**Draft Proposals for the Re-Vitalisation of the National Animal Disease Surveillance System in Ethiopia**

**October 2012**

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**Table of Contents**

[1. Executive Summary 3](#_Toc336776385)

[2. Introduction 5](#_Toc336776386)

[3. Situation Analysis 6](#_Toc336776387)

[4. Approaches recommended to improve the NADSS. 9](#_Toc336776388)

[4.1 To improve the report submission rate by wereda animal health staff 9](#_Toc336776389)

[4.2 To improve the quality of the reported data 9](#_Toc336776390)

[4.3 Mobilise the private sector 10](#_Toc336776391)

[4.4 Expand the range of data sources: 11](#_Toc336776392)

[4.4.1 Disease-related data 11](#_Toc336776393)

[4.4.2 Socio-economic data 11](#_Toc336776394)

[4.5 Update NADSS methodology 12](#_Toc336776395)

[4.6 Improve the focus of NADSS 13](#_Toc336776396)

[4.6.1‘New’ OIE reporting requirements 13](#_Toc336776397)

[4.6.2 The OIE disease notification procedures 14](#_Toc336776398)

[4.6.2.1 Reporting new occurrences of a disease or a changed epidemiological situation 14](#_Toc336776399)

[4.6.2.2 Routine six-monthly report on the absence or presence of listed diseases 15](#_Toc336776400)

[4.6.2.3 Annual Reports – joint report for OIE / FAO / WHO 16](#_Toc336776401)

[5. Specific recommendations for improving the management of NADSS 16](#_Toc336776402)

[5.1 Assigning total responsibility for implementing the NADSS to NAHDIC 16](#_Toc336776403)

[5.2 Prepare necessary documentation 17](#_Toc336776404)

[5.3 Establish a specialist veterinary epidemiology unit at APHRD 17](#_Toc336776405)

[5.4 Integrate a suitable web-based database management system 17](#_Toc336776406)

[5.5 The future 18](#_Toc336776407)

[6. Proposed Work Plan For Developing NADSS 20](#_Toc336776408)

**List of Figures**

[Figure 1: Current Structure of the Ethiopian NADSS 2](#_Toc333488064)

[Figure 2: Recommended Structure for the Ethiopian NADSS 2](#_Toc333488065)

# Executive Summary

An effective national animal disease surveillance system (NADSS) is a critically important basic tool for a State Veterinary Services. It is a requirement of the OIE, an essential facilitator for international trade in livestock and livestock products, and an essential prerequisite for informed disease management, nationally, regionally and globally.

The Ethiopian NADSS comprises two parallel systems for the collection and reporting of disease occurrence data: (i) the early warning / monthly reporting system of the veterinary field service, and (ii) the active disease investigations, studies and surveys of the veterinary laboratory service.

Performance of the monthly reporting system is poor. Coverage is low and data quality requires much improvement. For example there is a laboratory-confirmed diagnosis for <2% of outbreaks recorded in the national disease database – Dovari. However the outbreak investigation activities of the veterinary laboratory service have been expanded but records in Dovari are not updated with these findings. There is a lack of motivation and leadership amongst the APHRD epidemiologists (a function of the ‘flat management’ structure) and as a result the monthly reporting system is not actively managed.

The active disease surveillance activities of the veterinary laboratory service are improving but, as referenced above, there appears to be insufficient coordination with the APHRD epidemiologists.

The monthly disease reporting system was developed over 20 years ago and, despite several improvements, should now be brought into the 21st century by utilising modern electronic means of transferring and managing data. In this way it could become an effective disease early warning system that should lead to a higher proportion of laboratory confirmations and implementing disease eradication / containment measures in line with national policy.

Proposals for developing a modern ‘fit for purpose’ NADSS include:

* Clearly defining the objectives of the system these will change as knowledge of disease expands, as disease control priorities are modified, and as disease patterns change. The objectives must firstly address the current disease control priorities before all else.
* Assigning responsibility for implementation of the NADSS to an expanded veterinary epidemiology unit based at NAHDIC. This would produce one data collection and reporting system and facilitate laboratory confirmed diagnoses of disease outbreaks.
* Establishing a specialist epidemiology unit within APHRD to analyse NADSS output and report findings to decision makers, to guide and assist NAHDIC to satisfy the information needs of decision makers, to monitor the effectiveness of NADSS, and (in liaison with decision makers) submit required reports to international and regional organisations.
* Establish a web-based database management system to facilitate data and information transfer between all levels (wereda – zone – regional state – federal centre – regional and international bodies) improve liaison within NADSS, enhance data management analysis and reporting, and improve monitoring and management of NADSS,
* Increasing capability of field staff at wereda and kebele levels to collect, document and submit clinical and post mortem specimens for laboratory testing. This will require training and provision of required equipment and consumables.
* Enabling the RVLs to increase participation in disease outbreak investigations, and also in conducting disease studies and surveys to provide priority information required by decision makers.
* Develop a series of standard operating procedures covering all NADSS activities, including conducting disease outbreak investigations, determining if a given disease outbreak requires an investigation by the RVL or can be investigated locally, designing and implemented disease studies and surveys, data quality control, reporting location, etc.
* Ensuring that the design of NADSS enables its ready integration into the proposed privatisation of veterinary services and associated system of sanitary mandates
* Training and motivation of all players
* Piloting use of customised ‘smart’ phones to record and transmit data in real time, and the prompt display of resulting information to decision makers in the form of maps.

It is important to note that introducing new technologies, incorporating a new web-based database management system, and adding more such ‘bells and whistles’ are surveillance tools which cannot alone bring about the required change and for which the following are of basic importance:

Great attention must be given to improving the critically important grassroots level activities of:

* Interacting with livestock producers and other stakeholders
* Collecting accurate data at the herd level
* Promptly responding to reports of disease occurrence (and rapidly imposing control measures)
* Motivating actors at all stages along the data reporting chain

# Introduction

A well implemented National Animal Disease Surveillance System (NADSS) which addresses clear and relevant objectives is a core requirement for an effective, modern State Veterinary Service (SVS). The output of such a NADSS will, if properly managed:

* Inform the design of optimal disease control strategies;
* Enable effective monitoring of the implementation and effects of these strategies;
* Enable monitoring of disease patterns;
* Give science-based justification to requests for additional funding for the SVS;
* Inform and give credence to international veterinary certificates, and;
* Help to fulfil the reporting obligations of the OIE, WTO, FAO and other international and regional bodies.

Transparency is a cornerstone of an OIE member state’s disease reporting obligations and the quality of the information provided to the OIE reflects the degree of knowledge of the animal health situation in the country. This is an important factor in the evaluation of Veterinary Services.

The OIE Terrestrial Animal Health Code includes the following provisions regarding transparency and international trade in livestock:

**Article 5.1.3.** An exporting country should, on request, supply the following to importing countries:

* Information on the animal health situation and national animal health information systems to determine whether that country is free or has free zones of listed diseases, including the regulations and procedures in force to maintain its free status;-
* Regular and prompt information on the occurrence of notifiable diseases;-
* Details of the country's ability to apply measures to control and prevent the relevant listed diseases;

**Article 5.1.4**. Responsibilities in case of an incident related to importation:

In case of appearance of a disease included in the certificate discovered by the exporting/ importing country within the recognised incubation period after export:

* Notification to the importing / exporting country
* To enable appropriate actions to be taken quickly

It is important to note that:

‘**Once a country’s epidemiological data loses credibility, especially for trade, it is difficult and time-consuming to recover’**

OIE, 2009

# Situation Analysis

The Ethiopian NADSS comprises:

* The routine paper-based monthly disease reporting system from Wereda Animal Health Offices (veterinary field service – VFS) to the Federal Animal and Plant Health Regulatory Directorate (APHRD). This is a so called passive system in which wereda animal health staff receive disease reports from Kebele level staff, livestock owners, community-based animal health workers, private veterinary service providers, and other players.

Depending on available resources, the disease suspected, distance from the wereda office etc. these reports may or may not be investigated by wereda staff. Potentially serious reported occurrences will be reported upwards, and the assistance of an investigation team from the nearest regional veterinary laboratory (RVL) may be requested.

Reported data are compiled into a monthly disease occurrence report which is submitted directly to APHRD.

This system focuses on detection, investigation (although this component is generally not included) and reporting of outbreaks of important animal diseases such as foot and mouth disease, peste des petits ruminants, contagious bovine pleuropneumonia, sheep and goat pox, lumpy skin disease, anthrax, contagious caprine pleuropneumonia, African horse sickness, Newcastle disease, hemorrhagic septicaemia, etc. It is the all important early warning component of NADSS

* The active animal disease surveillance activities conducted by the veterinary laboratory system (VLS), namely the National Animal Health Diagnostic and Investigation Centre (NAHDIC) and the 14 Regional Veterinary Laboratories. This active component includes investigations of disease outbreaks plus field studies and surveys.

Thus the Ethiopia NADSS is made up of two parallel data collection systems:

* The passive ‘field’ system that transmits reports from kebele to wereda to APHRD, and;
* The active ‘laboratory’ system that includes the findings of disease outbreak investigations, field surveys and studies from RVL to NAHDIC to APHRD (or directly from NAHDIC to APHRD).

These are summarised in Figure 1.

Some problems of the current NADSS:

* The flow of information from the VLS to the VFS is limited: wereda-level animal health staff interviewed recently in the south (Borana zone, weredas in SNNPR) and north (Amhara NRS) of Ethiopia reported that they often did not receive the results of VLS investigations of disease outbreaks, nor reports of findings of field studies and surveys carried out by the VLS in their wereda. As a result the majority of disease outbreaks included in the disease reports from weredas is ‘suspected’ in that diagnosis of the causal agent is not based on the findings of laboratory examinations but on clinical and/or post-mortem findings generally made by an AHA or AHT (this category of animal health staff is being phased out). This greatly reduces the quality of these reports.
* Wereda animal health services do not undertake systematic investigations of disease outbreaks – including for example collection and submission of clinical / post mortem specimens for laboratory examination, systematic collection of data.
* A further deficiency is the very low annual reporting rate of 40% - this is the proportion of the total expected number of reports (total number of weredas x 12 months) that is actually received. Of those weredas that do participate, the submission rate is ca 50%. Over the period July 2009 to June 2011 not a single report was received from over 120 of the total of 775 (or so) weredas.

The consequence of these problems (which can be corrected) is that insufficient information is available to enable optimal management of disease in Ethiopia’s livestock populations. This was clear during recent field missions to wereda animal health services in the south and north of Ethiopia where unfocused use of vaccinations does effectively control or prevent disease.

It is clear that significant improvements to NADSS are required and it is the purpose of this short presentation to describe one strategy to this end. This process has taken into account the findings of recent field missions to southern and northern Ethiopia, and the views of involved staff, including epidemiologists in the APHRD and the Director of NAHDIC.

A number of veterinary epidemiologists are employed within the APHRD. However these lack leadership (due to the flat management structure?) and there is no real focus upon improving NADSS. Veterinary decision makers require tailored output from NADSS to inform decision making. Specialist staff are required for this purpose - to undertake risk analyses, time series analyses, basic economic analyses etc.

Figure 1: Current Structure of the Ethiopian NADSS

MoA Policy Makers

OIE, AU-IBAR, etc

APHRD – the national end user of surveillance findings

NAHDIC – Referral lab. Diagnostic tests and assays... Develops understanding of disease epidemiology at national level.

Vast majority of reports of disease outbreaks are unconfirmed - based on clinical findings only.

Output: reports, papers, maps, database records.

Contribute to very poor overall performance of NADSS

RVL Diagnostic tests and assays. Develops understanding of disease epidemiology at regional level

Submission rate of only ca 42%.

Regional animal health office – regional end user

Poor feedback of findings– either report is delayed or not received

Output: reports, papers, maps, database records.

Zonal animal health office

If Kebele report includes a suspected outbreak of a target disease then a request for VLS investigation may be made

Wereda- level animal health staff and others

Disease outbreak investigations

Kebele- level animal health staff and others

Field studies of priority diseases including sero-monitoring, active disease searching, participatory disease searching.

Field surveys, including sero-monitoring, active disease searching, participatory disease searching and rapid appraisals.

**The laboratory component of NADSS**

**The field component of NADSS**

# Approaches recommended to improve the NADSS.

## 4.1 To improve the report submission rate by wereda animal health staff

The current very low report submission rate (<40%) is a function of:

* + **Poor understanding of the disease reporting system** by some wereda animal health staff, for example: exactly how to complete the report form; the purpose of the disease reporting system; difficulties in submitted the form – including lack of access to the internet, poor access to the postal service, and lack of funds for postal charges

There is a definite need for awareness creation and training of wereda level staff. It is important that this activity is inclusive and for this purpose training should be conducted at the regional, or better, zonal level, and not for example in Addis Ababa.

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* + **Poor management of the system** – a successful disease reporting system requires constant ‘nursing’ which implies checking all reports received and promptly resolving any problems by contacting the reporting officer. The current procedure of simply rejecting incomplete or faulty forms should cease. Incoming reports should be checked as follows:
    - Promptness of receipt of a completed form.
    - Have all required data elements been entered on the form?
    - Are the reported data coherent and apparently accurate?
    - Have actions been taken to obtain laboratory confirmation of the preliminary diagnosis?
    - Is there continuity of reporting of a given outbreak – details of an outbreak should be reported for all months in which the outbreak remains active?

Regular and focussed feedback down the reporting chain is required to address these issues. Eventually this would be by internet, and in the meantime telephone (most officer-in-charge of wereda animal health services have their own mobile telephone) and post must be used. The point is that feedback must be a consistent and permanent management tool.

Preparation and distribution of regular (say, quarterly) epidemiological newsletters is a valuable tool to help motivate data sources. Further strategies to boost could include publicising the performance of weredas (eg in the newsletter) and recognising the staff of the best-performing weredas eg at the EVA annual conferences.

## 4.2 To improve the quality of the reported data

The major problem with data quality is the lack of laboratory-confirmed diagnoses which is a function of:

* + The low (but admittedly increasing) proportion of reported disease outbreaks for which systematic investigations, including specimen collection and testing, are carried out (by the veterinary laboratory service).
  + The current inability of wereda animal health staff to collect clinical and post mortem specimens for laboratory testing due to lack of equipment, adequate per diem budgets, consumables, training and access to transport (or funds to cover public transport costs).

The following remedial actions for these two problems are recommended:

* Clearly define those outbreaks (a) for which the wereda and kebele staff should collect and submit specimens for laboratory testing, and (b) those which require a visit by a laboratory-based investigation team. It is suggested that the former group should include anthrax, secondary outbreaks. The latter group should include primary outbreaks of TADS.
* Provide wereda-level staff with ongoing training, equipment and other resources[[1]](#footnote-1) to enable them to visit outbreak locations and collect and submit appropriate specimens.
* Provide wereda-level staff with the training, consumables and equipment required to conduct some laboratory tests at the wereda clinic laboratory – for example to fix, stain and examine blood smears for presence of *Bacillus anthracis*.
* Enable RVLs to make field visits to investigate disease outbreaks as required – with the distribution of one LVC-PPD funded vehicle to each RVL transport should not be a problem but adequate budgets for transport and operating expenses, per diems and consumables must be provided.
* A protocol (standard operating procedure) should be developed by epidemiologists and laboratory staff for the conduct of these outbreak investigations, and relevant training and data recording formats developed.
* Ensure that the disease database is promptly updated with the findings of laboratory examinations and epidemiological data collected in the course of outbreak investigations.

Further problems with data quality include: poor definition of populations at risk, poor location reporting, poor continued reporting after the first report of occurrence of an outbreaks, etc. These problems can be corrected through training.

## 4.3 Mobilise the private sector

The private veterinary sector, albeit embryonic, is slowly developing. The rate of growth can be expected to increase after enabling legislation has led to establishment of a Veterinary Statutory Body (plus associated Code of Professional Conduct) and a system of sanitary mandates.

Private animal health workers are legally obliged to report suspected occurrences of notifiable diseases. As they work at the grass roots level animal private veterinary practices are well placed to play an active role in NADSS - initially by complementing and in the medium term progressively replacing the public sector.

As part one component of the system of sanitary mandates, private practice staff would be responsible for investigating disease outbreaks (in defined geographical areas), according to a standard protocol developed by the VLS, and for collecting and submitting specimens for laboratory examination.

Private sector players would charge an agreed fee per outbreak investigation and this would serve as a useful incentive to improving the quality and range of NADSS.

The private sector could also, for agreed fee rates, participate in active disease studies and surveys and awareness campaigns.

Under the direction of public sector animal health officers private practices would assist in controlling outbreaks, for example by promptly carrying out ring vaccinations or other interventions. This improved response to reported disease outbreaks would further promote rapid reporting by livestock owners and other players.

## 4.4 Expand the range of data sources:

### 4.4.1 Disease-related data

The current system concentrates on collecting and reporting data from field-level disease outbreaks and ignores other potential sources of useful data including:

* + **Abattoirs** ante- and post-mortem findings can provide useful epidemiological data, particularly if targeted surveys are carried out – for example prevalence and classification (with laboratory test results as appropriate) of lung lesions. A start should be made at the export and municipal abattoirs in bigger cities, then extended to other municipal abattoirs. Abattoir data could include the source of animals (recorded at reception) and thereby assist in determining the spatial distribution of diseases and thereby begin the process of traceability. Inclusion of these abattoirs in the proposed web-based DBMS would be most valuable.
  + **The Inspection and Quarantine** service can provide useful information of disease status, serological findings, etc for export livestock. The value of these data will be greatly enhanced after an animal ID and traceability system has been established for export stock.
  + **Private veterinary practices** can provide information regarding possible occurrence of ‘new’ disease, trends in frequency of production diseases, from clinical impressions, practice laboratory findings etc. Links should be established with a sample of interested practices which should provide monthly anecdotal reports – these could be triangulated with reports from other sources, for example the VLS.
  + I**ndividuals, and associations** of producers, exporters, processors etc can also provide useful information. Initially this should be anecdotal but greater value would be obtained by included them in the web-based DBMS.
  + ‘**Mining’ of the routine diagnosis data of the VLS**. Once a VLS-wide web-based DBMS has been established it will be possible to analyse these data for trends, emergence of ‘new’ disease syndromes, and so on.
  + **Other laboratories**, for example for residue and quality testing.
  + **Research findings** from the VLS, veterinary and other faculties, EARO and others.
  + **International and regional information** relating to patterns of disease occurrence, new developments in surveillance techniques, vaccines, disease control strategies etc.
  + Surveillance and laboratory findings from **National Veterinary Institute** related, for example to vaccine efficacy testing and testing for export certification purposes.

### 4.4.2 Socio-economic data

Modern animal disease information systems, especially in the context of ‘One Health’, are increasingly incorporating socio-economic data. There are 2 potential benefits from this strategy:

* **Support requests for additional funding**. Socio-economic data can be used to quantify the (i) costs (direct and indirect) of livestock diseases, and (ii) the benefits of disease control /prevention, and enable economic analyses to estimate the potential benefit:cost ratio, net present value, and internal rate of return associated with disease control strategies. This information should be presented to senior policy makers to demonstrate the value of animal health services and justify requests for additional funding.
* **Enable a better understanding of disease patterns.** The behaviour of livestock owners in terms of animal movements, reasons for keeping animals, importance of animals, management of animals, animal marketing strategies, responses to environmental factors, and so on has a major influence on the spread / containment / evolution of disease patterns. Modern surveillance systems increasingly collect and analyse socio-economic data in order to better explain observed disease patterns.

It is recommended that this approach be used in Ethiopia. Socio-economic data can be collected as a component of:

* Outbreak investigations
* Disease history surveys
* Other surveys

The advice and assistance of specialist socio-economists will be required so that objectives can be determined, required data collected in the correct manner, and appropriate methods of data analysis are used.

**Conclusion**: These information sources should be integrated into NADSS.

## 4.5 Update NADSS methodology

The current paper-based data collection and reporting system can be slow and ponderous in transmitting data from the field to decision makers and consequently can lead to delays in responding to important disease events.

Ethiopia is participating in the communications revolution and a nation-wide mobile telephone network is being established. The 3G high speed network is being expanded and EVDO capability is available in larger towns.

The mobile networks can be used to enable rapid reporting of disease outbreaks, and several options are available:

* Immediate reporting by telephone either verbally of SMS, maybe using a prompt sheet to ensure that a standardised range of information, including geographic coordinates[[2]](#footnote-2), is provided. The recipient of the report would manually enter reported data into the disease database.
* Using a digital pen to record observations on special paper form then transmit to central database using mobile telephone (or laptop) – this method is being tested in a number of SADC countries, or reporting via the internet using a reporting template to ensure completeness – including geo-referencing. The completed form serves as a ‘permanent’ record.
* Reporting using a ‘smart’ phone with, for example, Google Android Open Source Data Kit – ODK[[3]](#footnote-3), into which a suitable template has been installed – data are then entered using the ‘phone’s keypad, a pen device, or touchscreen. The completed template is forwarded over the mobile network to databases at regional and central levels. Depending on the availability of a 3G network the template message could be complemented by images of infected animal(s), lesions etc. and geographical coordinates – a telephone with an in-built camera and GPS capability would be used. It should be noted that the LVC-PPD project will pilot the use of smart phones for disease reporting **however** this should be preceded by developing close coordination with Veterinary Services in Kenya where smart phone disease reporting is being used so that valuable lessons can be learned from Kenya’s experience.

Data, having been transmitted using one of the above methods, and received at the central level would be stored in a temporary data storage area. It would then be promptly checked by an epidemiologist for completeness and plausibility, etc before being added to the disease database – if the report content is found lacking then questions would immediately be referred to the reporting officer. The disease record would be flagged and updated as more data comes available. Flagged records would be displayed, by disease, on a map of Ethiopia (or East African region) as colour coded points. The colour coding would differentiate between reports based on clinical / post mortem findings, and those based on laboratory findings. Thus decision makers could very promptly be made aware of current and developing disease patterns, and this information used to inform necessary actions, including:

* Obtaining laboratory test results for outbreaks that lack this important quality components, by:
  + Chasing up laboratory test results
  + Conducting disease outbreak investigations (RVL or NAHDIC), or
  + Ensuring that local wereda/kebele staff collect, document and submit specimens for laboratory testing, as appropriate, or
  + Wereda level staff collect and examine specimens in the wereda clinic laboratory – this would be appropriate for suspected occurrences of anthrax in which case a duplicate blood smear must be submitted to the nearest RVL together with a completed specimen submission form.

This approach would increase the proportion of disease events for which a laboratory-confirmed diagnosis is available and thus greatly increase the quality of NADSS output.

* Promptly implementing appropriate disease containment / control measures
* Informing regional and international organisations as required

Conclusion. If the results of the trial of smart phones are positive then smart phones as a NADSS tool should be progressively extended nation-wide (first need to check mobile network coverage with Ethiopian Telecommunications). At the same time the old paper-based system would be phased out.

## 4.6 Improve the focus of NADSS

The data collected and reported at the field level should be reviewed in light of (i) the requirements of decision makers in APHRD and Regional Governments for planning and monitoring disease occurrence in Ethiopia, and assessing external threats, and (ii) OIE’s reporting obligations which are summarised below:

### 4.6.1‘New’ OIE reporting requirements

Of relevance here are the obligations of member states for reporting disease occurrence to the OIE which were significantly changed in 2005.

The current NADSS monthly disease reporting form was designed in the early 1990’s and addressed the OIE requirements at that time when the most serious infectious diseases of terrestrial animals were divided into 2 groups:

* List A, Transmissible diseases that have the potential for very serious and rapid spread, irrespective of national borders, that are of serious socio-economic or public health consequence and that are of major importance in the international trade of animals and animal products.
* List B, Transmissible diseases that are considered to be of socio-economic and/or public health importance within countries and that are significant in the international trade of animals and animal products.

In 2005 the OIE changed its categorisation of animal diseases and now has a ‘single list of listed diseases’ that comprises some 116 diseases selected on the basis of:

* Capacity for international spread;
* Capacity for significant spread in naїve populations;
* Zoonotic potential; and
* Being an emerging disease.

### 4.6.2 The OIE disease notification procedures

The ‘new’ OIE disease notification obligations:

* Clearly address the concept of infection without necessarily having clinical expression of the disease;
* Take into account changes in epidemiological situations regarding diseases within a country, or zone/compartment;
* Better address the problem of emerging diseases.

The reports required by the OIE are of three types:

* Those reporting new occurrences or changed patterns of occurrences of a listed (or in certain circumstances a non-listed) disease, comprising an immediate notification, followed by regular weekly update reports, and a final report;
* Routine 6-monthly reports giving details on the absence / presence of a listed disease;
* Routine annual reports giving more details of listed and non-listed diseases, veterinary services, etc.

#### 4.6.2.1 Reporting new occurrences of a disease or a changed epidemiological situation

***a. The immediate notification to be submitted within 24 hours***

This is required for the following

* First occurrence of a listed disease and/or infection in a country, a zone or compartment;
* Re-occurrence of a listed disease and/or infection in a country, zone or compartment following a report declared the outbreak ended;
* First occurrence of a new strain of a pathogen of an OIE listed disease in a country, zone or compartment;
* A sudden and unexpected increase in the distribution, incidence, morbidity or mortality of a listed disease prevalent within a country, zone or compartment;
* Evidence of change in the epidemiology of a listed disease (e.g. host range, pathogenicity, strain of causative pathogen), in particular if there is a zoonotic impact;
* An emerging [non listed] disease with significant morbidity or mortality or zoonotic potential.

The immediate notification report should include the following:

* Type of event
* Location
* Animals affected
* Source of infection
* Control measures implemented
* Nature of diagnosis
* Laboratory tests carried out

***b. Weekly follow-up reports***

The weekly follow up reports should include the same types of information as provided in the immediate notification reports, plus details of any new outbreaks.

***c. Final report***

A final report is submitted when:

* The outbreak(s) has ended, or:
* The disease has become enzootically established in which case the disease is included in the routine 6-monthly reports.

#### 4.6.2.2 Routine six-monthly report on the absence or presence of listed diseases

Part 1: Qualitative information

* Disease occurrence;
* control, prophylaxis and prevention measures,
* indication of the type of report to use to notify;
* diseases or infections/infestations present in the country.

Part 2: Quantitative information

Template 1: By lowest level Administrative Division and by Month

Preferred by OIE

Template 2 For the whole Country by Month

Or

Template 3 By lowest level Administrative Division for the six months period

Template 4: For the whole Country for the six months period

For each disease:

* Surveillance and control measures
* If absent, then either never reported, or not reported for this 6-month report
* If present, then number of new outbreaks, total number of outbreaks and animals affected

#### 4.6.2.3 Annual Reports – joint report for OIE / FAO / WHO

1. Information on non OIE-listed diseases
2. Information on Veterinary Services’ staff
3. National Reference Laboratories
4. Livestock census (by lowest level administrative division, etc.)
5. Zoonoses(human cases)
6. Production of vaccines

**Conclusions**

Systematic outbreak investigations, including collection of specimens for laboratory testing, will be required to provide required data on location, source of infection, laboratory-based diagnoses, and types and numbers of animal affected.

Routine reports from the VFS, the results database of the VLS, and the disease occurrence database must all be used to provide data required for the 6-monthly OIE reports and for planning disease control strategies (involving risk analyses etc), monitoring these strategies, and monitoring of disease patterns.

Specific disease surveys and studies will be required to provide additional data required for the OIE 6-monthly reports, and for assessing the economic impact of diseases.

# Specific recommendations for improving the management of NADSS

## 5.1 Assigning total responsibility for implementing the NADSS to NAHDIC

It is strongly recommended that NAHDIC assumes full responsibility for the day-to-day operation of NADSS. The aims and objectives of NADSS, in terms of the types and range of information to be generated by the system would be determined by close consultations between the APHRD and NAHDIC. An epidemiology team headed by a competent team leader and comprising epidemiologists with a range of skills / interests (eg data collection strategies, data management, data analysis, analysing and forecasting disease patterns, etc) will be required and supported by an IT / DBMS specialist.

One or two well experienced and capable veterinary epidemiologists would be retained in APHRD to receive the output of NADSS, submit required disease occurrence reports to OIE, AU-IBAR etc, monitor NADSS’ performance, and conduct risk analyses, economic analyses, etc. and so provide the high quality and timely input required by policy makers.

The major advantages of the proposed re-organisation are:

* Basing NADSS on a single data collection and reporting system will enable greatly improving coordination and facilitate integration of the field and laboratory components – this is required to enable planning and monitoring of disease control strategies, conducting related analyses (eg economic), and monitoring disease patterns, and satisfying OIE reporting obligations (thereby fostering confidence in Ethiopia’s NADSS and promoting trade);
* To take advantage of the expertise and flexibility of NAHDIC that has carried over from its previous status as part of EARO and which can ensure that a dedicated and fully focused team is in place to manage NADSS;
* Utilise the (admittedly informal but strong) links between NAHDIC and the RVLs, and between the RVLs and Wereda animal health offices;
* To increase local responsibility for operation of NADSS in that each RVL will be responsible, under the guidance and supervision of NAHDIC, for implementation of NADSS in its region. The performance of each regional NADSS will be monitored by NAHDIC and corrective action taken as appropriate. Thus RVLs will receive wereda disease reports, ‘nurse’ the disease reporting system, provide training to wereda staff, enable collection and submission of clinical / post mortem specimens by wereda level staff, and as required carry out disease outbreak investigations;
* To take advantage of the relatively well funded facilities at NAHDIC and the RVLs;
* Ensure that field reports of disease outbreaks are promptly updated with laboratory findings thereby greatly improving quality.
* The specialist epidemiologist(s) at the APHRD will provide senior decision makers with the high quality information (based on risk analyses, economic analyses, time series analysis, models etc) required for:
  + Formulation of cost-effective and prioritised disease control / prevention strategies
  + Monitoring the effects of these strategies, and;
  + Justifying requests for (additional) resources.

A summary of the proposed system is depicted in Figure 2.

## 5.2 Prepare necessary documentation

This will include:

* Memoranda of Understanding between (i) the NAHDIC and the APHRD, (ii) NAHDIC and the RVLs, and (iii) APHRD and the Regional Animal health offices.
* NADSS strategy, including data collection methods, data management, required output, staffing levels, funding, and monitoring;
* Terms of reference for each Epidemiology Unit and staff positions at all levels;
* Reporting formats;
* Standard operating procedures for outbreak investigations, specimen collection, data security, data quality control.

## 5.3 Establish a specialist veterinary epidemiology unit at APHRD

This unit will be the contact point for NADSS in the APHRD and shall:

* Advise the NAHDIC on the data and information output required from the NADSS;
* Undertake data compilations, reporting and analyses (risk, time series, economic) required by decision makers and recommend actions accordingly;
* Monitor disease occurrence and the effects of current disease control strategies;
* After clearance from senior decision makers submit reports required by international and regional organisation, including OIE, FAO, AU-IBAR, WHO;
* Together with senior staff of NAHDIC participate in regional and international fora as appropriate.

## 5.4 Integrate a suitable web-based database management system

This would enable easy transfer of data within the system, promote a standardised approach to data collection and reporting, facilitate monitoring of the system, enable rapid data compilation and preliminary analyses and production of reports (tables, charts, maps, and so on), ensure data security and generally promote efficiency.

The following actions will be required

* Identify and appraise available DBMS – these would include (i) the AU-IBAR ARIS2 (ii) FAO’s TADInfo, and (iii) possibly others to be identified. Select the most appropriate;
* In cooperation with the DBMS supplier implement a training program for all users;
* Commission and install the system on a pilot basis to test and tailor as required;
* After successful piloting install the system country-wide
* Select the most suitable on the basis of: ability to deal with Ethiopia-specific data and management structure; compatibility with existing systems; assured and continued support, development and ease of up-grading; and being in the public domain;
* Progressively ensure internet access (using for example EV-DO) to all regional and wereda offices and RVLs;
* Obtain an updated digital map of Ethiopia that includes shape files of all 770+ weredas and integrate this into the selected DBMS;
* Develop a system of location reporting based upon geographical coordinates, for this purpose require either (i) preparation and distribution of lists of coordinates of all villages in Ethiopia and / or (ii) purchase and distribution of GPS devices, at least o all RVL-based disease outbreak investigation teams

## 5.5 The future

As referenced above, the design of the NADSS must take into account the proposed progressive privatisation of delivery of animal health services. This process will mean that the ‘front line’ animal health personnel will largely be in the private sector and this implies (i) targeted training, and (ii) incorporating the local level NADSS activities (detection and reporting of disease outbreaks, collection, documentation and submission of clinical / post mortem specimens) into this new system through the sanitary mandate program.

Figure 2: Recommended Structure for the Ethiopian NADSS

MoA Policy Makers

**Web-based DBMS**

OIE, AU-IBAR, etc

**Web-based DBMS**

NAHDIC – Referral lab. Diagnostic tests and assays. Specialist Veterinary Epidemiology Unit (VEU) implements NADSS and develops understanding of animal disease epidemiology at national level.

**Web-based DBMS**

**NADSS Centre**

APHRD – the national end user of surveillance findings

**Web-based DBMS**

Export & Municipal Abattoirs

**Web-based DBMS**

**Web-based DBMS**

Quarantine and Inspection

**Web-based DBMS**

Output: reports, papers, maps, database records. Monthly summaries, weekly updates

Other data sources, eg research bodies, intl. and regional bodies, private practices, etc

Disease surveys and studies

RVL Diagnostic tests and assays. Specialist VEU develops understanding of animal disease epidemiology at regional level

**Web-based DBMS**

Disease outbreak investigations

Output: reports, papers, maps, database records.

Flow of monthly disease reports and Feedback

Zonal animal health office

Wereda- level animal health staff and others

**Web-based DBMS**

Kebele-level animal health staff and others

Regional animal health office – regional end user

|  |  |  |
| --- | --- | --- |
| Proposed Work Plan for Developing NADSS | | |
| **1 Agreements** |  | **Details** |
|  |  |
|  | 1.1 | In consultation with major stakeholders define and agree upon role and purpose of the national veterinary epidemiology network (VEN) - these must address the information needs of decision makers (the end users of the information generated by NADSS) |
|  | 1.2 | In consultation with major stakeholders prepare road map for the future development of NADSS, including use of mobile devices for immediate reporting of disease outbreaks and the gradual phasing out of the routine months disease reports. |
|  | 1.3 | Prepare series of workplans and budgets to enable implementation of the agreed roadmap. |
|  | 1.4 | Enter into discussion with senior decision makers and negotiate acceptance of the required changes to NADSS and of the associated budget |
|  | 1.5 | Define and agree upon roles and responsibilities of, and linkages between weredas, zones, regions, RVLs, NAHDIC and APHRD for the purpose of the VEN. |
|  | 1.6 | Define and agree upon the overall structure of the VEN that is required to deliver roles and purpose, including the location of each VEU in the organigrams at each level (regional, NAHDIC and APHRD) |
|  | 1.7 | Draw up MoU between APHRD and NAHDIC |
|  | 1.8 | Draw up MoU between APHRD+NAHDIC and NRSAOs |
|  | 1.9 | Draw up MoU between NAHDIC and RVLs |
|  | 1.10 | Between NAHDIC and RVLs |
| **2 Strategic planning** |  |  |
|  | 2.1 | Define and agree upon objectives of, and terms of reference for National Epidemiology Unit (NEU) at the APHRD |
|  | 2.2 | Define and agree upon objectives of, and terms of reference for the Central Epidemiology Unit (CEU) at NAHDIC |
|  | 2.3 | Define and agree upon objectives of, and terms of reference for regional epidemiology units (REU) at NRSAOs or equivalents |
|  | 2.4 | Define and agree upon objectives of, and terms of reference for epidemiology units (RVLEU) at the RVLs |
|  | 2.5 | In consultation with concerned stakeholders identify types of data, and data capture methods for the additional data sources - abattoirs, quarantine and inspection, NVI etc. d ensure that practical methods of updating the database are introduced |
|  | 2.6 | Identify suitable socio-economic group (eg at FAO) and use as source of advice for (i) incorporating the collection of socio-economic data into NADSS, and (ii) managing and analysing the socio-economic data that are collected |
|  | 2.7 | Identify means of monitoring the performance of NADSS, including defining objectively verifiable indicators, methods of data collection and reporting. |
|  |  |  |
| **3. Activities** |  |  |
|  | 3.1 | Communicate with Ethiopian Telecommunications Corporation to determine current and planned coverage of Ethiopia by mobile telephone network, and 3G service. |
|  | 3.2 | Use findings from above to inform use of smart(or simpler mobile telephones) phones to immediately report occurrence of disease outbreaks |
|  | 3.3 | Select web-based DBMS for epidemiology network to link: Weredas to RVLs and NAHDIC; RVLs to NAHDIC; NAHDIC to APHRD, and; NAHDIC to OIE, AU-IBAR, etc |
|  | 3.4 | Identify and train analytical epidemiologists who will form the specialist epidemiology unit at APHRD. |
|  | 3.5 | As required design / re-design required data collection forms |
|  | 3.6 | Enable DBMS to receive and manage data transmitted by mobile telephones and other electronic means |
|  | 3.7 | Procure, commission and progressively establish DBMS throughout epidemiology network using, as possible, 3 G network |
|  | 3.8 | Develop Standard Operating Procedures as appropriate for NADSS activities, including: disease outbreak investigations, and; specimen collection, documentation and submission. |
|  | 3.9 | Itemise required equipment and consumables, identify funding source and procure |
|  | 3.10 | Commencing in target areas (eg Borana) develop capacity (training, equipment, consumables) of wereda- and kebele-level staff to collect, document and submit post-mortem and clinical specimens for laboratory testing. Progressively extend to other areas. |
|  | 3.11 | Conduct training needs assessments of all categories of staff involved in the VEN and use findings to develop training programs |
|  | 3.12 | Pilot new activities (use of smart phones, collection of specimens, outbreak investigations) as part of the LVC-PPD grant. |
|  | 3.13 | Progressively implement training programs |
|  | 3.14 | Through the media, regional and international conferences, MoA website, meeting with importers from GCC and other countries, and so on create awareness of the new capability of Ethiopia's animal disease surveillance system. |
|  | 3.15 | Utilise the output of NADSS to prepare documentary support (for example B:C analyses) for requests for adequate finding of State Veterinary Services. |

1. Per diem and transport budgets are provided by Wereda Administrations via the Wereda Agricultural Office and either these bodies are successfully lobbied to provide additional funds for local outbreak investigations or funds must be provided from other sources – projects, NGOs, regional agencies / bureaux. [↑](#footnote-ref-1)
2. Latitude - longitude in degrees would be the most appropriate [↑](#footnote-ref-2)
3. Technology in this area is rapidly expanded, for example development of Epicollect a software system that enable capture of geo-referenced disease data (plus images) and transmission of this to a database for storage, visualisation on maps, etc. [↑](#footnote-ref-3)