinator, within two weeks after completion of the mission or as agreed for clearance by the CMC-AH;

4. Perform other related duties as required.

Duty Station Kampala in Uganda, with travel in the country as required and as allowed by FAO security policies
Duration: from 14th -23th July 2014 (excluding travel dates)
Mission Focal Points
 Event Coordinator:
Ludovic Plee:
- Ludovic.Plee@fao.org
- Tel: + 39 06 570 55206

 Deputy Event Coordinator
Jie Wang:
- Jie.Wang@fao.org
- Tel: +39 06 570 53663

Terms of Reference
Veterinary Epidemiologist
The Republic of Uganda

Crisis Management Centre – Animal Health (CMC-AH)
Emergency Centre for Transboundary Animal Diseases (ECTAD)
Under the general guidance of the FAO Chief Veterinary Officer (CVO), the general collaboration of the leader of TCE Team 2 and the direct supervision of the Manager of the Crisis Management Centre-Animal Health (CMC-AH), the technical guidance of the Head of EMPRES, and in close collaboration with the FAO Subregional Office for Eastern Africa (FAOSFE) in Addis Ababa, the ECTAD regional manager and the FAO representative for the Republic of Uganda, the veterinary epidemiologist will be responsible for assisting the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) of the Government of the Republic of Uganda, with the objectives listed below relative to the control of Foot-and-Mouth Disease (FMD).

General objectives

1. Assist the Veterinary Services on assessing the current FMD situation in Uganda, including control measures, and suggest enhancements to prevent further spread with a special focus on the Karamoja region;
2. Examine and advise on strategic interventions to be implemented and for future coordination for the control of FMD in Uganda
3. Develop a detailed short and medium term action plan that will assist with resource mobilization at national and regional levels, including necessary funding and possible funding sources, in order to meet the needs identified.

Scope of the work

1. Contribute to the activities of the CMC-AH mission members in the Republic of Uganda;

2. In association with the Team Leader, meet with veterinary officials in the Republic of Uganda;

3. Contribute to assess the extent of on-going risk of FMD in the Republic of Uganda and problems being encountered in containing the disease;

4. Advise on resources and operational plans in place and, on needs to improve capacities to control outbreaks including materials and equipment, laboratory reagents, vaccines, and training;

5. In collaboration with the other mission team members:
a. contribute to the production and the submission of Situation Reports (SITREPs) to be sent to the Event Coordinator, with copy to the Deputy Event Coordinator, as agreed;

a. assist with the preparation and presentation of preliminary findings and recommendations of the mission to the officials of the Republic of Uganda. The findings and recommendations should be submitted no later than 24h prior to presentation to officials via e-mail to the Event Coordinator, with copy to the Deputy Event Coordinator for clearance by CMC-AH;

b. assist and contribute to the preparation and finalization of the mission report with findings, conclusions and recommendations for follow-up actions. The mission report

will be submitted by the Team Leader via e-mail to the Event Coordinator, with copy to the Deputy Event Coordinator, within two weeks after completion of the mission or as agreed for clearance by the CMC-AH;

6. Perform other related duties as required.

Duty Station Kampala in Uganda, with travel in the country as required and as allowed by FAO security policies
Duration: from 14th -23rd July 2014 (excluding travel dates)
Mission Focal Points
 Event Coordinator:

Ludovic Plee:
- Ludovic.Plee@fao.org
- Tel: + 39 06 570 55206

 Deputy Event Coordinator

Jie Wang:
- Jie.Wang@fao.org
- Tel: +39 06 570 53663

Terms of Reference
Response Veterinarian
Team Leader
The Republic of Uganda

Crisis Management Centre – Animal Health (CMC-AH)
Emergency Centre for Transboundary Animal Diseases (ECTAD)
Under the general guidance of the FAO Chief Veterinary Officer (CVO), the general collaboration of the leader of TCE Team 2 and the direct supervision of the Manager of the Crisis Management Centre-Animal Health (CMC-AH), the technical guidance of the Head of EMPRES, and in close collaboration with the FAO Subregional Office for Eastern Africa (FAOSFE) in Addis Ababa, the ECTAD regional manager and the FAO representative for the Republic of Uganda, the response veterinarian and team leader will be responsible for assisting the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) of the Government of the Republic of Uganda, with the objectives listed below relative to the control of Foot-and-Mouth Disease (FMD).

General objectives

1. Assist the Veterinary Services to assess the current FMD situation in Uganda, including control measures, and suggest enhancements to prevent further spread with a special focus on the Karamoja region;
2. Examine and advise on strategic interventions to be implemented and for future coordination for the control of FMD in Uganda
3. Develop a detailed short and medium term action plan that may assist with resource mobilization at national and regional levels, including necessary funding and possible funding sources, in order to meet the needs identified.

Scope of the work

1. Coordinate and supervise the daily team members' activities during the mission;

2. Review the current measures implemented to control current outbreaks, in close collaboration with the Veterinary Services and other stakeholders involved ;

3. Consider the epidemiological aspects of the current outbreak, including means of spread and risk factors that should be considered in controlling the disease ;

4. Undertake field visits in FMD outbreaks areas;

5. Provide recommendations for recognition and reporting of the disease if needed; and on FMD control, especially in relation to surveillance, monitoring and vaccination measures;

6. In collaboration with the other mission team members:
a. coordinate and contribute to the production and the submission of Situation Reports (SITREPs) to be sent to the Event Coordinator, with copy to the Deputy Event Coordinator, as agreed;

a. coordinate and contribute to the preparation and presentation of preliminary findings and recommendations of the mission to the officials of the Republic of Uganda. The findings and recommendations should be submitted no later than 24h prior to

presentation to officials via e-mail to the Event Coordinator, with copy to the Deputy Event Coordinator for clearance by CMC-AH;

b. coordinate and contribute to the preparation and finalization of the mission report with findings, conclusions and recommendations for follow-up actions. You will submit the mission report via e-mail to the Event Coordinator, with copy to the Deputy Event Coordinator, within two weeks after completion of the mission or as agreed for clearance by the CMC-AH;

7. Perform other related duties as required.

Duty Station Kampala in Uganda, with travel in the country as required and as allowed by FAO security policies
Duration: from 14th -23th July 2014 (excluding travel dates)
Mission Focal Points
 Event Coordinator:

Ludovic Plee:
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- Tel: + 39 06 570 55206

 Deputy Event Coordinator

Jie Wang:
- Jie.Wang@fao.org
- Tel: +39 06 570 53663

Annex 3: In-country itinerary or plan

CMC-AH Mission to Uganda by Dr Peter Roeder, Dr Sam Okuthe and Dr Clarisse Ingabire
13 – 23 July 2014

Draft Programme

Purpose: To assess the current FMD outbreaks in Uganda and associated risks and challenges, and develop an emergency response plan

Date	Time	Activity	Location	Remarks/Responsible
Sunday 13 July 2014		Arrival and Hotel check in	Entebbe - Kampala	
Monday 14 July 2014	09:00-09:30 hrs	Briefing with FAOR	FAO Representation	Mission Team
	10:00-10:30 hrs	Security Briefing at UNDSS	UNDSS office, Kampala	Edward Okori
	10:30-12:30 hrs	Travel to Entebbe		
	12:30-13:00 hrs	Meeting with Chief Veterinary Officer	MAAIF Entebbe	Dr Rose Ademun
	13:00-14:00 hrs	Lunch		
	14:00-15.30 hrs	Visiting NADDEC facilities & Meeting with NADDEC Team	NADDEC , Entebbe	Dr Nantima Noelina
	15:30-17:00 hrs	Travel back to Kampala		
Tuesday 15 July 2014	09:00-09:30 hrs	Meeting with Uganda Wild life Authority (UWA	UWA, Kampala	Dr Patrick Atimnedi
	10:00-10:00 hrs	Meeting with Uganda Veterinary Association (UVA)	UVA, Kampala	Dr Robert Ojala
	11:00-11:30 hrs	Meeting with the Uganda Meat Producers Cooperative Union (UMPCU)	UMPCU, Wandegeya	Dr Joshua Wasiwa
	11:45:-14:45 hrs	Travel to Tororo		
	15:00-16:30 hrs	Meeting with National Livestock Resources Research Institute (NaLIRRI)	Tororo, NaLIRRI	Dr Kirunda H.
	16:30-:18.30 hrs	Travel to Mbale town overnight stay		
Wednesday 16 July 2014 13:00 hrs	08:00-13:00 hrs	Travel to Moroto via Nakapiripirit (with a short stop at Nakapiripirit)		
	Lunch			
	13:30-14:15 hrs	Meeting with District Veterinary Officer and Local Governments	Moroto	Dr Orongo WW
	14:30-15:30 hrs	Karamoja Veterinary Lab. & VsF Belgium	FAO Office: Moroto	Dr Isingoma Emmanuel/Mr. Ojwang/ Dr Stella Kuunse

	16:00 -17hrs	Meeting with livestock owners & CAHWs Representatives: DVO Moroto	Field (Acerer)	DVO Moroto
Thursday 17 July 2014	08:30-10:30 hrs	Travel to Kotido Town		
	11:00-11.45 hrs	Meeting with DVO Kotido	DVOs office	Dr Panvuga PP
	12.00-13:00 hrs	Meeting with KLDF, Mercy Corps & JICAHWA	FAO Kotido office	Patience Akure
	13:45-14:45 hrs	Meeting with CAHWs & LS Traders Representatives	Field	Patience Akure
	15:00-16:00	Travel to Abim, Night over		
Friday 18 July 2014	8.00-17:00 hrs	Travel back to Kampala (Via Karuma) Possibility of visit to Alebtong Dist.		
Saturday 19 July 2014	Weekends			
Sunday 20 July 2014				
Monday 21 July 2014	08:00-13:00 hrs	Meeting with UNDP		Meeting with Country Representative
	13:00-14:00 hrs Lunch			
	14:30-16:00	Meeting with the College of Veterinary Medicine, Animal Resources and Biosecurity (COVAB)	COVAB Makerere University	Dr Frank Mwiine
Tuesday 22 July 2014	10-11:00hrs	Meeting with DfID	DfID	Mr. Howard Stanton. DFID, Kampala, and Hamid Akhter
	11-12:30 hrs	Travel to Entebbe		
	14:30-15:30 hrs	Debriefing with CVO & CLH & E	MAAIF, NADDEC	Dr. Chris Rutebarika, Dr. Anna Rose Ademun Okurut, Dr Chris Ayebazibwe, Dr. Moses DHIKUSOOKA TEFULA
	15:30-16:45 hrs	Travel back to Kampala		
	18:00-21:30	Debriefing the Director of Animal resources	MAAIF	Drs. Nicholas Kauta Chris Ayebazibwe (Senior Veterinary Officer, NADDEC, Entebbe)
Wednesday 23 July 2014	Whole day	Report preparation & Review	FAO Representation	Mission Team
Thursday 24 July 2014	**9:15-9:45hrs**	**Debriefing FAOR**	**FAO Representation**	**Mission Team**
	After 10:00 hrs? Mission Departure			

Technical Contact Person: Dr Edward Okori, Mob: +256 772 957 019/ +256 751 019