Manual 6

Animal health information systems

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Background

> "Once information has been gathered, something has to be done with it. Three things must happen to information: firstly, it must be ***managed***, controlled and quality-checked; secondly, it must be ***analysed*** in order to become more understandable, and thirdly, it must be ***acted upon***" (FAO, 1999)

The description above is applicable to surveillance and data analysis but is also a cornerstone of animal health information systems which provide a platform in which data on animal health and disease may be collated, managed, analysed and shared. The information generated from these systems is then used as a basis for decision making and action.

Animal health information systems have developed rapidly in recent years to become an essential component of national, regional and global animal health management. Veterinary Services require effective systems for gathering relevant information from the field, processing it into a form which is easy for national policy makers and field staff to use in implementing appropriate actions to achieve effective disease control (Morris, 1991). There is a wide range of animal health information systems in operation at various levels, and some of these systems have been developed in such a way that information can easily be shared between them.

In a world where there is extensive trade in animals and animal products, where both people and animals move long distances in a very short time, rapid detection of diseases (both existing and emerging) and dissemination of this information is needed to ensure that the risk of disease spread can be minimised. The use of web-based animal health information systems now makes it possible to achieve almost instant dissemination of information, while increased communication and connectivity between individuals and organisations throughout the world means that there are now more sources of information on animal diseases than ever before.

This manual aims to provide a brief overview of animal health information systems in general, and to provide information on the use of: national animal health information systems by SEACFMD Member Countries; regional animal health information systems, with particular reference to the ASEAN Regional Animal Health Information System (ARAHIS); and global animal health information systems, including the OIE World Animal Health Information System (WAHIS), FAO EMPRES-i system and ProMED.

There is a list of references at the end of the manual where the reader can access further information relevant to the material covered. All of the references provided are open-access documents. However, it should be noted that some of the animal health information systems are password-protected and are not, therefore, publicly accessible.

What is an animal health information system?

In brief terms, animal health information systems are systems into which information and data relating to animal health and disease are gathered, collated and analysed into meaningful and useful forms which can then be used for disease monitoring, early warning or decision-making purposes.

Animal health information systems operate at different levels (national, regional and global) and their principal purpose, inputs and outputs vary depending upon the level at which they are used. This manual will explore the different animal health information systems which are relevant to the SEACFMD Mem ber Countries and will provide guidance on the responsibility of these countries to provide input to the various systems. The manual will also explore different animal health information systems which are available as a source of information on animal diseases for SEACFMD Member Countries, including links to relevant websites where further information can be accessed.

What is the purpose of an animal health information system?

The following list provides examples of the various purposes of animal health information systems. This list is collated from various sources but is not exhaustive as new uses of these systems are developing continuously with new methods of data collection and analysis, together with technological advances:

- Providing comprehensive information to decision makers on disease, control measures and their consequences
- Sharing of information within countries and between countries (early warning system)
- Monitoring disease occurrence and control programs
- Estimating vaccination coverage

- Providing information required to meet international disease reporting needs (Morris, 1991)
- Supporting declarations of disease status for trading purposes (Morris, 1991)
- Identifying unusual disease events or emerging diseases
- Highlighting shortfalls/gaps in surveillance

An animal health information system is only as good as the data it contains

Where countries have a good surveillance system in place and detailed, accurate data is collected and collated into an animal health information system, useful results can be produced by that system. However, where surveillance and data gathering is weak, the benefits of an animal health information system are limited by the inadequate data it contains.

The reader should refer to Manual 6 for further information on surveillance systems.

Before collecting data, there should already be a clear plan for the purpose of the data collection and how the resulting data will be analysed. This helps to ensure that the data collected is suitable for the purpose for which it is intended. There should also be a standard set of data collected so that the data is consistent even when collected by different individuals. This is often achieved through the use of standard data collection forms, whether this is a disease report form or an outbreak investigation form, to ensure that every report made, or investigation conducted, yields data which can easily be combined and analysed.

National animal health information systems

A national animal health information system was described by Sharma and Baldock (1999) as: the complete system responsible for handling information about the health of livestock in a country. In addition, animal health information systems should also be used to handle information about other domestic animals (such as dogs) as well as wildlife. Today, a national animal health information system generally refers to a computerised system into which data relating to animal health in a country can be entered, collated, and analysed to provide useful outputs in the form of reports, maps, etc.

These outputs present animal health information in such a way that it can be used for reporting on, and making decisions about, surveillance, control programs, etc. Some of these systems also have the capacity to send disease alerts out to specific staff within the Veterinary Services (or other relevant stakeholders) who need to respond to disease events, thus operating as an early warning system.

Animal health information systems should allow for a multi-directional flow of information among national veterinary headquarters, government veterinary diagnostic laboratories and regional veterinary offices (or local disease control headquarters) that will allow the efficient monitoring of the progress of disease eradication or control programmes (Geering *et al.*, 1999).

Figure 1 shows a schematic of typical inputs and outputs of a national animal health information system:

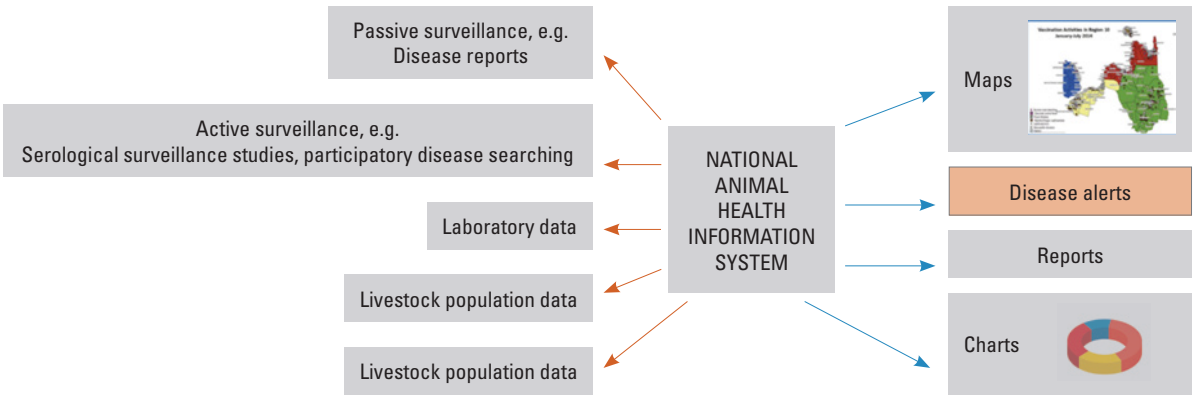

Figure 1: A generic example of a national animal health information system showing possible inputs and outputs

Most of the SEACFMD Member Countries use a national animal health information system, with significant developments being seen in some of these systems in recent years. However, there are still some Member Countries where animal health information systems are not yet used, but could offer significant benefits to animal health management in those countries.

Some SEACFMD Member Countries use systems which have been developed specifically to suit their own needs while others may use more generic systems which can be modified in order to handle information for specific countries. One such system was developed by FAO and is known as Transboundary Animal Disease Information System (TADinfo) (FAO, 2016). TADinfo can be customised to suit a particular country's needs, with geographical information being imported for that particular country, and is designed such that the data can be easily transferred into other regional and global animal health information systems.

Examples of national animal health information systems from SEACFMD Member Countries

Two SEACFMD Member Countries which have updated animal health information systems relatively recently are Indonesia, with iSIKHNAS, and the Philippines with the animal health information system: PHILAHIS. Although other SEACFMD Member Countries also have effective systems in place, these are taken as examples given that they have been recently updated, represent some of the more advanced systems in the region and have extensive details available on the internet which serve as useful references for those interesting in learning about these systems. Information may be found at the following links:

Indonesia: iSIKHNAS – www.wiki.isikhnas.com/w/what_is_iSIKHNAS%3f

Philippines: PHILAHIS –www.philahis.bai.da.gov.ph

In addition to their contributions to data analysis, early warning and decision making at the national level, national animal health information systems also help countries to gather information needed to fulfil reporting responsibilities at regional and global levels.

Minimum requirements of a national animal health information system for PCP-FMD

A document by FAO and the European Commission for the control of Foot-and-Mouth Disease (EuFMD) (date unknown) outlines the minimum features of a national animal health information system which should be in place in order to support a FMD control program at various stages of the progressive control pathway for FMD (PCP-FMD). This pathway is described in more detail in Manual 10. The following is taken from the document of FAO and EuFMD (date unknown):

PCP stage 1: At this stage, the animal health information system should be able to store a minimum of two types of data:

- Serological data (so that records of individual samples can be easily retrieved by age, species, production systems, etc.)
- Virological data (date of collection, species, age, serotype, general structure of population from where samples have been obtained, and details of the production systems)

PCP stage 2: At this stage, the animal health information system should have modules to store two additional sets of data generated by the surveillance program:

- The monitoring system on target groups included in the control program
- Data generated through outbreak investigations. In this regard, the system (in addition to the information indicated in stage 1) should easily generate the following basic additional information for each attended outbreak: a) estimated date of onset b) risk period for virus introduction c) risk period for spread d) end of infectivity

PCP stage 3: At this stage, in addition to the data which the animal health information system should already be able to generate (as indicated for stages one and two), it is essential that the system should be able to provide clear indications whether outbreaks are detected at an early stage. Indicators such as the time frame between the estimated date of introduction and the date of report should be part of the outputs generated by the information system. At this stage it would also be important that the information system is upgraded to include a geographic information system to allow for spatial analysis (see Manual 6).

Regional animal health information systems

The ASEAN regional animal health information system (ARAHIS) was developed under a project funded by AusAID, in partnership with ASEAN Member States as a WAHIS regional core (ASEAN, 2011). This system allows disease information for five nominated priority diseases in ASEAN Member States (of which FMD is one) to be shared privately amongst ASEAN members and for confirmed outbreak reports to be transferred electronically to WAHIS (with permission from the Chief Veterinary Officer (CVO) of the respective country). The information collected on ARAHIS is also available to the system's administrators,

including the OIE Sub-Regional Representative and designated authorised staff members. In this way, ARAHIS provides an early warning system between ASEAN Member States as well as data for analysis and monitoring of disease at the regional level, and also helps ASEAN Member States fulfil their reporting obligations to OIE.

Figure 2 illustrates the interaction between SEACFMD members' national animal health information systems, ARAHIS and WAHIS.

An additional benefit of ARAHIS is that reporting of suspected disease outbreaks in addition to confirmed outbreaks is encouraged, thus providing earlier warning for other ASEAN members compared to WAHIS, through which only confirmed outbreaks are usually reported. In addition, ARAHIS has the facility to monitor disease status and for the collection of timely information on outbreaks from FMD endemic countries. Under the WAHIS system, endemic countries are only required to submit six-monthly reports about outbreaks unless there is any notable change in the pathogen or its epidemiology (see The OIE *Terrestrial Animal Health Code*, article 1.1.3). By collecting immediate or monthly notification of outbreaks even from endemic countries, ARAHIS provides a platform for Member Country focal points and delegates to access the relevant information to support appropriate responses to outbreak reports.

Appointed focal points for FMD in endemic countries are given authority by their CVO to submit reports of suspected and confirmed outbreaks to the ARAHIS system. Once an outbreak has been confirmed, and only with the approval of the CVO, this information can be submitted to WAHIS. In the future, it may be possible for outbreak reports submitted via ARAHIS to WAHIS by FMD endemic countries to be incorporated into the mandatory six-monthly report required from all OIE members regarding the absence or presence of OIE listed diseases (see OIE *Terrestrial Animal Health Code*, article 1.1.3). However, this option is under development by the system's administrators and OIE.

In addition to receiving disease notifications from ARAHIS, ASEAN Member States can also access the data held by ARAHIS in order to conduct analyses and present the data in different formats (mapping, charting, etc.) on a regional scale. If sufficient information is available on this system, it would allow Veterinary Services in one country to make decisions based on incidence and characteristics of disease in other countries.

Global animal health information systems

Finally, there is a global animal health information system operated by the OIE to handle disease notifications and reports from Member Countries. This is known as the World Animal Health Information System (WAHIS). OIE members are obligated to report certain disease events to the OIE through this system (see chapter 1.1 of the OIE *Terrestrial Animal Health Code*).

The OIE *Terrestrial Animal Health Code* (article 1.1.2) requires that Member Countries make available to other

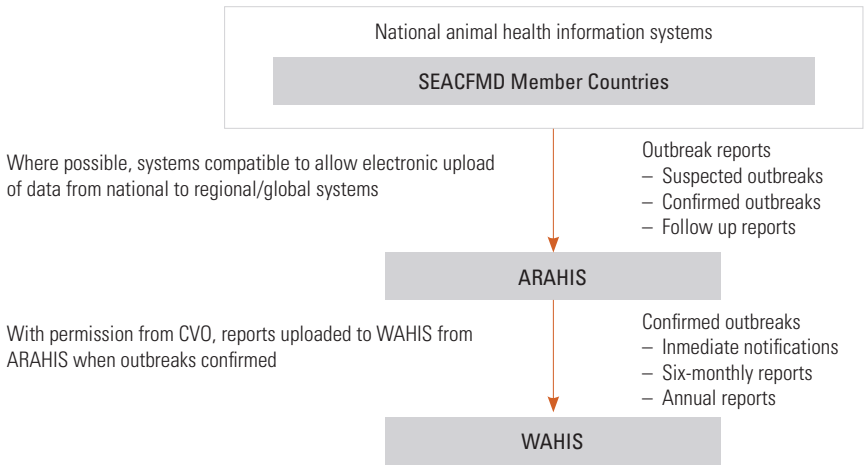

Figure 2: A diagram illustrating the interaction between SEACFMD members' national animal health information systems, ARAHIS and WAHIS.

Member Countries, through the OIE, whatever information is necessary to minimise the spread of important animal diseases, and their aetiological agent, and to assist in achieving better world-wide control of these diseases, infections or infestations. Therefore, OIE Member Countries have an obligation to: report certain events of OIE listed diseases immediately to the OIE (within 24 hours); to provide follow-up weekly reports after an immediate notification, until such time that the outbreak is eradicated or the situation has become stable and the disease is considered endemic; and to provide 6-monthly reports on the status of OIE listed diseases (further details on reporting obligations to the OIE and a list of OIE listed diseases are provided in chapter 1.1 of the OIE Code). Member countries are also requested to submit annual reports concerning other information of significance, including on non OIE-listed diseases, Veterinary Services, laboratories, animal populations, etc.

Just as OIE Member Countries have an obligation to report disease events and occurrence to the OIE, so the OIE is obliged to make immediate reports to Member Countries on emerging diseases and other significant epidemiologic events which are reported to them. The final users of surveillance information provided by OIE Member Countries are, therefore, the countries themselves. The OIE simply provides a means to communicate this information between countries (Cameron, 2012). In addition, the OIE has an obligation to publish and disseminate periodic reports on the global animal disease situation to all Member Countries (OIE, 2015). The OIE disseminates immediate notifications and periodic reports directly to governments of Member Countries and information about disease events is also available on the OIE website, which can be accessed publicly. The system through which information reported through WAHIS can be accessed publicly or by Veterinary Services is through the World Animal Health Information Database (WAHID). This enables users to generate charts, maps, reports, etc. using data reported to the OIE through WAHIS. The OIE also publishes Bulletins and alerts which are released to a mailing list to which anyone can subscribe. The OIE WAHIS Alert application for smartphones which allows subscribers to receive alert messages was launched in 2016.

An additional system to be introduced to WAHIS was outlined during the OIE General Assembly in May, 2015. This is for OIE to establish a platform for the collection and management of partial and complete genomic sequences (including genotype assignment) with the aim to integrate the reporting of genomic sequence data into WAHIS (SEACFMD, 2015). This would allow OIE Member Countries to access virological information for FMD, at the genotype level, which is essential for a more comprehensive understanding of the patterns and spread of FMD. It will also provide additional information on which countries can base decisions such as vaccine strain selection.

Chapter 1.1 of the OIE *Terrestrial Animal Health Code* should be referred to alongside this section of the manual as it provides essential information on the use of WAHIS and Member Country reporting requirements. As described below, the data collected through WAHIS is accessible through WAHIS Interface. Readers should refer to the WAHIS Interface website for further information (http://www.oie.int/wahis_2/public/wahid.php/Wahidhome/Home).

Accessing data from animal health information systems

In addition to the animal health information systems described above, there are other systems which are available to SEACFMD Member Countries where information about animal health and disease status in other countries may be accessed. As described above, the WAHIS system and the ARAHIS system both rely on information provided by the Veterinary Services from each country and therefore may be termed 'official' sources of information. There are other global animal health information systems which collate information both from official sources (governments can make official reports to these animal health information systems) but also from unofficial sources, including: media reports, research findings, public reports, etc.

Using information from a variety of sources enables these systems to capture disease information at a very early stage, sometimes before official reports have been issued, where disease events have not been detected through official surveillance systems or, where events have been detected but have not been officially reported to the international community. These represent useful early warning systems and can also provide comprehensive disease information on a global scale. OIE may follow up with Member Countries to either confirm or refute circulating disease information obtained through unofficial sources. This information, if confirmed, should lead to submission of official notifications to the OIE.

Two notable examples of such global animal health information systems are EMPRES-i, developed by FAO and available for public access, and Pro-MED which is hosted by the International Society for Infectious Diseases and is also publicly available. Short descriptions of these systems are provided below, with references to websites where further information can be accessed. Figure 3 illustrates the sources of information for the animal health information systems

described in this manual (ARAHIS, WAHIS, EMPRES-i and ProMED), and how these systems can be used by SEACFMD Member Countries to gather information.

EMPRES-i

EMPRES-i is a global animal disease information system. It is described by FAO (2014) as a web-based application designed to support Veterinary Services by facilitating the organisation and access to regional and global disease information. It also states that EMPRES-i aims to clarify disease events worldwide which are received from: country or regional project reports, field mission reports, partner non-government organisations (NGOs), cooperating institutions, government ministries of Agriculture and Health, FAO in-country representations and other UN parties, public domains, media and web-based health surveillance systems.

For further information on EMPRES-i, and to access data from this system, use the following link: http://empres-i.fao.org/eipws3g/

ProMED mail

ProMED is a web-based reporting system with the purpose of rapid global dissemination of information about outbreaks of infectious diseases and acute exposure to toxins. It includes information on human health and also on the health of plants and animals intended for human consumption. According to the ProMED website (International Society for Infectious Diseases, 2010), a central purpose of ProMED is to promote communication amongst the international infectious disease community, including: scientists, physicians, epidemiologists, public health professionals and others interested in infectious diseases on a global scale.

ProMED is open to all sources and is therefore free of political constraints (International Society for Infectious Diseases, 2010). Information disseminated by ProMED comes from a number of different sources, including: media reports, official reports, online summaries, local observers and others.

A team of expert human, plant and animal disease moderators screen, review, and investigate reports before posting to the network. These reports are then posted on the ProMED website and are also sent out to subscribers via e-mail. Anyone can subscribe to ProMED and receive these reports. Following posting of reports, there may also be further discussion about the report or further verification of that report which is also posted on the website or sent to subscribers.

For further information on ProMED and to access this service, use the following link: http://www.promedmail.org/

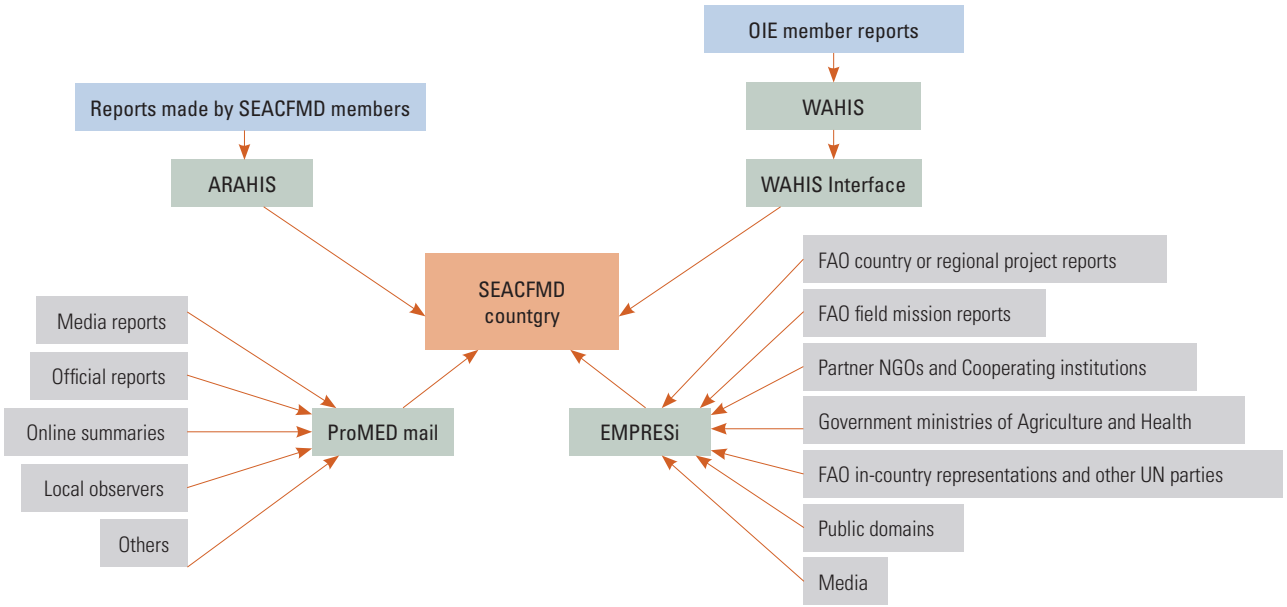

Figure 3: Some of the major animal health information systems which can be used as a source of information for SEACFMD Member Countries. Note: OIE also periodically reviews other sources including FAO reports, WHO reports, ProMed, media reports, scientific journals and follows up Member Countries for confirmation.

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