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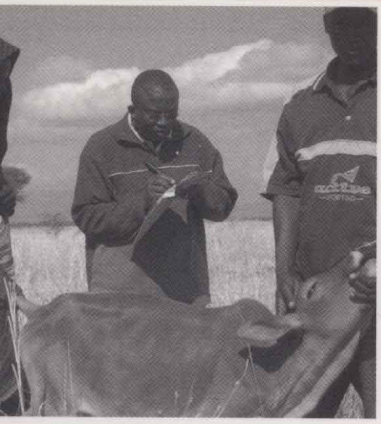

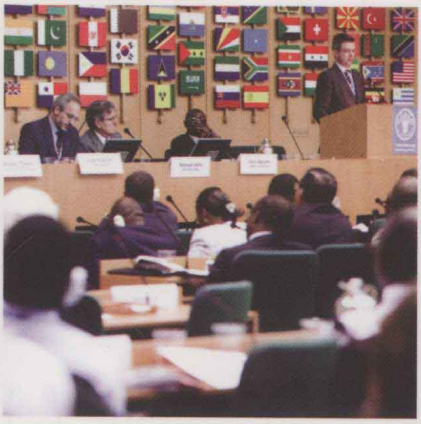

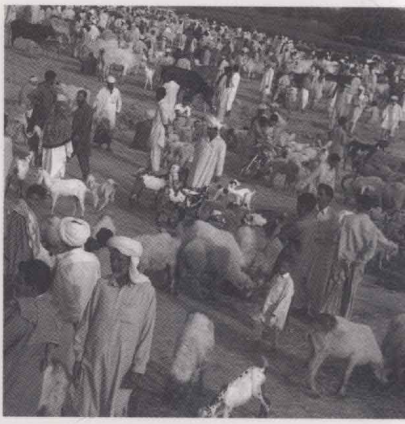

proceedings

CHALLENGES OF ANIMAL HEALTH INFORMATION SYSTEMS AND SURVEILLANCE FOR ANIMAL DISEASES AND ZOONOSES

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Acronyms

AAHL	Australian Animal Health Laboratory
ADMAS-Epitrak	India's own disease information software
AFENET	African Field Epidemiology Network
AHA	Animal Health Australia
AI	Avian Influenza
AIEMU	Avian Influenza Emergency Management Unit
ARIS	Animal Resources Information System
ARIS1	PACE Integrated Database (PID)
AU-IBAR	African Union Interafrican Bureau for Animal Resources
AVS	Additional Veterinary Surgeons - Bangladesh
BioSIRT	Biosecurity Surveillance, Incident, Response and Tracing - Australia
BMELV	Federal Ministry of Food, Agriculture and Consumer Protection - Germany
CADDB	Centralized Animal Disease Database - Germany
CADMS	Centre for Animal Disease Modelling and Surveillance - University of California, Davis, US
CAHW	Community Animal Health Worker
CAP	Caribbean Amblyomma Programme (to eradicate the tropical bont tick)
CaribVET	Caribbean Animal Health Network
CEAH	Centres for Epidemiology and Animal Health - US
CMC-AH	Crisis Management Centre-Animal Health
CRIS	Australian Client Resource Information System
CSF	Classical Swine Fever
CVO	Chief Veterinary Officer
DAH	Department for Animal Health - Viet Nam
DGLS	Government Directorate General of Livestock Services - Indonesia

DIC	Disease Investigation Centres (Type-A regional veterinary laboratories with comprehensive testing capabilities) - Indonesia
DTP	Digital Pen Technology
EAD	Exotic Animal Disease
EDIS	Epidemic Disease Information System - Australia
ELISA	Enzyme-linked Immunosorbent Assay
EMS	(WHO) Event Management System
EMPRES-i	(FAO) Emergency Prevention Systems for Transboundary Animal and Plants Pests and Diseases (Web-based platform developed by EMPRES)
FANR	Food, Agriculture and National Resources Directorate of IADC
FAO	Food and Agriculture Organization of the UN
FLI	Friedrich Loeffler Institute in Wusterhausen - Germany
FMD	Foot-and-mouth disease
GAINS	Global Animal Information System
GAUL	Global Administrative Unit Layers (developed by FAO to address the international community's need for harmonized global information about administrative units)
GIS	Geographic Information System
GLEWS	Global Early Warning System for Major Animal Diseases, including Zoonoses
GOARN	Global Outbreak Alert and Response Network
GPHIN	Global Public Health Intelligence Network
GREP	Global Rinderpest Eradication Programme
HAI	Human-Animal Interface
HPAI	H5N1 Highly Pathogenic Avian Influenza
IAEA	International Atomic Energy Agency
ICD	(WHO) International Classification of Diseases
IEFS	Independent Emergency Field Server - Australia
IHR	(WHO) International Health Regulations
ILRI	International Livestock Research Institute

INFOSAN	(WHO/FAO) International Food Safety Authorities Network
IOM	Institute of Medicine
ISID	International Society for Infectious Diseases
KIDS	Key Indicator data system (built-in mapping unction for EMPRES – developed by FAO Computer Service)
LDCC	Local Disease Control centres
LIMS	Laboratory Information Management System
LIMS	Livestock Information Management System
LTC	Livestock Technical Committee
MARD	Ministry of Agriculture and Rural Development - Viet Nam
MOH	Ministry of Health - Viet Nam
NACA	Network of Aquaculture Centres in Asia Pacific
NADRES	National Animal Disease Referral Expert System - India
NAHIS	National Animal Health Information System - Australia
NAHLN	National Animal Health Laboratory Network - US
NAHRS	National Animal Health Reporting System (for US reportable diseases plus comprehensive reporting system for OIE)
NAHSS	National Animal Health Surveillance System - US
NAMPinfo	National Arbovirus Monitoring Programme - Australia
NCVD	National Centre for Veterinary Diagnostics - Viet Nam
NFP	National Focus Points
NGO	Non Governmental Organization
NLRAD	National List of Reportable Animal Diseases (draft list held by CEAH of notifiable or monitored diseases) - US
NVAP	National Veterinary Accreditation Program – US
OIE	World Organization for Animal Health
OIRSA	Organismo Internacional Regional de Sanidad Agropecuaria (International Regional Organization for Plant and Animal Health)
PACE	Pan African programme for the Control of Epizootics
PANAFTOSA	Pan American FMD Centre

PARC	Pan African Rinderpest Campaign
PARCO	Chilean Certification of Premises under Official Control
PCP	Progressive Control Pathway (for FMD)
PDSR	Participatory Disease Surveillance and Response Programme
PENAPH	Participatory Epidemiology Network for Animal and Public Health
PID	PACE Integrated Database (ARIS1)
PPR	Peste des Petits Ruminants
PRRS	Highly Virulent Porcine Reproductive and Respiratory Syndrome RAHC-
NA	Regional Animal Health Centre - North Africa
RAHO	Regional Animal Health Offices - Viet Nam
REC	Regional Epidemiology Centre
RECOMSA	Animal Health Communication Network
REMESA	Mediterranean Animal Health Network (Algeria, Egypt, France, Italy, Libya, Morocco, Mauritania, Portugal, Spain and Tunisia)
RELABSA	Animal Health Laboratory Network
ReLaIS	Reference Laboratories Information System (for FMD)
REPIVET	Veterinary Epidemiosurveillance Network
RESEPSA	Animal Health Socio-Economic and Production System Network
RIACSO	UN Regional Inter-Agency Coordination and Support Office
RICAZ	Inter American Meeting on FMD and Zoonoses Control
RMP	Resource Management Package - Australia
RVC	Royal Veterinary College - UK
RVF	Rift Valley Fever
SAARC	South Asian Association of Regional Cooperation (Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka)
SADC	Southern African Development Community (Angola, Malawi, Mozambique, Namibia, Tanzania, Zambia, Zimbabwe)
SAG	Animal Protection Division of the Agriculture and Livestock Service of Chile
SCIV	Continental Epidemiological Information and Surveillance System - South America

SE	Stomatitis-Enteritis
SIB	Swiss Institute for Bio-Informatics
SIKHNAS	Sistem Informasi Kesehatam Hewan Nasional (National Information System for Animal Health)- Indonesia
SIPEC	Livestock Information System - Chile
SIVCONT	Web platform application installed at PANAFTOSA servers, supporting SCIV to improve timeliness of information when sanitary events occur
SNIV	National Information and Surveillance Systems - South America
SPC	Secretariat of the Pacific Community
SPS	Sanitary and Phytosanitary
SQCR	Surveillance, Quarantine, Control and Recovery - Australia
SQL	Structured Query Language
STARS	Sample Tracking and Reporting System – Australia
STV	Spatio-Temporal Visualizer
TAD	Transboundary Animal Disease
TSN	Tier Seuchen-Nachrichten (National Animal Disease Reporting System) - German
ULAV	Local Veterinary Care Field Unit
ULO	Upazila (Subdistrict) Livestock Officer - Bangladesh
US-CDC	United States Centres for Disease Control and Prevention
VEE	Venezuelan Equine Encaphalongelitis
VS	Veterinary Services
WAHID	World Animal Health Information Database
WAN	Wide Area Network
WHO	World Health Organisation
WRLFMD	World Reference Laboratory for FMD - Purbright, UK
XML	Extensible Markup Language

Contents

Introduction

The international workshop organized by FAO on the *Challenges of National, Regional and Global Information Systems and Surveillance for Major Animal Diseases and Zoonoses* took place in Rome from 23 to 26 November 2010. Forty-four experts from around the world made a series of presentations over three days on different aspects of collective global animal health promotion, animal diseases surveillance and disease prevention systems. A broad array of international and regional organizations, national veterinary, medical and other health-related services, academic institutions and non-profit organizations were involved.

This report summarizes the conference participants' discussions on surveillance and information systems, and explores issues raised in the presentations. The focus is on the operation, characteristics, objectives, conceptual design, needs and future directions for national, regional and global animal health surveillance and information systems.

The workshop was based on the following principles:

- Disease surveillance designed to reduce disease burden and poverty is a global public good.
- Health information systems should be designed to cross geographic boundaries and to encompass human and animal health, where appropriate, because pathogens do not respect geographic or species differences.
- Early detection and early warning are of paramount importance in allowing health systems to respond to events, reduce risk and mitigate the consequences of disease emergence.

OBJECTIVES

Four objectives were articulated for the workshop participants:

1. Identify successes achieved by current national, regional and global surveillance systems, and propose means to overcome challenges – including strategies to facilitate data sharing and technology transfer between national, regional and global health information systems.
2. Discuss standardizing mechanisms for exchanging data between information systems, by encouraging the use of open source software and technologies.
3. Identify appropriate ways to improve collection, management, analysis and use of georeferenced data on transboundary animal diseases (TADs), zoonoses and other emerging diseases.
4. Seek consensus on protocols for sharing official and unofficial data between national, regional and global animal health information systems.

This workshop report is presented in two parts, encompassing the deliberations of the group. The first part is a summary of discussion points and recommendations, and the second part presents the results of an informal but structured survey that ranked participants' perceptions of global surveillance and information needs.

The effective containment and control of epidemic diseases depends on early notification of disease events or outbreaks, and the capacity to forecast the spread of pathogens to new areas. Emergent zoonoses include H5N1 Highly Pathogenic Avian Influenza (HPAI) or Rift Valley Fever (RVF) and other transboundary threats such as Foot-and-Mouth Disease (FMD), Highly Virulent Porcine Reproductive and Respiratory Syndrome (PRRS) in South East Asia and Peste des Petits Ruminants (PPR) in Eastern Africa.

Early warning of animal disease outbreaks with a known zoonotic potential enables health authorities to advise at-risk populations. Public health measures – including behaviours to be avoided and controls to prevent human illness and mortality – can be implemented. For many zoonotic diseases, animals not only harbour the pathogens but act to amplify their effects, increasing the risk for humans. The effects of endemic diseases and epidemics in livestock impact, food security, food safety, people's livelihoods and trade, with the accompanying potential for disruption in each of these arenas alongside the animal and human suffering involved when an epidemic takes hold.

Timely and good-quality information about disease events are needed in order to understand the disease situation, support decision-making, prevent potential disease incursion and respond quickly in an emergency situation. A system that allows information-sharing among relevant agencies at national and regional levels is of vital importance, underpinning cooperation in the ongoing surveillance of disease pathogens and the human-animal health interface. Different agencies are involved in human health, animal health, agriculture and food safety but require shared access to the information available. Having access will enable them to ensure an integrated specific approach for understanding pathogen ecologies, and to develop control strategies for diseases such as zoonotic avian influenza – at national, regional and international levels.

Risk factors or drivers of disease emergence take agro-ecological practices and conditions into account, including land use, climate, demographics and economic data. Shared analysis of disease data therefore gets beyond the health status reported officially by countries and, in light of the mandates and information held by OIE and WHO, FAO is able to make major contributions in identifying these drivers of disease emergence, trends, geogenetic mapping, socio-economic influences and agro-ecological zoning.

Various tools for collecting information about animal health at national, regional and global levels have made significant contributions to the timely reporting of animal disease events, and to analysing animal disease drivers and patterns of transmission and spread. Ongoing challenges relate to the sensitivity of surveillance systems for capturing information about new pathogens or old pathogen emergence. The proliferation in recent years of official and non-official systems, such as ProMED and the Global Public Health Intelligence Network (GPHIN), has been accompanied by different technologies, data requirements and standards. Overlaps between national, regional and global information systems are evident in some regions and most data relating to animal disease outbreaks are entered and processed at national, regional and global levels.

Epidemiology and laboratory networks play an important role in gathering quality disease data and providing epidemiological interpretation. Linking outbreak information with data related to the pathogen characteristics can help in understanding disease and genetic dynamics in their spatial and temporal context. Where information from national

and reference laboratories may not be available in the public domain, there is insufficient integration of national, regional and global databases; and where availability of information may be constrained by political or trade implications, there are difficulties in sharing disease data.

FAO is actively developing country tools and software such as TADinfo to provide technical assistance to member states through developing and implementing national information systems, and creating global platforms such as EMPRES-i to collect animal disease information in the context of the agro-ecosystem parameters. These Web-based secure information systems – which are password-protected with individual privileges – serve as management and analysis tools for animal health data and information, and as platforms for sharing data and information on transboundary animal diseases (TADs) in agreement with other national, regional and global animal health information systems. Information stored can be easily adapted and transferred to other databases should parties agree.

Group discussion and recommendations

A recurring theme in the group's discussions was the recognition that good animal health surveillance combines the process of detection with the transformation tools for converting rough data into information for taking action on disease control and risk management.

The group considered that, in addition to their traditional role in promoting animal health and production, surveillance systems provide important early warning and tracking of zoonotic diseases, identify emerging diseases, and promote international trade. The implicit recognition was that animal health surveillance is a global public good that spans many sectors in our global economic system. Participants also recognized challenges for surveillance at the human-domestic animal-wildlife interface, where ongoing surveillance has usually been absent. Surveillance in wildlife populations is an important way of assessing specific ecosystem health and this information can help protect the broader environment in specific or threatened ecosystems.

The group also turned its focus towards technical issues, acknowledging the value of geographic information systems, discussing analytic strategies to extract information from the large volume of data collected, and reaching conclusions about how to share data among animal and public health institutions and officials, how to incorporate open source platforms, and how to disseminate results.

Finally, a lack of capacity at national, regional and international levels, in many regions, was recognized. Given this starting point, finding the resources for effective surveillance at all levels is a long-term and critical challenge to building better global health systems.

An ongoing process of evaluating and improving objectives and standards is needed, along with capacity- building to ensure effective and efficient surveillance systems at every level. An important starting point is the existing global framework provided by the Food and Agriculture Organization of the United Nations (FAO), the World Organisation for Animal Health (OIE) and the World Health Organization (WHO) which together promote ongoing iterative processes of quality improvement.

Participants indicated that OIE standards, such as the OIE Terrestrial Animal Health Code, and WHO International Health Regulations (IHR) for disease reporting respond to the mandates of each organization. They recommend that continuing efforts be made to assist FAO/OIE/WHO members to expand and improve their surveillance systems to include protecting livelihoods, improving and safeguarding food production, discovering disease, and detecting and responding early to novel pathogens. Adding extra value to disease reporting mechanisms and feedback to countries providing data is imperative. International and regional bodies, in collaboration with research institutions, could facilitate epidemiological analysis and risk assessment, and might usefully provide feedback reports to countries

originating the data - as having their contributions recognized might well stimulate their interest and further collaboration.

The participants recognized that the objectives of individual surveillance systems vary widely, depending on the needs and level of development of the country or countries involved. There is also variation between local, subnational, national, regional and global surveillance systems. At a technical level, this variation can be harnessed by encouraging common standards for disease reporting in such areas as terminology, disease identificatio (ID), geocoding, and so on based on accepted international standards.

To this end, data-sharing technology and terminology needs to be standardized in cost-effective and robust ways. Databases must be flexible enough to accommodate local needs and to incorporate new diseases and wildlife and zoonotic diseases of importance to a country. Harnessing existing components to create a comprehensive and sensitive surveillance system requires resources, and it is recommended that the international community builds capacity at all levels to meet these standards and benchmarks.

The group discussed the advantages of event-based surveillance as a platform to add on to more traditional surveillance systems. Event-based surveillance is the rapid and timely collection of health events gathered through open source reporting. Traditional surveillance systems produce credible information but reporting is often delayed, which slows response times; and these systems are typically built for known diseases, meaning that diseases without a confirmed etiology might not be picked up. Event-based surveillance, as a component of a wider surveillance system, could be an asset in monitoring the health of wildlife populations which, as mentioned above, have traditionally lacked highly effective surveillance strategies.

As a first step, the group proposed making an inventory of existing animal and public health databases – with a description of their structure, objectives, purpose and functions – so as to build on strengths and identify weaknesses. Participants proposed that open source data handling systems should be explored carefully as offering the advantage of accessibility for many members, which is crucial for an effective global surveillance community. Valid alternatives exist and the choice of data management tools depends on many factors.

An ability to share information system source codes could promote an open system, aiding the development of an *information platform* where widely differing technological tools are blended together to make a robust, balanced, comprehensive global surveillance system broadly accessible to all stakeholders. Security of shared codes must be balanced in each situation, bearing in mind that open source programs can provide significant cost advantages and enable widespread adoption of common, integrated platforms capable of amalgamating information from multiple surveillance systems.

The group advocated the use and sharing of open source codes for disease database development, using adequate filters or security features to prevent unauthorized data sharing. Database managers could share codes developed for public databases in the public domain but the risk of external users accessing sensitive information would need to be mitigated.

Participants identified several challenges to the optimal performance of disease surveillance systems. These challenges sometimes interfere with effective monitoring and analysis of the animal health status of a particular geographic area or over a particular period of