Uganda
Evaluation for action
Assessing animal disease surveillance capacities

March 2018
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Contents

Acknowledgements .................................................................................................................... vi
Abbreviations ..............................................................................................................................vii
Background .................................................................................................................................. 1
  General context ....................................................................................................................... 1
  Development of SET .............................................................................................................. 1
  Objective of SET missions ..................................................................................................... 2
Evaluation methodology ............................................................................................................ 3
  The SET toolkit and expected outputs .............................................................................. 3
  Phases of SET missions ....................................................................................................... 4
The SET mission in Uganda ........................................................................................................ 5
  Local situation and livestock production ........................................................................... 5
  Composition of the evaluation team .................................................................................... 7
  Mission summary .................................................................................................................. 7
Evaluation results ...................................................................................................................... 10
  Description of surveillance system .................................................................................... 10
  SET outputs .......................................................................................................................... 13
  Core results .......................................................................................................................... 13
  Performance attributes ........................................................................................................ 14
  JEE indicators ....................................................................................................................... 16
    Zoonotic diseases ............................................................................................................. 17
    Workforce development ................................................................................................. 17
    Real-time surveillance .................................................................................................... 18
Recommendations ..................................................................................................................... 19
  SWOT analysis .................................................................................................................... 19
    Strengths .......................................................................................................................... 19
    Weaknesses ...................................................................................................................... 20
    Opportunities ................................................................................................................... 21
    Threats ............................................................................................................................. 22
  Recommendations and action plan .................................................................................. 22
    Action plan ....................................................................................................................... 24
References .................................................................................................................................. 32
Appendix I – Members of the evaluation team ................................................................. 34
Appendix II – Action plan summary .................................................................................... 35
Appendix III – Detailed JEE findings .................................................................................. 37
Figures

**Figure 1.** Areas visited by 3 teams during SET evaluation mission in Uganda, March 2018. ................................................................. 9

**Figure 2.** Livestock disease reporting system in Uganda (POE = Point of entry; VP = veterinary practitioner), March 2018. ...................... 10

**Figure 3.** Comparative SET graphical outputs for Uganda by category, March 2018 .............................................................................. 14

**Figure 4.** SET outputs for Uganda by performance attribute of the system, March 2018 .............................................................................. 16

**Figure 5.** Feasibility/impact graph of proposed recommendations identified during the SET mission in Uganda, March 2018...................... 23
Tables

Table 1. Categories and areas evaluated by SET................................. 3
Table 2. Cattle numbers in Uganda ....................................................... 5
Table 3. SET outputs for Uganda, March 2018 .................................. 14
Table 4. Performance attributes evaluated by the SET.................... 15
Table 5. JEE scores evaluated by SET for Uganda, March 2018 ....... 16
Table 6. Prioritized recommendations from SET outputs, Uganda, March 2018 ................................................................. 24
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Abbreviations

ANSES  Agence nationale de sécurité sanitaire de l’alimentation, de l’environnement et du travail
AU-IBAR  African Union Inter-African Bureau for Animal Resources
CBPP  Contagious bovine pleuropneumonia
CDC  Centers for Disease Control and Prevention
COVAB  College of Veterinary Medicine Animal Resources and Biosecurity
CVL  Central Veterinary Laboratory
DVO  District Veterinary Officer
ECF  East Coast fever
ECTAD  Emergency Centre for Transboundary Animal Disease
EMA-i  Event Mobile Application
EMT  Epidemiology Mapping Tool
FAO  Food and Agriculture Organisation of the United Nations
FETPV  Field epidemiology training programme for veterinarians
FMD  Foot and mouth disease
FP  Focal point
GHSA  Global Health Security Agenda
HPAI  Highly pathogenic avian influenza
IHR  International Health Regulations
ISAVET  In Service Applied Veterinary Epidemiology Training
ISO  International Organization for Standardization
JEE  Joint External Evaluation
LINA  Laboratory Infrastructure Network Analysis
LITS  Livestock Identification and Tracking System
LMT  Laboratory Mapping Tool
MAAIF  Ministry of Agriculture, Animal Industry, and Fisheries
MoH  Ministry of Health
MoU  Memorandum of understanding
MWE  Ministry of Water and the Environment
NADDEC  National Animal Disease Diagnosis and Epidemiology Centre
NGO  Non-governmental organisation
NTF  National task force
OASIS  Outil d’Analyse des Systèmes de Surveillance
OHSP  One health Strategic Plan
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>OHTWG</td>
<td>One Health Technical Working Group</td>
</tr>
<tr>
<td>QA</td>
<td>Quality assurance</td>
</tr>
<tr>
<td>QMS</td>
<td>Quality management system</td>
</tr>
<tr>
<td>RA</td>
<td>Risk assessment</td>
</tr>
<tr>
<td>RVF</td>
<td>Rift Valley fever</td>
</tr>
<tr>
<td>RVL</td>
<td>Regional veterinary laboratory</td>
</tr>
<tr>
<td>SET</td>
<td>Surveillance Evaluation Tool</td>
</tr>
<tr>
<td>SO3</td>
<td>Strategic Objective 3 of Uganda’s One Health Strategic Plan</td>
</tr>
<tr>
<td>SOP</td>
<td>Standard operating procedure</td>
</tr>
<tr>
<td>SWOT</td>
<td>Strengths weaknesses opportunities threats</td>
</tr>
<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
</tr>
<tr>
<td>UVA</td>
<td>Uganda Veterinary Association</td>
</tr>
<tr>
<td>UVRI</td>
<td>Uganda Virus Research Institute</td>
</tr>
<tr>
<td>UWA</td>
<td>Uganda Wildlife Authority</td>
</tr>
<tr>
<td>VO</td>
<td>Veterinary officer</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organisation</td>
</tr>
<tr>
<td>ZDCO</td>
<td>Zoonotic Disease Coordination Office</td>
</tr>
</tbody>
</table>
Background

General context

In 2014, The United States Agency for International Development (USAID), under the Global Health Security Agenda (GHSA), granted funding to the Food and Agriculture Organization of the United Nations (FAO) to address emerging and re-emerging high impact zoonoses in Africa, Asia and the Near East.

A strong component of GHSA includes building capacity for the surveillance of priority zoonotic diseases in animals. In this context, FAO project countries in West, Central and East Africa requested a tool to:

1. Assess general epidemiological surveillance capacity for animal diseases in countries in Phase 1 of GHSA (GHSA, 2016) and,

2. Evaluate countries’ progress for the surveillance of priority zoonotic diseases under the scope of the World Health Organization’s (WHO) Joint External Evaluation (JEE) (WHO, 2016).

The JEE Tool is used to assess countries’ capacity to prevent, detect, and rapidly respond to public health threats whether they are naturally occurring, deliberate, or accidental. The purpose of the external evaluation is to measure the status and progress in reaching targets defined by the GHSA Action Packages (GHSA, 2014).

Development of SET

In response to the request of project countries, FAO developed the Surveillance Evaluation Tool (SET) to support prevention and control of animal disease threats, including zoonoses. The tool provides veterinary services and ministries with an objective, standardized, comprehensive and systematic evaluation of animal health surveillance systems.

The basis for the development of SET was the surveillance network assessment tool “Outil d’Analyse des Systèmes de Surveillance” (OASIS) developed by the French “Agence Nationale de Sécurité Sanitaire de l’alimentation, de l’environnement et du travail” (ANSES) (Hendrikx, et al., 2011). Additional assessment criteria from FAO’s Epidemiology Mapping Tool (EMT) were also included for the following indicators: cross-sectoral collaborations, epidemiology workforce capacities, outbreak investigation, and risk assessment. Finally, the tool’s structure, scoring system (1 to 4) and graphical outputs were harmonized with FAO’s Laboratory Mapping Tool (LMT).

The SET toolkit also incorporates an evaluation of the following JEE indicators (WHO, 2016), from the perspective of animal health only:

- D.2.1 – Indicators and event-based systems
- D.2.2 – Interoperable, interconnected, electronic real-time reporting system
- D.2.3 – Analysis of surveillance data
- D.2.4 – Syndromic surveillance systems
- **D.4.1** – Availability of human resources to implement International Health Regulations (IHR) core capacity requirements
- **D.4.3** – Workforce strategy
- **P.4.1** – Surveillance systems in place for priority zoonotic diseases/pathogens
- **P.4.2** – Veterinary or animal health workforce
- **P.4.3** – Mechanisms for responding to infectious zoonoses

Two piloting sessions were conducted in Tanzania (12-21 June 2017) and Liberia (4-13 September 2017) to test SET in real-time situations in the East and West African contexts. Following these missions, outcomes were compiled in final reports that were distributed to key-decision makers of the surveillance system in both countries. The toolkit and evaluation methodology were also updated to reflect feedback and lessons learned during each of those piloting missions. Lastly, the final version of SET was distributed in English and French for implementation in the rest of GHSA Phase 1 countries in Africa.

This report details the SET mission conducted in Uganda during March 2018, and highlights outcomes and recommendations for the improvement of the local animal disease surveillance system.

**Objective of SET missions**

The main objective of the mission was to conduct an external evaluation of the animal health surveillance system in Uganda using the SET tool, with specific focus on:

- Institutional organization and legal framework at central, intermediary and field levels
- Timeliness and quality of laboratory analyses
- Surveillance activities and methodology
- Epidemiology workforce capacity and management, and epidemiological training
- Outbreak investigation mechanisms and resources
- Data management and analysis
- Communication and reporting of results to internal, local, multi-sectoral and international stakeholders
- Sensitivity, specificity, representativeness, rapidity, simplicity, flexibility, acceptability, data quality, stability, and utility of the surveillance system

Examining each of these areas in the Ugandan context allowed for the identification of strengths and areas of improvement for the surveillance system. Recommendations on tangible actions were then made in the form of an action plan to reach realistic goals for improvement.
Evaluation methodology

The SET toolkit and expected outputs

SET was developed to provide a comprehensive evaluation of the animal health surveillance system of a country, using a scoring grid composed of 90 indicators also called “subcategories”. These indicators are grouped into 19 “categories”, which constitute seven “areas” (Table 1).

<table>
<thead>
<tr>
<th>Area</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institutional organization</td>
<td>Central institutional organisation</td>
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<tr>
<td></td>
<td>Field institutional organisation</td>
</tr>
<tr>
<td></td>
<td>Intersectoral collaborations</td>
</tr>
<tr>
<td>Laboratory</td>
<td>Operational aspects</td>
</tr>
<tr>
<td></td>
<td>Technical aspects</td>
</tr>
<tr>
<td></td>
<td>Analytical aspects</td>
</tr>
<tr>
<td>Surveillance activities</td>
<td>Objectives and context of surveillance</td>
</tr>
<tr>
<td></td>
<td>Surveillance data collection</td>
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<tr>
<td></td>
<td>Surveillance procedures</td>
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<tr>
<td></td>
<td>Animal health investigations</td>
</tr>
<tr>
<td></td>
<td>Risk assessment</td>
</tr>
<tr>
<td>Epidemiology workforce</td>
<td>Workforce management</td>
</tr>
<tr>
<td></td>
<td>Training</td>
</tr>
<tr>
<td>Data management</td>
<td>Information system</td>
</tr>
<tr>
<td></td>
<td>Data processing and exploiting</td>
</tr>
<tr>
<td>Communications</td>
<td>Internal communication</td>
</tr>
<tr>
<td></td>
<td>External communication</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Internal evaluation</td>
</tr>
<tr>
<td></td>
<td>External evaluation</td>
</tr>
</tbody>
</table>

Using the information gathered during the evaluation mission, a score from 1 to 4 (or “N/A” if the indicator is not applicable) must be assigned to each one of these 90 indicators. Finally, after the scoring session, outputs are generated to identify the strengths and the gaps of the evaluation system, including:

- **Core-results** for the operation of the surveillance system, assigning a score for each category and area evaluated by SET
- **Performance attributes** of the surveillance system (sensitivity, specificity, representativeness, rapidity, flexibility, reliability, stability, acceptability, simplicity and utility). These performance indicators are calculated using weighted coefficients assigned to the scores obtained for each subcategory
- **JEE scores** from an animal health perspective for indicators in the capacities of “Zoonotic Diseases” “Real-time surveillance” and “Workforce Development”
Phases of SET missions

SET evaluation missions consist of four main phases:

1. **Preparation and document review.** Preparation of the mission starts at the latest one month prior to the arrival of the team into the country. During this phase, team members finalise the mission’s program, stakeholders to interview and logistics in the field. The full SET packet is also shared with each evaluator so that they can familiarise themselves with the toolkit, its methodology. A number of documents to support the information provided during the interviews must be shared by the national focal points prior to the mission – these include standard operating procedures (SOPs), protocols and other written documents describing how the surveillance system functions.

2. **Data collection during stakeholder interviews.** Detailed information on the country’s animal surveillance system is elicited through participatory interviews with various stakeholders at each level of the system (national, subnational and field) and in the field (livestock owners, traders, abattoirs, markets, public/private sector and more). A structured questionnaire is available to identify the information required for a complete evaluation. Nevertheless, a key element of the SET methodology is to embrace dialogue with stakeholders and therefore the questionnaire may only be utilized as a guideline during the interview process.

3. **Scoring session.** The evaluation team enters the information gathered during interviews into the SET scoring grid (Excel file), by assigning a score (1-4) to each of the 90 indicators evaluated, along with a justification.

4. **Development of country-specific recommendations.** Based on the scores entered into the SET scoring grid, graphs highlighting the system’s strengths and weaknesses are automatically generated. These outputs become the basis from which recommendations are identified. A final restitution meeting reports the evaluation’s conclusions and recommendations to key decision-makers.
The SET mission in Uganda

Local situation and livestock production

Livestock production systems in Uganda have recently been reviewed by a multidisciplinary team of National Experts under the project African Sustainable Livestock 2050 (FAO, 2018). Cattle are the most important source of meat in Uganda. The greatest concentration of animals is found in the "cattle corridor", extending from South-Western to North-Eastern Uganda. The total number of cattle in Uganda is shown in Table 2. The majority of cattle farmers are smallholders who rear cattle primarily for milk production, most of which is consumed at home, and to some extent beef production. The country annually produces 185-709 metric tonnes of beef. The production sub-systems for beef in Uganda are classified into commercial ranching, pastoral, agro-pastoral and semi-intensive.

<table>
<thead>
<tr>
<th>Region</th>
<th>Cattle number (million)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western</td>
<td>2.4</td>
<td>22.3</td>
</tr>
<tr>
<td>Eastern</td>
<td>2.5</td>
<td>21.8</td>
</tr>
<tr>
<td>Central</td>
<td>2.5</td>
<td>21.7</td>
</tr>
<tr>
<td>Karamoja</td>
<td>2.3</td>
<td>19.8</td>
</tr>
<tr>
<td>Northern</td>
<td>1.6</td>
<td>14.4</td>
</tr>
<tr>
<td>Total</td>
<td>11.4</td>
<td>100</td>
</tr>
</tbody>
</table>

Dairy industry in Uganda

The dairy industry has undergone numerous transformations since the 1960s and has been greatly affected by the historical perspectives of civil strife, high prevalence of livestock diseases, structural adjustment programs, lack of infrastructure and markets, and poor livestock breeds. The period 2000–2018 has witnessed a rapidly growing and vibrant dairy industry in Uganda. The cattle kept by majority of farmers are largely indigenous and mixed but a number of farmers recently crossed their cattle with exotic breeds for higher productivity. The common dairy exotic breeds include: Friesian, Jersey, Guernsey and Ayrshire. Needless to say, the dairy sector is contributing significantly to economic development, employment and improved nutrition especially in the rural communities, Central and Western regions accounting for most of the milk production in the country. The sector faces a lot of challenges including:

- High prevalence of livestock diseases
- High cost of farm inputs
- Poor livestock breeds
- Price fluctuations and unstable livestock markets
- Lack of adequate pastures and water
- Lack of knowledge and skills for better production
Beef production systems

Ranching production systems gather large number of animals in perimeter fencing and paddock structures. Substantial investment is made in animal health management and breeding. Commercial ranching accounts for less than 10 percent of the national herd. This system is mainly found in the south-western and Central Regions. Ranches manage herds that range from 500 to 3,000 heads of a mixture of indigenous, cross, and exotic beef breeds. Exotic and improved breeds are often imported from Kenya, South Africa, and Europe for commercial ranchers. A number of diseases affect cattle production, the most common being: foot-and-mouth disease (FMD), contagious bovine pleuropneumonia (CBPP), lumpy skin disease, helminthosis, tick-borne diseases (theileriosis, anaplasmosis, heartwater and babesiosis) anthrax, rabies, bovine tuberculosis and brucellosis.

Pastoral production systems

Typical pastoral production systems, whereby over 70 percent of food is routinely obtained from livestock, have greatly declined following over 20 years of investment in land and water management systems through a concerted effort of government and farmers. Pastoral systems are free-ranging communal production systems, with cattle moving from place to place in search of pastures and water. This system requires large expanse of land characterized by ethnic groupings and unique challenges. About 90 percent of the national cattle herd is kept under pastoral and mixed smallholder farms. This pastoral system is dominant in the north-eastern sub-region (Kotido, Moroto, Soroti and Kumi) in the southwest sub-region (Ntungamo, Isingiro, Mbarara, Masaka, Sembabule and Rakai Districts), and in central Uganda (Luwero and Kiboga Districts). Pastoralists keep herds of variable size that goes up to 100 heads per person. Herds are largely (98 percent) composed of local breeds (e.g. Ankole and local zebu). Pastoral livestock have limited access to animal health services and are rarely vaccinated unless free vaccination campaigns are arranged by government and other partners. Unlike in the past, there is a growing trend of ‘modern pastoralism’ where cattle can now be moved on trucks to other areas for purposes of fattening and in some cases trade.

Agro-pastoral production systems

In agro-pastoral production systems, cattle graze in private or public pastures and provided with additional feed material, particularly crop by products. Agro-pastoralists produce beef, milk and other products such as blood, hides and skins in addition to cropping activities. Agro-pastoralists are present in the East Central, Mid-Western, Mid-Eastern, Mid Northern and West Nile Regions. The average herd size comprises around 10 heads of cattle. Animals are mainly of indigenous breeds, with some cross breeds, such as between Holstein Friesian and Ankole or East African Zebu. Agro-pastoralists have limited resources to invest for prevention and treatment of animal diseases. Common diseases encountered in this context include East Coast fever (ECF), anaplasmosis, tick burdens, trypanosomiasis, FMD, CBPP and brucellosis.

Semi-intensive production system

In semi-intensive systems farmers keep cattle confined and provide them with fodder, compound feed as well as crop residues. Under this production system, land is a scarce resource and livestock efforts entail careful consideration of the various requirements. The major products include milk and beef. Semi-intensive systems are
not common in Uganda, comprising less than 10 percent of the national herd. Farmers in this system are mainly located in the central and south-western sub-regions. They are usually located in peri-urban areas, which facilitates marketing. The average herd size comprises between 1 and 5 animals for small farms, including also in urban and peri-urban areas, between 5 to 15 animals for medium farms, and more than 20 animals for large farms (Mwebaze et al., 2011). Farmers typically invest in animal health, including disease prevention and treatment. In addition, as animals never mix with other cattle, the prevalence and incidence of diseases are usually low in intensive systems.

Wildlife in Uganda

Uganda has a total of ten National parks and ten game reserves. A range of wild animals including wild pigs, antelopes, hippos, elephants, carnivores and reptiles are widely distributed in various protected and non-protected areas in Uganda.

Composition of the evaluation team

External evaluation team was composed of two FAO epidemiologists from headquarters, an epidemiologist and team leader from FAO’s Emergency Centre for Transboundary Animal Diseases (ECTAD), an ECTAD Uganda national epidemiologist, an ECTAD veterinarian, an ECTAD Uganda laboratory expert, and three staff from the epidemiology unit at the National Animal Disease Diagnosis and Epidemiology Centre (NADDEC) who acted as national focal points during the evaluation (Appendix I).

Mission summary

Identification of the stakeholders and areas to visit reflected the need for a representative assessment of Uganda’s animal disease surveillance system, balanced with logistical limitations of field work.

The mission started on 11 March 2018 when members of the evaluation team met in Entebbe to finalise the agenda and ensure adequate coverage of all identified stakeholders. The following day, a launching meeting was held with key decision-makers of the animal disease surveillance system in Uganda including the representatives from various departments in the Ministry of Agriculture Animal Industry and Fisheries (MAAIF). The Deputy FAO Representative for Uganda Ms. Priya Gujadhur officiated at the launch together with Dr. Rebecca Nuwematsiko (Zoonotic Disease Coordination Office [ZDCO]), Dr. Juliet Sentumbwe, (Director Animal Resources) and Dr. Anna Rose Ademun (Commissioner, Animal Health). Forty four participants from different central and sub-national levels and partner organizations attended the meeting.

The launching presentation highlighted the development of the SET as well as goals for the mission. Interviews with animal disease surveillance actors at the central level immediately followed the launching meeting.

The first one and a half days of interviews allowed the evaluation team to gain a clearer understanding of the structure and function of the system at the central level, as well as the integration between human and animal surveillance systems in place in Uganda at the time of the mission. Interviews at the central level included the following: Uganda Veterinary Association (UVA), ZDCO, Ministry of Health,
The evaluation team then divided into three groups during the field portion of the mission to cover more territory (Fig. 1). Stakeholders selected for interviews consisted of various veterinary offices, laboratories, inland and border ports, national parks, livestock farmers, abattoir workers and local non-governmental organisations (NGO):

- **Team I (Central and Western regions):** Masaka, Kiruhura, Mbarara, Kabarole and Kasese Districts – including Lukaya inland port and Mpondwe border post.
- **Team II (Eastern and North Eastern regions):** Tororo, Busia, Mbale, Soroti, Moroto and Kotido Districts – including the Busia border post.
- **Team III (West Nile and Northern regions):** Lira, Gulu, Arua, Koboko and Masindi Districts – including Elegu and Oraba border posts.

The teams then reconvened in Entebbe on 19 March, for a debriefing of the field portion of the mission. A total of 79 interviews were conducted at the central and field levels to gather the information necessary to enter into the SET toolkit.

Following the data gathering phase, the team met to summarize the information from the interviews and begin identifying recommendations. A restitution meeting occurred on 22 March 2018 where findings of the mission and recommendations were presented to key decision-makers. Following this meeting, the evaluation team met one last time to provide feedback on the mission itself.
Figure 1. Areas visited by 3 teams during SET evaluation mission in Uganda, March 2018 (Source: FAO).
Evaluation results

Description of surveillance system

Central level

MAAIF Headquarters, located in Entebbe, is responsible for regulation of sector activities through the Directorate of Animal Resources, though most services are decentralized to the 122 different districts in the country. NADDEC, the division of Veterinary Diagnostics and Epidemiology, is responsible for animal disease investigation and reporting and forms the backbone of the animal health services at the central level (Fig.2). NADDEC employs five veterinary epidemiologists. The Commissioner of Animal Health is responsible for the Department of Animal Health and directs all the functions of Animal Disease Control.

Figure 2. Livestock disease reporting system in Uganda (POE = Point of entry; VP = veterinary practitioner), March 2018.

Committees and meetings

Since the eradication of rinderpest in 2008, there has been no substantive steering committee present that oversees surveillance activities per se. Internal meetings may be regularly scheduled within NADDEC, but they are not specific to surveillance nor do they involve other departments. During the (highly pathogenic avian influenza) HPAI panzootic of 2000 to 2007, the National Task Force (NTF) had a multi-sectoral zoonotic disease surveillance sub-committee which developed surveillance plans for HPAI and other zoonoses such as Rift Valley fever (RVF). The first outbreak of HPAI in Uganda during January 2017 revived the NTF zoonotic disease sub-committee that updated the 2012 HPAI Preparedness and Response plan and also triggered the creation of many committees to respond to the event, however they
focused predominantly on disease control and surveillance during outbreak response rather than on-going surveillance during peace time. Though current work plans call for quarterly MAAIF meetings, a lack of funding means they do not always occur, despite opinion expressed by district veterinary officers (DVOs) that meetings should be more frequent. Project-based meetings on surveillance have occurred in the past between NADDEC and DVOs on a region by region basis. Frequent but irregular internal meetings are held monthly at the DVO offices, and there is widespread use of WhatsApp and Google Groups to disseminate various types of animal information.

Field level

Surveillance objectives for the system can be summarised as: 1) early detection; 2) determining disease extent; 3) detection in vaccinated animals (specifically FMD) and; 4) demonstrating freedom from disease. However, surveillance at the field level is not always coordinated with these objectives. Staff are present in each district and sub-county to conduct surveillance, with the majority of sub-counties being covered by a veterinarian or para-veterinarian. Regulations advise that there should be one staff member per sub-county, however individuals are often forced to cover multiple sub-counties due to understaffing. Such measures result in a lower density of coverage and obvious disparity between districts. As a result, intermediary units are unable to seek out missing data. Animal health investigation is systematic with veterinarians reliably responding to reports of disease. However timeliness is an issue, with a 2-day response goal often unmet. Active surveillance is almost entirely project-based and limited. Logistical resources are a constant strain on surveillance activities: transport may or may not be available and sampling materials usually not available. Some standardised field data collection forms and SOPs for field level activities exist, adopted from projects supported by the African Union’s Inter-african Bureau for Animal Resources (AU-IBAR), such as the Surveillance for Trade Sensitive Diseases and the Standard Methods and Procedures for Animal Health. Furthermore, monthly reporting forms are standardised by the central level, which actively works to harmonise activities amongst districts. At border points, limited to no resources are available and in some cases, posts may not be manned. Creativity is often used to provide services (e.g. transport of samples), which is commendable but affects reliability and standards. Logistical issues impact training as well since transportation of personnel is not readily available.

Laboratories

Major efforts are in place to strengthen laboratory diagnostic capacity at the National Veterinary Referral Laboratory within NADDEC. In relation to biosafety and biosecurity, while containment is achieved for most of the pathogens handled at biosafety level 2, efforts are underway to complete the biosafety level 3 facility to handle and contain pathogens in higher risk groups. Currently, the centre is faced with budgetary constraints which are further hampered by the fact that there is no specific vote for NADDEC as a division within the Department of Animal Health. Additionally, there is need to review the institutional, policy and regulatory framework to fully anchor the regional and district laboratories within the National Veterinary Laboratories System. Currently, districts run smaller veterinary laboratories for simpler diagnostic analyses (e.g. cytology) often supported by the National Veterinary Lab. An estimated 40-60 district veterinary laboratories currently exist, though many are not fully functional. MAAIF, in collaboration with FAO and other partners, has strengthened/established regional veterinary
laboratories in Moroto, Mbale, Arua, Lira, Gulu, Masaka, Mbarara, and Kiboga. A number of laboratory technologists have been recruited but still require training and budget allocation to undertake their activities. There is currently no ISO 17025 accreditation for the National Veterinary Laboratories within Uganda, however, some laboratories which test animal samples such as the Chemiphar and Uganda National Bureau of Standards Microbiology laboratories are both ISO 17025 accredited. In order to receive certification, improvements are needed in areas such as inter-laboratory trials and standardised interval times for reporting of results. Nevertheless, the laboratory has been performing well on proficiency tests for HPAI, Newcastle Disease, PPR and FMD.

Feedback and supervision

Significant concern was visible at all levels regarding the limited time available for staff to satisfy all requirements of their position. As a result, disease control and surveillance activities may not be prioritized relative to animal production activities. This leads to meetings that may be missed and feedback/auditing of personnel that cannot always be performed. Supervisory visits which do occur are most often for animal movement and quarantine, and do not always relate to data collection and performance of surveillance duties. Reporting rates from the field to central level are approximately 20 percent, with only three quarters of the received monthly reports being filled out correctly. Reports received at the central level are entered into the database manually and the procedure is tedious and inefficient. Unfortunately current feedback methods and regulations do not contribute to improvements in this area.

Wildlife

There are no fenced protected areas in Uganda leading to high chances of livestock mixing with wildlife in different production systems. Government-mandated control of animal diseases is limited to domestic animals. Veterinarians are involved with wildlife only during life-threatening situations or routine capture. In the past, disease conditions affecting domestic animals have been detected in wildlife such as anthrax in hippos in Queen Elizabeth National Park and Zebras in Lake Mburo National Park. FMD, tick-borne diseases, brucellosis and trypanosomosis have also been detected in wild animals in Uganda in the past. Uganda has had a number of Ebola outbreaks and it is believed that wildlife such as bats are the reservoirs. The Uganda Wildlife Authority (UWA)’s primary objective is conservation and they are not fully integrated into the surveillance system. There are central level partnerships and Memoranda of Understanding (MoU) (ex: ZDCO, HPAI protocols) but these are not always operational in the field.

One Health system in Uganda

To effectively control livestock, wildlife and human diseases, it is important to collaborate with other sectors. The country has formed a National One Health Platform with ZDCO as its secretariat to extend inter-sectoral collaboration across MAAIF, Ministry of Health (MoH), Ministry of Water and Environment (MWE), and UWA. Under GHSA, there are a number of USAID-funded activities to improve control of zoonotic diseases, promote national laboratory systems, biosafety and biosecurity, and develop the national workforce. All these activities are coordinated by the National One Health Platform and the One Health National Technical Working Group (OHTWG). The National One Health Strategy has been finalized and was launched in early 2018. In addition, a Veterinary Public Health division exists within
A national policy to recognize One Health at the national level is still required to accelerate implementation of the objectives of One Health. Currently, inter-sectoral coordination is affected by lack of dedicated budget, poor institutional policies, and incoordination.

The role of the private sector in livestock production in Uganda

Close to 1 000 veterinarians (Bachelor of Veterinary Medicine degree holders) are available in the country but largely employed by the government, in counties and centrally. The number of diploma holders (Animal Husbandry Officers) is over 2 000 and most of them are employed across various fields and industries. The total number of private veterinary service professionals is not well-documented nor regulated, thereby leaving room for infiltration with sub-standard and unregulated providers (also known as “quacks”). The Community Animal Health Service providers are generally widespread in the country, but recognition is limited to Karamoja region due to their better coordination with services provided by local government entities. All markets are controlled by private players and data on the services provided is not readily captured.

SET outputs

Three different types of outputs are provided by the evaluation:

1. Core results (Table 3, Fig. 4)

2. Performance attributes (Table 4, Fig. 5)

3. Scores for the following JEE indicators (Table 5):
   - **P.A.1** – Surveillance systems in place for priority zoonotic diseases/pathogens
   - **P.A.2** – Veterinary or animal health workforce
   - **P.A.3** – Mechanisms for responding to infectious zoonoses
   - **D.A.1** – Availability of human resources to implement IHR core capacity requirements
   - **D.A.3** – Workforce strategy

Core results

The core results describe the operation and general status of the surveillance system, assigning a score to subcategories within each area evaluated by the SET (Table 1). All scores are expressed as percentages, based on an ideal situation where scores of 4 are given to all indicators (100 percent).

The strongest individual category scores were “External evaluations” and “Animal health investigation” (66.7 percent), followed by “Objectives and context of surveillance” (58.3 percent). Categories that received the lowest scores included “External communications and resources” (22.2 percent), “Intersectoral collaborations” (25 percent) and “Central institutional organization” (28.6 percent) (Table 3, Fig. 3).
Table 3. SET outputs for Uganda, March 2018

<table>
<thead>
<tr>
<th>Area</th>
<th>Score by area (%)</th>
<th>Category</th>
<th>Score by category (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institutional</td>
<td>36.8</td>
<td>Central institutional organization</td>
<td>28.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Field institutional organization</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intersectoral collaborations</td>
<td>25</td>
</tr>
<tr>
<td>Laboratory</td>
<td>41</td>
<td>Lab - Operational aspects</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lab - Technical aspects</td>
<td>41.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lab - Analytical aspects</td>
<td>33.3</td>
</tr>
<tr>
<td>Surveillance activities</td>
<td>48.4</td>
<td>Objectives and context of surveillance</td>
<td>58.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surveillance data collection</td>
<td>54.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surveillance procedures</td>
<td>33.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Animal health investigation</td>
<td>66.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Risk assessment</td>
<td>33.3</td>
</tr>
<tr>
<td>Epidemiology workforce</td>
<td>44.4</td>
<td>Workforce management</td>
<td>53.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Training</td>
<td>33.3</td>
</tr>
<tr>
<td>Data management</td>
<td>52.4</td>
<td>Information system</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data processing and exploitation</td>
<td>53.3</td>
</tr>
<tr>
<td>Communications</td>
<td>38.1</td>
<td>Internal communication</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>External communication and resources</td>
<td>22.2</td>
</tr>
<tr>
<td>Evaluation</td>
<td>50</td>
<td>Internal evaluation</td>
<td>33.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>External evaluation</td>
<td>66.7</td>
</tr>
</tbody>
</table>

Figure 3. Comparative SET graphical outputs for Uganda by category, March 2018

Performance attributes

Qualitative attributes have been identified and used by several international organisation to evaluate the general performance of a surveillance system (Table 4) (CDC, 2001; CDC, 2004; Health Canada, 2004; WHO 1997). The SET Excel spreadsheet calculates the progress of the surveillance system relative to these performance attributes and generates visual outputs in the form of a spider graph.
Scores for indicators are weighed according to their importance to a specific attribute and outputs are generated as percentages of an ideal situation (scores of 4 on all indicators). An exhaustive list of the relationship between indicators and attributes is available upon request.

Table 4. Performance attributes evaluated by the SET¹

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>The ability of a surveillance system to detect true health events i.e. the ratio of the total number of health events detected by the system over the total number of true health events as determined by an independent and more complete means of ascertainment.</td>
</tr>
<tr>
<td>Specificity</td>
<td>A measure of how infrequently a system detects false positive health events i.e. the number of individuals identified by the system as not being diseased or not having a risk factor, divided by the total number of all persons who do not have the disease or risk factor of interest. Because of the difficulties in ascertaining the total population at risk in surveillance, determination of the number of misclassified cases (false positives) can be used as a measure of the failure of the system to correctly classify health events.</td>
</tr>
<tr>
<td>Representativeness</td>
<td>A surveillance system that is representative accurately observes both the occurrence of a health event over time and the distribution by person/animal and place of that event in the population at any point in time.</td>
</tr>
<tr>
<td>Rapidity/Timeliness</td>
<td>The interval between the occurrence of an adverse health event and (i) the report of the event to the appropriate public health agency, (ii) the identification by that agency of trends or outbreaks, or (iii) the implementation of control measures.</td>
</tr>
<tr>
<td>Flexibility</td>
<td>The ability of the surveillance system to be easily adapted to new reporting needs in response to changes in the nature or the importance of the health event, the population monitored, or the resources available.</td>
</tr>
<tr>
<td>Data quality (reliability)</td>
<td>Reflection of the completeness and validity of the data recorded in the public health surveillance system.</td>
</tr>
<tr>
<td>Stability</td>
<td>The surveillance system’s ability to collect, manage, and provide data properly, and its availability (the ability to be operational when it is needed).</td>
</tr>
<tr>
<td>Acceptability</td>
<td>Assessed by the willingness of persons conducting surveillance and those providing data to generate accurate, consistent and timely data.</td>
</tr>
<tr>
<td>Simplicity</td>
<td>Refers to both its structure and ease of operation. Surveillance systems should be as simple as possible while still meeting their objectives.</td>
</tr>
<tr>
<td>Utility/usefulness</td>
<td>The usefulness of a surveillance system is assessed by whether it leads to prevention or control or a better understanding of health events.</td>
</tr>
</tbody>
</table>

Performance outputs for animal disease surveillance in Uganda reveal some diversion between the strengths and weaknesses, but generally well-rounded scores amongst the majority of attributes (Fig. 4). The “Utility” of the system scored relatively high (57 percent), influenced by the level of basic analysis of data done at NADDEC and the reporting to international organisations. On the other hand, the “Rapidity” of the system scored low (26 percent), which reflects some of the

¹ CDC, 2001; CDC, 2004; Health Canada, 2004; WHO 1997
difficulties seen during the mission such as with transportation logistics and staff whose primary roles are often not dedicated to surveillance.

![Attribute Score Chart]

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexibility</td>
<td>37%</td>
</tr>
<tr>
<td>Utility</td>
<td>26%</td>
</tr>
<tr>
<td>Acceptability</td>
<td>21%</td>
</tr>
<tr>
<td>Data quality</td>
<td>20%</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>18%</td>
</tr>
<tr>
<td>Specificity</td>
<td>15%</td>
</tr>
<tr>
<td>Stability</td>
<td>13%</td>
</tr>
<tr>
<td>Simplicity</td>
<td>12%</td>
</tr>
<tr>
<td>Representativeness</td>
<td>10%</td>
</tr>
<tr>
<td>Rapidity</td>
<td>4%</td>
</tr>
</tbody>
</table>

Figure 4. SET outputs for Uganda by performance attribute of the system, March 2018

JEE indicators

A JEE evaluation was conducted in Uganda in June 2017, and a report is available online (WHO, 2017). It is worth noting that, for the purpose of this evaluation, JEE indicators are assessed strictly from the perspective of animal disease surveillance. This may lead to a difference in scores between this evaluation and previous JEE assessments, where the public health system is also evaluated. Furthermore, WHO published in early 2018 an updated JEE scoring guide (WHO, 2018), which redefines some of the indicators evaluated in this report. For the purpose of this evaluation, the anterior version of 2016 (WHO, 2016) is used to provide a comparative perspective to the previous JEE mission conducted in Uganda in 2017. Scores for the JEE indicators evaluated during the mission in Uganda are shown in Table 5. A detailed description of the mission’s findings related to the JEE indicators evaluated is available in Appendix III.

![Table 5. JEE scores evaluated by SET for Uganda, March 2018]

<table>
<thead>
<tr>
<th>Capacities</th>
<th>Indicators</th>
<th>SET Score</th>
<th>JEE Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zoonotic Diseases</td>
<td>P.A.1 Surveillance systems in place for priority zoonotic diseases/pathogens</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>P.A.2 Veterinary or Animal Health Workforce</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>P.A.3 Mechanisms for responding to zoonoses and potential zoonoses are established and functional</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Workforce Development</td>
<td>D.4.1 Human resources are available to implement IHR core capacity requirements</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>D.4.3 Workforce strategy</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Real-time Surveillance</td>
<td>D.2.1 Indicator and event-based systems</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>D.2.2 Interoperable, interconnected, electronic real-time reporting system</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>D.2.3 Analysis of surveillance data</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>D.2.4 Syndromic surveillance systems</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>
Zoonotic diseases

Indicator P.4.1
The JEE report for Uganda discusses the following: “Whereas an animal health surveillance system exists, the country team reported the system’s attributes perform very poorly. There are substantial challenges with reporting rates, data quality, timeliness and sensitivity” (WHO, 2017). While the SET mission discovered similar findings, the team felt that improvement of transmission of quality data from the field to central level would require only few modifications. Lastly, in Uganda, a surveillance plan for HPAI is in place, and draft plans exist for brucellosis, anthrax and rabies meeting the requirements for a score of 3 based on the 2016 JEE scoring guide (WHO, 2016).

Indicator P.4.2
There was agreement with the JEE with respect to the animal health workforce ratio and distribution being below set standards. Though both reports indicated the existence of training opportunities for veterinarians, their availability to all players in the system is not uniform and should be strengthened. Additionally, though an animal health representative is present within the public health system at the national level, there is not yet equivalent representation at lower levels including the districts.

Indicator P.4.3
Both SET and the JEE recognised the One Health Platform which has helped strengthen joint outbreak response planning, with rapid response teams established at the national level and in several district level offices. However, actual capacity to respond in a rapid and joint manner, especially outside the national level, remains limited (e.g. goal of two-day response times often not met).

Workforce development

Indicator D.4.1
JEE and SET both identified a large number of epidemiologists in the country who are often engaged in multi-disciplinary response teams at national and subnational levels. However room for improvement exists, specifically in terms of raising awareness of the One Health platform to stakeholders outside of MAAIF and MoH. Likewise, the number of vacant veterinary posts in the country also affects this score (only 60 percent filled at sub-national level).

Indicator D.4.3
Both reports note the inadequacy of routine staffing planning in the animal health sector outside of the central level. One Health focal points (FP) are being established at the field level, however equal geographic distribution is not apparent. In particular, the system could benefit from a Field Epidemiology Training Programme for Veterinarians (FETPV) capable of integrating para-veterinarians including frontline training programmes.
Real-time surveillance

Indicator D.2.1.
Uganda completed the CDC zoonotic disease prioritisation workshop in March 2017. Due mainly to a lack of resources, the animal health system utilises a combination of partial event- and indicator-based surveillance systems, with sudden disease events often being reported on a monthly basis to the central level. Improvements to mobile, real-time reporting systems should soon improve event-based surveillance capabilities.

Indicator D.2.2.
The variation between the human and animal health sectors in terms of electronic reporting capacity leads to a difference between SET and JEE scores, with a lack of data analysis and event based mobile applications in the animal health sector representing key areas of weaknes. A pilot project for the implementation of the EMPRES Mobile Application (EMA-i) is underway, however the tool is not available in all regions of the country as of yet.

Indicator D.2.3.
The SET mission found that reporting of disease information to international organisations such as the OIE or AU-IBAR occurred, with some delays. In addition, several risk analysis have been conducted and communicated to stakeholders, albeit in an ad hoc manner. Overall a lack of capacity in the animal health sector for conducting risk analysis was revealed by both assessments, with limited staffing and reliable surveillance data hindering growth.

Indicator D.2.4.
There are multiple syndromic surveillance systems in place in Uganda capable of detecting multiple disease characteristics which could be related to a public health emergency. Unfortunately these systems operate almost exclusively through passive surveillance and suffer from chronic under reporting, with only about 25 percent of district offices submitting monthly reports to the central level. Such underreporting limits the real-life utility of these systems.
Recommendations

SWOT analysis

A strengths-weaknesses-opportunities-threat (SWOT) analysis was conducted to gain a better understanding of the animal disease surveillance system in place in Uganda.

Strengths

Organisational structures in place

Animal health and associated services have long existed in the country with institutional structures spread across different establishments (MAAIF, COVAB, NaLiRRi, UWA, National Animal Genetic Resources Centre and Data Bank, and the Ministry of Local Government).

One Health

ZDCO was established as the One Health secretariat, and involves collaboration between the MoH, UWA, and MAAIF. ZDCO along with the OHTWG comprise the National One Health Platform, which has been operational at the central level since 2016. As of 2018 the One Health Strategic Plan (OHSP) was launched which defines One Health activities through to 2022.

Rapid response

A National Taskforce under the Office of the Prime Minister exists to respond to emergencies/outbreaks/disasters – MAAIF is a member. Rapid response teams exist at national and subnational levels.

NADDEC structure

Collaboration and communication for surveillance-related activities are facilitated by the joint presence of both epidemiology and laboratory units at a same central location at NADDEC.

Laboratory growth

Noting the need for necessary growth and geographic expansion, laboratory space is available in most districts for basic field testing (e.g. microscopy, faecal analysis). Furthermore, new equipment has been distributed to the NADDEC laboratory, regional laboratories, and wildlife laboratories (though currently most are not yet operational). The central NADDEC laboratory has recently invested in a new building which is planned for biosafety level 3 certification.

Workforce qualifications and organisation

Qualified personnel, veterinary agents with basic degrees in veterinary medicine/sciences, are present at all levels, with the central level having many staff holding Masters or PhD degrees. Terms of reference, called duty schedules, are formalized for all agents of the system and evaluated on an annual basis.

Outreach

The country has a fully-fledged department of agricultural extension which was written in 2016, aimed at providing services to farmers, farmers’ groups, and other
actors in agriculture value chains throughout Uganda (MAAIF, 2016). Furthermore, many counties were found to be actively cooperating with farmers through the use of radio talk shows, in many cases utilised to sensitize stakeholders on current operations.

**Weaknesses**

**Institutional oversight**

The absence of steering and technical committees on surveillance, in conjunction with legal structures that require updating to increase authority over surveillance, result in an inability to provide strong guidance from the central level down to the field. Complicating supervision is the fact that the reporting structure is not direct from sub-counties to districts to the central level (e.g. need to go through Chief Administrative Officer).

**Workforce definitions**

Terminology within the veterinary profession remains unclear (“vet” can be interpreted as Bachelor of Veterinary Medicine and/or para-veterinarian in some cases). Some staff are locally categorized as doctors even when they are not, leading to unscrupulous practices.

**Uncoordinated surveillance priorities**

The activities of different organisations involved in surveillance are not always harmonised under one joint plan for surveillance and and thus do not work in unison to detect diseases. Indeed, different organisations have different priorities, for example UWA and conservation, Makerere University and scientific research, and MAAIF on the development of the agricultural sector.

**Livestock identification and tracking system (LITS)**

Though pilot studies have been performed, Uganda does not currently employ a universal LITS, making it difficult to trace individual animals from farm to slaughter. Branding is the most commonly utilised identification system, however there is no subsequent tracing method available (Bett, 2016).

**Sub-national laboratory resources and organisation**

Though many regional and wildlife laboratories are receiving new equipment, currently there are not enough consumables such as reagents or personnel with dedicated laboratory positions; in most cases veterinary officers (VOs) must double as laboratory personnel. Furthermore, there is no policy/plan to coordinate all the laboratories’ work (central, regional, district levels, border posts, institutional), leading to potential duplication of efforts.

**Transportation infrastructure**

Lack of transport and surveillance materials at district level prevents efficient field surveillance activities (e.g. often on fuel or vehicles), including sample submission to labs. Lack of proper transportation at the central level constrains support to districts and planned active surveillance efforts.
Surveillance prioritisation

The roles of most of the staff in the field (DVOs, VOIs, etc.) do not allow for sufficient time to participate in or perform surveillance duties, due to competing priorities (production, vaccination campaigns, etc.). Additionally, there is no surveillance/epidemiology focal person at district levels, and only about 60 percent of sub-county veterinary positions are filled.

Funding

Uganda lacks a dedicated budget line for surveillance activities (NADDEC and districts), leading to general underfunding of surveillance. This results in low motivation of the workforce due to poor remuneration across all levels, and causes staff to look for opportunities outside of their core tasks. When performing surveillance activities such as sampling, field staff are often limited due to a lack of continuous training/sensitization and transport. Lastly, active surveillance in Uganda is either not planned or inconsistent due to an overreliance on project funding.

Data processing and analysis

A variety of issues surrounding the processing of data at all levels are currently limiting the effectiveness of surveillance in Uganda. At the field level, SOPs for surveillance are absent or not standardized, creating inconsistencies in the data collected from field agents. Due to an over-reliance on paper-based reporting from districts to NADDEC, there are also delays in the transmission of field data. Analysis that is performed at NADDEC is also limited, requiring improvements to statistical software, computers and staff capable of performing advanced statistical analyses centrally (risk assessments, GIS mapping, & modelling).

Internal communications

There are few means by which surveillance related information can be distributed throughout the system. There is currently no epidemiology bulletin, and coordination meetings involved DVOs are held irregularly.

Opportunities

Mobile reporting

The EMA-i pilot project was well-received by staff in the field and should therefore be expanded. Mobile telephone network and internet functioning across country, though irregular internet data coverage can limit use of apps for real-time reporting (recommend SMS reporting capabilities).

Hub system

the Hub system (Kiyaga, 2014), used by the MoH to transport laboratory specimens, can be a resource to the animal health sector’s sample transport.

Donor relations

Strong partnerships forged with international organisations and other donors who have a large presence in Uganda. Furthermore, there is growing donor/NGO interest to support animal health activities specifically.

Growing private sector
There exists an active private animal health workforce in all regions of Uganda, fuelled by an increasing demand for services as commercial animal production, animal export markets, and value added components of the industry grow (demand for animals and animal products expected to double in the near future).

**Threats**

**“Quacks”**

Fraudulent veterinary medicine practitioners (or “quacks”) are present in much of the country. Unfortunately the recognition of trained community animal health workers exists only in the Karamoja region, providing no means of differentiating regulated vs unregulated field workers in the rest of Uganda.

**Donor reliance**

Multiple facets of animal disease surveillance, from actual surveillance programmes and activities to equipment and reagents, are procured through external donor funding. Though an important means of obtaining aid, an over reliance on donors is unsustainable.

**Private laboratories**

There are currently no private veterinary laboratories operating in Uganda, apart from those which perform milk sampling.

**Human-livestock-wildlife interface**

Uganda is a densely populated inland country rich in fauna. Interactions between populations, livestock and wildlife have led to frequent diseases outbreaks including zoonotic and transboundary animal diseases.

**Instability in region**

Civil unrest in many neighbouring countries over the past several decades, and most recently in the Democratic Republic of the Congo and South Sudan, have resulted in large numbers of refugees entering the countries. Many refugees bring livestock with them and often live in densely populated camps with limited services available, fuelling the spread of disease. Furthermore, livestock markets in warring countries are often closed, resulting in further movement across the borders as farmers seek to buy or sell animals.

**Recommendations and action plan**

The final product of a SET evaluation is a series of strategies for the improvement of the local animal disease surveillance system. These strategies are presented in the form of an action plan with realistic, measurable, and time-bound recommendations. To design this action plan, the evaluation team discussed and identified major recommendations using the information gathered during interviews.

Each proposed recommendation was then plotted qualitatively on a feasibility/impact chart to help prioritize their implementation within the local context (Fig. 5), where cost includes budgetary constraints as well as logistical ones (e.g. workload). Recommendations that were kept in the final action plan were those that were considered to provide a significant impact for the improvement of the
surveillance system, with the ideal situation being high impact/high feasibility strategies (upper right quadrant in Fig. 5).

To maintain continuity within the report, perceived “benefit” was graded in part based on the ability of the recommendation to improve the SET score, and thus the surveillance capabilities of the country. As such, recommendations focussing on improvements to those areas that received a higher score, such as “Laboratory” systems, may be deemed less likely to improve the surveillance system versus recommendations falling under lower scoring areas, such as “Data management”.

Figure 5. Feasibility/impact graph of proposed recommendations identified during the SET mission in Uganda, March 2018.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Identify and appoint surveillance focal point (FP) at district veterinary offices</td>
</tr>
<tr>
<td>2.</td>
<td>Operationalize the One Health Platform and increase preparedness for zoonotic disease outbreak response</td>
</tr>
<tr>
<td>3.</td>
<td>Ensure quality surveillance reporting by promoting training programs that reinforce the importance of proper surveillance techniques</td>
</tr>
<tr>
<td>4.</td>
<td>Institute steering and technical committees to coordinate surveillance efforts at national and field levels</td>
</tr>
<tr>
<td>5.</td>
<td>Upgrade disease reporting tools to improve timeliness and compliance of information flow from the sub-national to the central level</td>
</tr>
<tr>
<td>6.</td>
<td>Develop a formalized national surveillance plan that brings together active and passive activities</td>
</tr>
<tr>
<td>7.</td>
<td>Increase internal and external stakeholders’ participation in surveillance activities through the development of a surveillance communication plan</td>
</tr>
<tr>
<td>8.</td>
<td>Develop capacity for advanced epidemiological analyses</td>
</tr>
<tr>
<td>9.</td>
<td>Enhance budgetary autonomy of surveillance activities at the central level</td>
</tr>
<tr>
<td>10.</td>
<td>Develop a laboratory strategic plan/network to coordinate laboratory work</td>
</tr>
<tr>
<td>11.</td>
<td>Implement Quality Management System (QMS) and Quality Assurance (QA) in laboratories</td>
</tr>
</tbody>
</table>
Recommendations were then prioritized into short-term (1–2 years), mid-term (3–4 years) and long-term (5–10 years) based on their impact and feasibility (Table 6).

Table 6. Prioritized recommendations from SET outputs, Uganda, March 2018

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Short-term 1-2 years</th>
<th>Mid-term 3-4 years</th>
<th>Long-term 5-10 years</th>
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<tbody>
<tr>
<td><strong>Priority 1</strong></td>
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<td>1. Identify and appoint surveillance focal point (FP) at district veterinary offices</td>
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<td>2. Operationalize the One Health Platform and increase preparedness for zoonotic disease outbreak response</td>
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<td>4. Institute steering and technical committees to coordinate surveillance efforts at national and field levels</td>
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<td>6. Develop a national surveillance plan that brings together active and passive activities</td>
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<tr>
<td>7. Increase internal and external stakeholders’ participation in surveillance activities through the development of a surveillance communication plan</td>
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<td>8. Develop capacity for advanced epidemiological analyses</td>
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<tr>
<td><strong>Priority 3</strong></td>
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**Action plan**

(A summarized version of this action plan is available as a standalone document in Appendix II)
1 Prioritise surveillance at decentralised levels though the identification and appointment of surveillance focal point(s) (FP) within the district veterinary office (Priority 1)

Strategy:

- Identify staff to become primary contact point at district level for the coordination of surveillance activities
- Identify and formalize roles/responsibilities – may include basic data validation, cleaning, and analysis, transmission of information (NADDEC, feedback to stakeholders), inter-district surveillance coordination, communication of surveillance updates to colleagues
- Standardise communication channel between focal points across different districts including feedback system (e.g. organizing annual FP surveillance meetings)

Roles and responsibilities:

1. Identification of FP: District veterinary services
2. Establishment for formal communication protocols for surveillance coordination: NADDEC

Deliverables:

1. Surveillance focal points are identified in districts
2. Terms of Reference captured within position profile
3. Surveillance activities are harmonised between districts

Timeline for completion: Within 1–2 years of SET evaluation

2 Increase MAAIF’s role in operationalizing the One Health approach and increase preparedness for zoonotic disease outbreak response (Priority 1)

Strategy:

- Improve MAAIF’s involvement in ZDCO meetings via:
  - Update staff’s duty schedule to facilitate participation to meetings
  - Update hardware to include teleconference capabilities and allow for remote connections
  - Provide feedback from meetings to MAAIF personnel (e.g. update meetings, newsletter, etc.)
- Expand the animal health aspects of the One Health Platform and Strategic Plan by having MAAIF identify:
  - Prioritised limitations to participating in joint zoonotic disease investigations
  - Resource sharing opportunities
  - Ability for joint reports for One Health outbreaks

Furthermore, MAAIF should take steps to ensure readiness of the animal health sector in achieving specific aspects of the OHSP Strategic Objective 3 (SO3) (One Health Platform, 2018), including:

- Information sharing
• Simulation exercise with all major One Health partners and involvement of field staff in exercises

Roles and responsibilities:
1. Increased participation in One Health meetings: MAAIF in coordination with ZDCO
2. Increased One Health readiness within the animal health sector: MAAIF in coordination with OHTWG

Deliverables:
1. Regular participation of MAAIF to ZDCO meetings
2. Prioritised action plan on improving MAAIF’s OH capabilities to meet SO3

Timeline: Within 1–2 years of SET evaluation

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3 Ensure quality surveillance reporting by promoting training programs that reinforce the importance of proper surveillance techniques (Priority 1)

Strategy:
• Perform a training needs assessment for staff at all levels
  o Estimated gaps in workforce numbers at present and in future
  o Required trainings and timelines that can be distributed to local NGOs and/or partners (Veterinary board for continuous development and veterinary license, Institutions of higher learning e.g. universities)
  o Accuracy of veterinary training on surveillance in school and upon entry to public workforce compared to the needs/objectives of surveillance system
• Identify frequency training is needed (yearly, quarterly, etc.)
• Identify available training programs, such as the In Service Applied Veterinary Epidemiology Training (ISAVET) or FETPV, and provide programs with materials to make training relevant to Ugandan animal health system
• Create SOPs covering all aspects of disease reporting from the moment of identification to conclusion of report: e.g. sampling techniques and shipment, report writing, report submission

Roles and responsibility:
1. Needs assessment: MAAIF
2. SOP creation: NADDEC
3. Supportive role: financial and technical partners

Deliverables:
1. A needs assessment identifies staffing requirements and required trainings for those in public workforce
2. A manual on surveillance SOPs is distributed to staff, which includes: sampling techniques, sample submission, report writing, report submission

Timeline: Within 1–2 years of SET evaluation
Institute steering and technical committees to coordinate surveillance efforts at national and field levels (Priority 2)

Strategy:

- Identify essential partners to surveillance activities
  - Define appointing authority
  - Identify and include major partners of surveillance as needed, e.g.: UVA, veterinarian/para-veterinary associations, representatives from districts, research institutes, UWA and any major stakeholder of surveillance as needed
- Develop goals of committees and draft MoU to formalise roles
- Primary tasks:
  - Steering committee: review current legal framework and identify areas of improvement
  - Technical committee: align and coordinate surveillance activities of partners with objectives of surveillance system

The steering committee should have the ability to evaluate services which may benefit from public-private-partnerships, perform cost analysis, manage available resources from project-based activities, identify/accept/monitor private sector proposals, and clarify private industry activities within the public sector.

Roles and responsibilities:

1. Establish Steering Committee: MAAIF
2. Establish Technical Committee: NADDEC, international organisations, Makerere University

Deliverables:

1. Partners and stakeholders required for committees are identified
2. MoUs are developed to foster coordination of surveillance activities
3. Committees are established and meet regularly

Timeline: Within 3–4 years of SET evaluation

Upgrade disease reporting tools to improve timeliness and compliance of information flow from the sub-national to the central level (Priority 2)

Strategy: Standardise paper-based and electronic reporting options such as:

- Reinstitute and sustainably expand EMA-i project nationally for real-time reporting (standard monthly and event-based reporting)
  - May require SMS reporting capabilities from personal phones
  - Must include sufficient training and incentives (e.g. certificates)
- Review/convert monthly reporting form to spreadsheet format
  - SET team provided a draft spreadsheet upon mission end
- Update and distribute standardized field data collection form
  - Currently there is no available form for field investigation
  - Form should be consistent with EMA-i format in order to promote transition

Roles and responsibilities:
1. Expansion of digital reporting: MAAIF with support from FAO and Directorate of Agricultural Extension Services

2. Updating of current materials: NADDEC

**Deliverables:**

1. Real-time electronic reporting used in all districts

2. Reporting tools updated, standardised and distributed to agents of the surveillance system

**Timeline:** Within 3–4 years of SET evaluation

### 6 Develop a formalized national surveillance plan that brings together active and passive activities (Priority 2)

**Strategy:**

- Identify partners of surveillance, their roles/responsibilities/expectations
  - E.g. wildlife, para-veterinarians, national veterinary board, farmers, inspection division, NGOs, etc.
  - Clarify roles of different agents (e.g. DVOs, VOs, municipality)
  - Incorporates OH platform collaboration with human health in the field when dealing with zoonoses

- Revise objectives of surveillance to ensure that they are: specific, measurable, agreed-upon, realistic, time-bound

- Solidify SOPs for passive disease reporting

- Include disease-specific surveillance protocols for data collection, information feedback and analysis for:
  - Priority/notifiable diseases
  - Active surveillance

- Distribute finalized plan to all agents of surveillance
  - In order to better incorporate their efforts into formal plan (e.g. UWA)

**Roles and responsibilities:**

1. Revision of surveillance objectives: MAAIF

2. Drafting and distribution of plan: MAAIF with support from NADDEC, NALiRRI, and OHTWG

**Deliverable:**

1. A formalised surveillance plan is finalised and made available to all actors of the system

**Timeline:** Within 3–4 years of SET evaluation
Increase internal and external stakeholders’ participation in surveillance activities through the development of a surveillance communication plan (Priority 2)

Strategy:
- Identify communication stakeholders:
  - Internal – Districts, partners of surveillance
  - External – NGOs, farmers, private animal health service providers
- Develop materials adapted to each stakeholder that utilise risk communication to address surveillance objectives
- Promote scientific publication of surveillance activities

Roles and responsibilities:
1. All activities/materials should be implemented by current communications coordinator, with funds allocated specifically to the communications plan, with support from financial and technical partners, professional associations and more
2. Scientific contributions: Universities in conjunction to MAAIF

Deliverables:
1. Formal communications plan finalized
2. Communications outputs are produced and distributed to internal (e.g. Newsletter/bulletin, annual report, budget report, meeting minutes, scientific reports) and external (e.g. posters, brochures) stakeholders

Timeline: Within 3–4 years of SET evaluation

Develop capacity for advanced epidemiological analyses (Priority 3)

Strategy:
- Hire specialized staff – statistician, information technology personnel
- Update current equipment – software, hardware
- Incorporate scientific data originating at universities and research institutions
- Train staff for implementation (e.g. risk assessments, GIS mapping and modelling)

Roles and responsibilities:
1. NADDEC to draft plan on requirements pertaining to equipment, staffing, training
2. Supporting role from universities and financial/technical partners

Deliverables:
1. In-house capability to conduct advanced data analysis that support decision-making, communications with stakeholders and participation in One Health activities

Timeline: Within 3–4 years of SET evaluation
9 Enhance budgetary autonomy of surveillance activities at the central level (Priority 3)

Strategy: Empower NADDEC to manage and efficiently use surveillance-related funds to ensure continuation of activities nationally and in the districts, by:

- Creating/updating a surveillance-specific budget plan that details yearly costs of all activities nationally and in the districts, including:
  - Laboratory activities
  - Fund for emergency preparedness/response
  - Participation to One Health activities (e.g. ZDCO meetings)
  - Communications
  - Sample transport
  - Provision of supplies (e.g. sampling materials)
- Coordinate project-related funds for more efficient use in line with surveillance objectives
  - Pre-identified list of surveillance needs provided to NGOs/international organisations to increase project-related harmonisation

Roles and responsibilities:
1. Creation of detailed budget plan: surveillance system steering committee, with support from DVOs
2. Lobbying for independent surveillance budgetary line: surveillance system steering committee

Deliverables:
1. Surveillance specific funding streams at all levels
2. Coordinated NGO funding to address secondary surveillance needs

Timeline: Within 5–10 years of SET evaluation

10 Develop a nationwide laboratory strategic plan/network to coordinate the work of the different laboratories in the country and increase the effectiveness of current facilities (Priority 3)

Strategy:
- Identify actors involved: e.g. national, regional, district, border i.e. points of entry (PoE), institutional (NaLRRI, UWA, COVAB, Makerere University, private)
- Train actors on the capacity of laboratories at each level to direct samples appropriately
- Clarify staffing structure at regional laboratories and relationships between districts and NADDEC, MAAIF
- Develop a strategic plan to help define International Organization for Standardization (ISO) accreditation of laboratory system
- E.g. the Laboratory Infrastructure Network Analysis (LINA) tool by Sandia National Laboratories can be used to provide support improvement of laboratory networks
Roles and responsibilities:

1. Lead coordination of network and communication to stakeholders of laboratory capabilities: NaLiRRI with help from NADDEC
2. Support of harmonised functioning amongst regional laboratories: FAO, UWA, COVAB

Deliverables:

1. A network of laboratory works efficiently to provide national and local actor with timely information on animal diseases diagnostics
2. Inter-laboratory trials conducted regularly to improve testing quality and networking
3. Workshops initiated at regional level on the running and stocking of small labs

Timeline: Within 5–10 years of SET evaluation

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11. Promote efficient management of laboratory resources by implementing a progressive Quality Management System (QMS) and Quality Assurance (QA) (Priority 3)

Strategy: Starting at the Central Veterinary Laboratory (CVL), work towards ISO 17025 standards by identifying:

- Quality manager to oversee accreditation and establish:
  - Quality Assurance Committee
  - Internal Audit Working Group
  - Equipment and Calibration Working Group
- Activities to establish accredited ISO SOPs on:
  - Specimen management
  - Testing protocols
  - Reporting

After accreditation of the CVL, working groups and committees should expand scope and utilise improved strategic plan (recommendation 10) to fully certify all regional veterinary laboratories (RVL).

Roles and responsibilities:

1. Appointing Quality Manager: NaLiRRI with support from MAAIF
2. Development of updated laboratory SOPs and protocols: QA committee

Deliverables:

1. Update the QMS Documentation Plan with realistic timelines
2. Clearly defined SOPs for all laboratory processes from time of sampling to delivering of results, that allows for a more efficient tracking of capacity deficiencies in human resources and consumables, and leads to ISO accreditation
3. Internal auditing system that allows for monitoring of performance and ongoing improvement (Daniels, 2014)

Timeline: Within 5–10 years of SET evaluation (2-3 years for CVL accreditation, 7-10 years RVL accreditation)
References


Appendix I – Members of the evaluation team

<table>
<thead>
<tr>
<th>Team member</th>
<th>Title and organisation</th>
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<tbody>
<tr>
<td>Ryan Aguanno</td>
<td>Epidemiologist, FAO headquarters, Rome</td>
</tr>
<tr>
<td>Chrisostom Ayebazibwe</td>
<td>Deputy Team Leader and Epidemiologist, ECTAD Uganda</td>
</tr>
<tr>
<td>Gaël Lamielle</td>
<td>Epidemiologist, FAO headquarters, Rome</td>
</tr>
<tr>
<td>Robert Mwebe</td>
<td>Senior Veterinary Officer, Epidemiology, MAAIF</td>
</tr>
<tr>
<td>Deo Ndumu</td>
<td>Principal Veterinary Officer, Epidemiology, Disease Surveillance and Investigations, MAAIF</td>
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<tr>
<td>Susan Ndyanabo</td>
<td>Laboratory Expert, MAAIF</td>
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<tr>
<td>Gerald Nizeyimana</td>
<td>Livestock Program Officer, ECTAD Uganda</td>
</tr>
<tr>
<td>Sam Okuthe</td>
<td>Country Team Leader, ECTAD Uganda</td>
</tr>
<tr>
<td>Gloria Tamale</td>
<td>Senior Veterinary Inspector, MAAIF</td>
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</tbody>
</table>
# Appendix II – Action plan summary

## 1. Prioritise surveillance at decentralised levels through the identification and appointment of surveillance focal point(s) (FP) within the district veterinary office

<table>
<thead>
<tr>
<th>Priority</th>
<th>Strategy</th>
<th>Roles &amp; responsibilities</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Designate focal point(s) and formalize roles/responsibilities</td>
<td><strong>Lead:</strong> District veterinary services (focal point identification), NADDEC (standardizing communication channels) <strong>Support:</strong> Financial and technical partners</td>
<td>Within 1–2 year of SET evaluation</td>
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<tr>
<td>2.</td>
<td>Standardise communication channel between focal points across different districts</td>
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**Output:** Surveillance focal points identified, roles/responsibilities and communication protocols formalized

## 2. Operationalize the OH platform and increase preparedness for zoonotic disease outbreak response

<table>
<thead>
<tr>
<th>Priority</th>
<th>Strategy</th>
<th>Roles &amp; responsibilities</th>
<th>Timeline</th>
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<tbody>
<tr>
<td>1.</td>
<td>Promote MAAIF’s participation in ZDCO meetings and share resources</td>
<td><strong>Lead:</strong> MAAIF <strong>Support:</strong> OHTWG</td>
<td>Within 1–2 year of SET evaluation</td>
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<tr>
<td>2.</td>
<td>Enhance MAAIF’s role in achieving One Health Strategic Plan (e.g. SO3)</td>
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**Output:** Regular participation of MAAIF staff to ZDCO meetings; Animal health activities fully integrated into One Health Strategic Plan;

## 3. Ensure quality surveillance reporting by promoting training programs that reinforce the importance of proper surveillance techniques

<table>
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<tr>
<th>Priority</th>
<th>Strategy</th>
<th>Roles &amp; responsibilities</th>
<th>Timeline</th>
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<tbody>
<tr>
<td>1.</td>
<td>Perform a training needs assessment for staff at all levels</td>
<td><strong>Lead:</strong> MAAIF &amp; NADDEC <strong>Support:</strong> International organisations (FAO, OIE)</td>
<td>Within 1–2 year of SET evaluation</td>
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<td>2.</td>
<td>Identify training types and frequency and develop training SOPs</td>
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**Output:** Training requirements are identified; A manual on surveillance SOPs is distributed to staff

## 4. Institute steering and technical committees to coordinate surveillance efforts at national and field levels

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<th>Strategy</th>
<th>Roles &amp; responsibilities</th>
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<tr>
<td>2.</td>
<td>Identify essential partners</td>
<td><strong>Lead:</strong> MAAIF &amp; NADDEC <strong>Support:</strong> FAO, Makerere University, financial/technical partners</td>
<td>Within 3–4 year of SET evaluation</td>
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<tr>
<td>2.</td>
<td>Formalise roles and responsibilities of committees</td>
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**Output:** Partners and stakeholders required for committees identified; MoUs are developed to foster coordination of surveillance activities; Committees meet regularly

## 5. Upgrade disease reporting tools to improve timeliness and compliance

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<tr>
<td>2.</td>
<td>Expand EMA-i project nationally</td>
<td><strong>Lead:</strong> MAAIF &amp; NADDEC <strong>Support:</strong> FAO, financial/technical partners</td>
<td>Within 3–4 year of SET evaluation</td>
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<td>2.</td>
<td>Update and distribute standardized field data collection form</td>
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**Output:** Real-time electronic reporting used in all districts; Reporting tools updated, standardised and distributed to agents of the surveillance systems

## 6. Develop a national surveillance plan that brings together active and passive activities

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<td>2.</td>
<td>Identify partners of surveillance, their roles/responsibilities/expectations</td>
<td><strong>Lead:</strong> MAAIF &amp; NADDEC <strong>Support:</strong> NAIRRI, OHTWG, financial and technical partners</td>
<td>Within 3–4 year of SET evaluation</td>
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<td>2.</td>
<td>Develop surveillance plan with disease-specific protocols</td>
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**Output:** An itemized list of items essential to surveillance is identified and their cost is made available to donor organisations
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<tr>
<th><strong>7. Increase internal and external stakeholders’ participation in surveillance activities through the development of a surveillance communication plan</strong></th>
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<td><strong>Priority 2</strong></td>
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<td>3.</td>
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<td>4.</td>
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<td><strong>Output:</strong></td>
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<td>2.</td>
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### Appendix III – Detailed JEE findings

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<th>Capacity</th>
<th>Indicator</th>
<th>SET score</th>
<th>Findings</th>
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</table>
| **Zoonotic Diseases** | P.4.1. | 3 | • Identification of priority of zoonotic diseases utilising CDC tool  
• Established focal points within other ministries and international organisations.  
• Zoonotic disease surveillance plans exist nationally for HPAI and regionally for RVF, however anthrax, brucellosis, and rabies plans written as a GHSA requirement remain in draft form.  
• Significant room for improvement related to information sharing and coordination between animal and human health sectors, as well as the implementation of corrective measures following external evaluations. |
| | P.4.2. | 2 | • An animal health worker is stationed within the MoH at national level but not sub-national levels  
MAAIF does offer advanced level training opportunities but more focussed at central level. Some districts may not offer any training. |
| | P.4.3. | 3 | • Joint investigation/response under the One Health Platform occur but not in a systematic manner  
• Multidisciplinary outbreak investigations have taken place for anthrax, RVF, HPAI and Crimean-Congo Haemorrhagic Fever  
• In a large number of situations the MoH responds before the National Task Force for joint investigations is even initialised |
| **Workforce Development** | D.4.1. | 3 | • Rapid response teams exist at the central level and at several newly created districts. Roles and responsibilities within the teams are established but may not be known to new recruits until the next response (inadequate preparation).  
• Focal points for coordination between ministries and international organisations have been identified in most cases. Response plans for several diseases, such as AI and RVF (tentative), are established.  
• Focal points usually meet in an ad hoc manner rather than systematically, this does occur frequently. |
| | D.4.3. | 2 | • At the national level a plan is in place which requests staffing requirements from different units. This does not include sub-county or district levels.  
• ZDCO works under One Health platform with MoU signed. SOPs exist for HPAI, rabies, but not for all zoonosis. Some joint epidemiology trainings at district level available. A national taskforces exists for zoonotic diseases. Some One Health focal points exist in the field. |
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<th>Indicator</th>
<th>SET score</th>
<th>Findings</th>
</tr>
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</table>
|          | D.2.1.    | 3         | - No indicator-based surveillance system in existence or planned.  
- No event-based surveillance system in existence or planned.  
- Reports are submitted to OIE and WHO regularly for the past 5 years or more. |
|          | D.2.2.    | 2         | - Uganda currently developing interoperable, interconnected, electronic reporting systems (e.g. EMA-i), but they are not yet fully functional.  
- Significant delay from arrival of data to its entry into system as only one staff is available for data entry. Reports are all printed before input by entrant. NADDEC is piloting Microsoft Word-based systems to increase efficiency/speed of entry. Responses to disease events may be delayed due to data entry delay. |
| Real-time Surveillance | D.2.3.    | 3         | - Ad hoc animal health risk assessments (RA) exist, including HPAI (multiple strains) in 2009 and 2014, and RVF in 2015. The RA were conducted before outbreaks occurred but are not regular/systematic.  
- RA findings are communicated sporadically to stakeholders (not all stakeholders contacted), however improvements have been made (e.g. increased surveillance) following RA findings.  
- Regular reporting to the African Union’s Interahican Bureau for Animal Resources and OIE though often late as a result of delayed reception of data at NADDEC.  
- Quarterly reporting to regional animal health epidemiology network.  
- Lack of scientific reports published.  
- Major retraining required for statistics as advanced analysis is wanted but not performed. Understaffing also results in constraints to availability of staff. In the field each of data management, analysis, and entry is not performed to a suitable level. |
|          | D.2.4.    | 4         | - Syndromic surveillance systems are in place to detect respiratory, gastrointestinal, haemorragic fever, and neurological disease related to animal health emergencies |