

proceedings

DEVELOPING A STEPWISE APPROACH FOR RABIES PREVENTION AND CONTROL

FAO/GARC Workshop
Rome, Italy
6-8 November 2012



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Contents

Acknowledgments	v
Abbreviations and acronyms	vii
Executive summary	ix
Introduction	1
Background	1
Process	2
Objectives of the workshop	2
Rabies prevention and control, past and present	3
International organizations	3
Regional initiatives	7
Country experiences	10
Activities, opportunities and issues associated with programme implementation	15
Brainstorming session	15
The stepwise approach	19
The progressive prevention and control of transboundary animal diseases (TADs) in developing countries	19
Development of an approach and indicators	21
Lessons learned from Global Programmes	21
First draft of the stepwise approach to rabies control	28
Next steps	28
Closure	31
References	33
ANNEX A	
Agenda of the meeting	35
ANNEX B	
Meeting participants	38
ANNEX C	
Key elements of effective cross-sectoral collaboration	39

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Abbreviations and acronyms

ASEAN	Association of Southeast Asian Nations
CDC	United States Centers for Disease Control and Prevention
DALY	Disability-adjusted life year
dRIT	Direct rapid immunohistochemical test
DVS	Department of Veterinary Services
EuFMD	The European Commission for the Control of Foot-and-Mouth Disease
GARC	Global Alliance for Rabies Control
GF-TADs	Global Framework for the Progressive Control of Transboundary Animal Diseases
FAT	Fluorescent antibody test
FAO	Food and Agriculture Organization of the United Nations
FMD	foot-and-mouth disease
HMIS	Health Management Information System
HPAI	Highly Pathogenic Avian Influenza
IBCM	Integrated bite case management
NGO	Non-governmental organization
NTD	Neglected tropical disease
NTV	Nerve tissue vaccine
NZD	Neglected zoonotic disease
OCP	Onchocerciasis Control Programme
OIE	World Organisation for Animal Health
PAHO	Pan-American Health Organization
PANAFTOSA	Pan-American Foot-and-Mouth Disease Center
PCP	Progressive control pathway
PENAPH	Participatory Epidemiology Network for Animal and Public Health
PEP	Post-exposure prophylaxis
PRP	Partners for Rabies Prevention
RIG	Rabies immunoglobulin
RIMSA	Inter-American Meeting at Ministerial Level on Health and Agriculture
SEARG	Southern and Eastern African Rabies Group

SMS	Short message service
SOP	Standard operating procedure
TOT	Training of trainers
TAD	Transboundary animal disease
UN	United Nations
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
VPH	Veterinary Public Health
WHO	World Health Organization
WHOCC	World Health Organization collaborating centres
WRD	World Rabies Day
ZDU	Zoonotic Disease Unit
ZTWG	Zoonotic technical working group

Executive summary

On 6-8 November 2012, a workshop was held on developing a stepwise approach to the prevention and control of human rabies of canine origin. The meeting, which was organized by the Food and Agriculture Organization of the United Nations (FAO) and the Global Alliance for Rabies Control (GARC), convened 21 participants at FAO headquarters in Rome, Italy. Participants included rabies experts from two rabies-endemic countries (Kenya and China), academic institutions, GARC, the World Health Organization (WHO), the World Organisation for Animal Health (OIE) and FAO. The focus of the meeting was on the prevention of canine-mediated human rabies, which is hereafter referred to simply as rabies.

Updates were presented on the status of ongoing and anticipated rabies prevention and elimination initiatives, including available strategies, tools and approaches at the national, regional and global levels. Constraints and opportunities to eliminate rabies at this time were then discussed. The methodology, successes and challenges of the FAO-developed progressive control pathway (PCP) for Foot-and-Mouth disease (FMD) were presented to the participants along with an in-depth analysis of the possibility of adapting the PCP approach for rabies prevention and elimination.

The rabies experts concluded that a PCP approach can and should be developed and tested for rabies prevention and elimination, based upon the PCP-FMD experience. Next steps towards a PCP for rabies should include a review of lessons learned from the PCP-FMD experience and the development of an action plan to be tested in rabies-endemic countries. The rabies experts produced a first draft of a PCP toward rabies elimination composed of six stages, ranging from Stage 0, where no information on rabies is available in a suspected rabies-endemic area, to Stage 5, where valid and timely epidemiological surveillance data confirm the elimination of rabies in humans and canines. This first draft of the PCP is intended for adoption and adaptation by national programmes as a tool for managing rabies surveillance, control and prevention. Through the process of sharing field experience over time, a better PCP tool will be forged and made available for use worldwide.

Introduction

BACKGROUND

Rabies is perhaps the most deadly of all human diseases, as once clinical symptoms appear it is almost 100 percent fatal. WHO estimates that approximately 50 000 people die of rabies annually, and that approximately 40 percent of the victims are children. Current data suggest that more than 95 percent of human rabies cases are due to dog bites, particularly in developing countries in Asia and Africa. Recently, there have been successes in treating unvaccinated human patients with clinical rabies, but these successes are extremely rare and costly. Nonetheless, human rabies of canine origin is completely preventable using biologicals and tools that could be accessible even in resource-poor environments. Public awareness, health education, dog vaccination and the availability and accessibility of post-exposure prophylaxis (PEP) are key for rabies prevention and control.

Human rabies of canine origin could be eliminated globally given political will, adequate resources and diligent programme management. Since the introduction of World Rabies Day (WRD) by GARC in 2007, tremendous progress has been made in building global public awareness about rabies. The Partners for Rabies Prevention (PRP) is an informal network created in 2008 by GARC to provide a platform for the exchange of current information in the field of rabies prevention including: global epidemiology, outbreak information, new tools and diagnostic techniques, laboratory surveillance, educational awareness and advocacy. The PRP developed the Blueprint for Rabies Prevention and Control (www.rabiesblueprint.com) as a guide for countries that intend to prevent human rabies by eliminating canine rabies within their borders. Since the early 1990s, the Southern and Eastern African Rabies Group (SEARG) has been instrumental in bringing together countries in southern and eastern Africa every two years to share epidemiological data, the latest research findings and global innovation, especially related to rabies epidemiology and diagnostics. In Asia, the Association of Southeast Asian Nations (ASEAN) was established in 1967 to accelerate economic growth, social progress and cultural development in the region. Since 2011, ASEAN countries have targeted dog-transmitted human rabies for elimination by 2020.

The prevention of human rabies is dependent upon the effective and verifiable control of canine rabies. Therefore, this report focuses on the prevention of canine-mediated human rabies.

Although rabies has been the disease that falls through the cracks between institutions and government agencies, the One Health approach provides an opportunity to address rabies in an intersectoral manner. In the spirit of implementing One Health, FAO has organized a number of national stakeholder consultations in member countries, bringing together diverse partners responsible for rabies prevention and control. These partners range from animal, wildlife and public health agencies, to law enforcement agencies, municipalities and animal welfare groups. The national stakeholder consultations have been useful in identifying barriers and constraints to effective collaboration in rabies prevention, and in drafting integrated and multidisciplinary rabies action plans.

FAO rabies experts found that there was a need to assist member countries in developing their action plans and identifying milestones in the prevention of rabies. Faced with a similar challenge, FAO infectious disease experts recently developed the progressive control pathway for foot-and-mouth disease (PCP-FMD) to assist and guide countries in its control and elimination. The PCP-FMD has been used since 2008, with support from the European Union, FAO and OIE. Many FMD-endemic countries have endorsed this approach to managing the control and elimination of FMD with positive results. Building on the experience of the PCP-FMD, FAO and GARC have organized this workshop – Developing a stepwise approach for rabies prevention and control – to explore how a similar PCP could be developed to benefit rabies-endemic countries.

PROCESS

The concept of developing a stepwise approach to rabies prevention, based on the FMD programmatic experience, was first presented in national and regional rabies prevention and control meetings by FAO subject matter experts in 2010 to 2012. Positive feedback from those meetings encouraged FAO to present a more comprehensive proposal to the PRP in May 2012. As a result, FAO engaged two of the veterinary epidemiologists who had developed and launched the PCP-FMD globally to prepare a background paper exploring if and how the PCP-FMD could serve as a model for a PCP for rabies.

OBJECTIVES OF THE WORKSHOP

Dr Juan Lubroth, FAO's Chief Veterinary Officer and Chief of the Animal Health Service, opened the workshop. He welcomed all participants and stressed that, as a development organization, FAO recognized the significance of rabies for its impact on public health and food security. In rural communities, rabies has a significant, yet largely unmeasured, detrimental effect on livelihoods through loss of livestock and working animals. Dr Lubroth reminded the participants that FAO and its partner organizations have had successful collaborations in controlling and eliminating zoonoses in recent decades, and that controlling emerging and re-emerging diseases at their source is the most efficient and effective means of protecting human and animal health. It is in this spirit that the group was challenged to work together to hasten the control and elimination of human rabies of canine origin.

Dr Katinka de Balogh presented the following workshop objectives which were accepted by the meeting participants:

- to review the current status of global rabies prevention and control efforts;
- to identify constraints and opportunities for rabies prevention and control in the near and long term;
- to introduce the concept of a stepwise approach for rabies control, taking inspiration from the PCP-FMD, including:
 - definition of the key steps in a rabies control pathway and indicators of progress from one step to the next;
 - discussion about how a PCP would facilitate drafting of national strategies and regional roadmaps;
 - development of a plan for moving the PCP from concept to implementation.

Rabies prevention and control, past and present

(Chair J. McGrane)

INTERNATIONAL ORGANIZATIONS

Rabies control strategy: measures at the source

Marta Martinez

Promoting rabies control in dogs as a key strategy to control rabies in humans was endorsed by multiple partners, including governments and other stakeholders in rabies control, at the Global Conference on Rabies Control organized by OIE in collaboration with FAO and WHO at Incheon-Seoul, Republic of Korea in September 2011. In this way, rabies control was recognized as the ideal candidate for application of the One Health concept. The vast majority of human rabies deaths can be prevented through sustained dog vaccination programmes. Vaccination of dogs was recognized as the most cost-effective intervention to interrupt the cycle of transmission and to avoid human deaths occurring due to dog rabies. Additional measures like dog population management, education, awareness and cooperation from all stakeholders improve the cost-effectiveness of the vaccination intervention. OIE provides support for vaccination in dogs to OIE member countries that request it through its regional vaccine bank in Asia. However, the success of a vaccination campaign is not simply ensured by the availability of good quality vaccines. Strong governance of animal health systems in compliance with international standards will improve the design and implementation of the best combination of vaccination strategies, including data gathering on dog ecology parameters or time and space coordination of the vaccination campaigns. Strategies must be adapted to the epidemiological situation and the resources available to achieve the recommended 70 percent vaccination coverage in a population of dogs in the same epidemiological unit.

Strategy, approaches, guidance and resources for human and dog rabies control

François X. Meslin

Rabies is widely distributed across the globe, with only a few countries (mainly islands and peninsulas) that are free of the disease. Rabies is a neglected disease of poor and vulnerable communities. The major reason why it persists today is that rabies is a disease which often affects people whose deaths are not heard about or recorded. This tragic silence keeps decision-makers from understanding that resources aimed at eliminating human and dog rabies can and should be mobilized from the international community. As a result, measures to avert human disease through the proper management of suspect rabid animal bites are not set up and activities for the control and ultimate elimination of dog rabies are not conducted.

Canine rabies predominates in most of the developing world where the greater burden of human rabies also falls. It is estimated that approximately 50 000 people die from dog-mediated rabies annually, mostly in Asia and Africa (WHO, 2005; Knobel *et al.*, 2005). Human rabies deaths following contact with wildlife species, including bats, are rare compared with those caused by dog-transmitted rabies.

To break the cycle of ignorance and neglect, WHO and its partners have advocated for greater recognition of the burden of rabies globally, and have promoted the use of new tools to prevent rabies (Rupprecht *et al.*, 2008; Lembo *et al.*, 2010). One of the new tools for advocacy has been the promotion of the concept of neglected zoonotic diseases (NZDs) that emerged from a meeting held at WHO headquarters in Geneva in September 2005 (WHO/SDE/FOS, 2006.1). The value of an NZD platform, particularly for advocacy, was reinforced by two more international conferences held in 2007 (Lembo *et al.*, 2010) and 2010 (WHO/HTM/NTD/NZD, 2008.1). The name NZD for this group of diseases indicates that governments and the international community at large insufficiently address them. NZDs are best defined by the people and communities that are most affected by them: poor people living in remote rural areas or urban slums of the developing world. The term is now accepted internationally. Unfortunately, rabies has all the features of an NZD.

However, rabies is recognized as the zoonosis most amenable to control because effective and accessible tools exist for the prevention of canine-mediated human rabies. It is ranked first in the NZDs list targeted for regional and eventual global elimination. A proposal was developed by an interagency meeting (WHO/HTM/NTD/NZD, 2011.1) for investment in a 'priority NZDs portfolio' comprising canine-mediated human rabies regional elimination in Latin America and Asia. A cost evaluation indicates that external funding for coordination and capacity building to achieve the expected outcomes by 2016 is around US\$10 million per annum for the next five years (WHO/HTM/NTD/NZD, 2011.3).

Rabies appears prominently in the first and second WHO reports on neglected tropical diseases (NTDs) (WHO/HTM/NTD, 2010.1; WHO, 2013). Rabies is also included in the shorter list of diseases targeted for regional elimination featured in the executive summary of the NTD roadmap for implementation published in 2012 (WHO/HTM/NTD, 2012). In addition, rabies is mentioned as one of the major viral zoonoses in the technical report of the WHO NTD Disease Reference Group on *Zoonoses and marginalized infectious diseases of poverty* published by WHO in 2012 (Molyneaux *et al.*, 2011; WHO, 2012a).

Rabies is a vaccine-preventable disease in humans and animals. Safe and efficacious human and veterinary vaccines have been developed and are becoming increasingly accessible for those in need. However, their cost remains high for individuals and for the ministries of health in countries which provide them for free. In many places where dog rabies is endemic people remain insufficiently aware of the rabies risk and prevention. Health care personnel are not always informed about the importance of wound washing and flushing and are sometimes unaware of the recommended regimens for PEP. Finally, veterinary services in many countries are not interested or strong enough to conduct dog rabies control activities at a level that would break the cycle of transmission from dog to dog and onwards to humans (Lembo *et al.*, 2011; Lembo *et al.*, 2013).

Approaches to rabies control and prevention include strategies directed at humans (WHO, 2010; WHO/HTM/NTD/NZD, 2010) and measures targeting the animal species most

responsible for transmission to humans (WHO, 2005; Lembo *et al.* 2010; WHO, 2010). While both approaches are needed, the goal of rabies elimination supported by cost-effectiveness studies requires a strong focus on activities directed at the animal host of rabies in a given area. Since the development of effective animal vaccines for rabies, mass vaccination has become an integral component of rabies control measures. However, the elimination of rabies requires several components in addition to mass vaccination, including effective engagement of communities and policymakers, dog population assessment and management, and surveillance capacity and legislation. A high level of awareness among key players in rabies prevention and control is vital for effective policy towards canine rabies elimination, including allocation of resources.

Discussion

During the discussion, Dr Meslin stated that human rabies is eligible for elimination and that a roadmap to overcome the global impact of NTDs is being conceived. There are different target dates for rabies elimination, depending on the region. For the Latin American region, the target is 2015; for Southeast Asia and ASEAN countries, 2020; and for sub-Saharan Africa, 2030.

Rabies control is very advanced in Latin America where programmes have been implemented over the last 30 years. Nevertheless, there is still a need for an additional last push.

From 2009 to 2013, the Bill and Melinda Gates Foundation, through WHO and in collaboration with GARC, has made US\$10 million available to fund three rabies pilot projects in the Philippines, South Africa and the United Republic of Tanzania.

GARC and partners for rabies prevention: working towards control, prevention and elimination of rabies

Sarah Cleaveland

GARC was founded five years ago and is now registered as a charitable organization in the United Kingdom of Great Britain and Northern Ireland and in the United States of America with offices in Southeast Asia (the Philippines) and in Europe. GARC has one central objective: to provide a platform to bring together individuals and institutions to find workable solutions to reduce the burden of rabies across the world. It is understood that the elimination of rabies will require an intersectoral approach. What is required is not only effective animal and human vaccination, but the commitment and engagement of communities, and sharing of expertise in education, legislation, economics, animal welfare, ecology, advocacy and communication. GARC aims to catalyse and support efforts to bring together this diverse expertise, building partnerships among different constituencies to work towards a common goal of rabies control and elimination.

The activities of GARC include:

- initiation of WRD in 2007, with the day now listed among the UN Health Days and with participants from more than 100 countries worldwide. WRD activities have catalysed widespread dog vaccination campaigns, helped to launch new national rabies programmes, assisted with dissemination of rabies educational material to millions of people worldwide and have implemented a rabies webinar for people from across the world to share experiences and expertise;

- development of e-communication tools to provide technical information, to support sharing of expertise and experience across the global rabies community, to empower and motivate communities, and to highlight the efforts and activities of local champions in rabies-endemic countries;
- implementation of pilot projects, including rabies elimination demonstration projects in Bohol, the Philippines, that have demonstrated the power of community mobilization and education as part of sustainable rabies control strategies;
- establishment of an informal group of stakeholders – the PRP – in 2008, to serve as a platform for private and public institutions to come together and discuss problems, find solutions and share resources. The PRP convenes working groups to integrate necessary disciplines and institutions, identify gaps and key constraints to rabies control, and develop short-, mid- and long-term measures for addressing these problems. Initiatives of the PRP include:
 - development of the Blueprint for Rabies Prevention and Control (www.rabies-blueprint.com) – an online resource, translated into multiple languages, that provides operational guidelines to support national and local authorities and health professionals to develop effective rabies control and prevention strategies. The tool supplies detailed information for planning and implementation of different elements of rabies prevention and control strategies, such as dog vaccination campaigns, human PEP and dog population management, and includes links to other technical reference material from international agencies;
 - establishment of a working group on health economics to develop tools for evaluating the cost-effectiveness of different rabies intervention strategies and to quantify the global burden of rabies;
 - drafting of a resolution for the World Health Assembly on the elimination of canine-mediated human rabies;
 - initiating and catalysing the development of an integrated strategy for the global elimination of canine rabies;
 - promoting the establishment of regional networks, focussing initially on South-east Asia and Africa to support the development of coordinated regional strategies and sharing of expertise and experience within regions.

Dr Cleaveland further explained that a second organization, PRP, was created in 2008. PRP consists of an informal group of global stakeholders from different sectors (public, private, non-governmental organization (NGO), philanthropic organizations, etc.) working together towards the elimination of rabies. The PRP has developed the Blueprint for Rabies Prevention and Control (www.rabiesblueprint.com) and has commissioned studies on the burden of rabies. In addition, PRP is studying the short-, medium- and long-term investments required to accomplish rabies elimination. The commemoration of WRD has been instrumental in creating advocacy and public awareness about rabies. During WRD 2012, at least 135 countries and 150 schools participated in the day's activities. Furthermore, WRD has been a catalyst for vaccinating more than eight million dogs in participating countries.

Discussion

Participants discussed the burden of rabies at the national and community levels. Dr Cleaveland explained that socio-economic studies are ongoing to quantify disability-adjusted life years (DALYs) lost to rabies. Participants noted that rabies also has an important economic impact beyond the cost of PEP and losses due to the death of a family member. In some communities in rabies-endemic countries, rural workers are not able to go to work and children are not able to go to school due to the fear of rabid animals in the vicinity. The social dimensions of rabies and its prevention need to be better explored; however, it is difficult to quantify the social costs of the fear that rabies creates and its impact on communities and families. Discussants also noted the need to explore the decision-making process for societies and individuals investing in rabies prevention and treatment. Data from some countries suggest that increased anti-rabies vaccination coverage in dogs results in reduced use of PEP, however, a decline in rabies incidence does not always reduce the demand for PEP. In some areas, anecdotal reports suggest that the price of PEP increases during rabies outbreaks, making it more difficult for poor families to treat persons exposed to the virus. It is clear that further research is necessary to clarify the economic benefits of dog vaccination campaigns.

Overall, there is agreement that a 70 percent rabies vaccination coverage for dogs is sufficient for the control of canine rabies in any setting. However, the efficacy of the vaccine used needs to be assured. Most modern dog rabies vaccines will confer immunity for three years. Nevertheless, annual campaigns are recommended due to the turnover of the dog population. The challenges of rabies prevention in urban and rural areas are different. In urban areas it is sometimes more difficult to identify owners of dogs found in vaccination campaigns, and vaccination coverage rates may be lower than in rural areas. Field experience suggests that post-exposure treatment of humans, and the associated costs, decrease slowly, in spite of regular dog vaccination campaigns.

REGIONAL INITIATIVES

Africa

Sarah Cleaveland

Southern and Eastern African Rabies Group (SEARG)

SEARG was established in 1992 in Zambia and since then the group has met every two years. Initially, this forum was the only one in Africa to share and discuss epidemiological data on rabies as the disease has suffered and continues to suffer from large under-reporting of cases in animals as well as in humans.

AfroREB

AfroREB, is a francophone rabies network, bringing together rabies experts, physicians, researchers and representatives from the ministries of health of 15 north and sub-Saharan African countries. The main goal of the network is to increase awareness of rabies among public officials and health institutions, enhancing the understanding of health professionals and the public to ensure better access to proper care following rabies exposure.

In Africa, there is a need for the design of national and regional rabies elimination strategies, especially coordinated between animal and human health sectors. Challenges for national programmes include how to organize large-scale dog vaccination campaigns and attain high vaccination rates while avoiding patchy vaccination coverage. These networks also have a role to play in sharing expertise between countries, as well as motivating and improving political support. North Africa is developing a regional rabies control plan through the year 2020. Overall cross-sectoral financing mechanisms are required, political barriers need to be broken down and rabies control strategies need to build on the experience of successful disease control and eradication campaigns, like that for rinderpest. African countries are exploring improved and cost-effective delivery systems, including the feasibility of cost sharing between the public and private sectors. Dog ecology studies over the years have provided valuable insights for estimating dog populations and options for their management. The overall lack of human and animal rabies data due to deficient population-based surveillance systems and diagnostic resources, remains a major constraint, yet the successes of the global rinderpest and smallpox eradication programmes demonstrate that the elimination of human and animal diseases is possible in sub-Saharan Africa, in spite of constraints.

World Health Organization (WHO)

François X. Meslin

Asian countries

As part of its provision of technical support to Member States for prevention and control of human and animal rabies, WHO has been advocating for the use of cost-effective intradermal vaccination to improve availability and affordability of modern rabies vaccine, and the phasing out of production and use of nerve tissue vaccine (NTV). Since 2005, the Lao People's Democratic Republic, Cambodia, India, Nepal, Viet Nam and Bangladesh have abandoned production and use of NTV. The WHO Collaborating Center for rabies diagnostics in Bangalore has introduced the direct rapid immunohistochemical test (dRIT) in the region in collaboration with United States Centers for Disease Control and Prevention (CDC) Atlanta. A regional hands-on training in rabies diagnosis was organized in Bangalore in 2010 to train laboratory professionals in the use of dRIT.

The WHO regional office for Southeast Asia has developed a regional strategy for elimination of human rabies transmitted by dogs in the region in 2011. The strategy aims to eliminate human rabies through progressive control of dog rabies and improved human rabies prophylaxis in rabies-endemic countries and to maintain the rabies-free status of areas of the Southeast Asia region by 2020.

Latin American countries

The Veterinary Public Health unit of the Pan-American Health Organization/WHO regional office for the Americas (VPH/PAHO-AMRO/WHO) manages the programme for the elimination of human rabies transmitted by dog. This VPH unit has been actively working with Member States towards rabies elimination since 1983.

The 15th Inter-American Meeting at Ministerial Level on Health and Agriculture held in Rio de Janeiro, Brazil 11-12 June 2008 proposed 2012 as the target date for ending human

rabies transmitted by dog (WHO/PAHO, 2008). In its resolution on 'Elimination of neglected diseases and other poverty-related infections', the 49th Directing Council of PAHO in 2009 selected 2015 as a more likely target date (WHO/PAHO, 2009).

Africa

WHO is working with the United States Agency for International Development (USAID) and other partners on a draft strategy for prevention and control of zoonoses in the African Region which should include rabies as both an endemic and epidemic prone (emerging) disease. Two major rabies outbreaks (in Angola and the Democratic Republic of the Congo) have recently been reported in sub-Saharan Africa (WHO, 2012b) and rabies is rampant in most other countries of the region. WHO headquarters and the regional office in Brazzaville are coordinating field projects for human and dog rabies control and elimination in Africa by 2015.

WHO is also sponsoring the SEARG meeting to be held in February 2013 in the United Republic of Tanzania as a platform for discussing the results of the Gates Foundation funded/WHO coordinated projects for human and dog rabies control and elimination ongoing since 2009 in Kwa Zulu Natal (South Africa) and the southeastern part of the United Republic of Tanzania.

The Americas

Frederieke Mayen

PAHO is the specialized organization for health (Interamerican system), WHO regional office for the Americas and part of the United Nations system.

In the last 40 years, cases of human rabies transmitted by dogs have reduced considerably. Nevertheless, there are still critical areas in northeast Brazil, the Plurinational State of Bolivia, Peru, Honduras, El Salvador, Guatemala, Haiti, Bolivarian Republic of Venezuela and Cuba.

In the 61st session of the regional committee, resolution CD 49/R 19 has been adopted with the commitment to the elimination of neglected diseases and other poverty-related infections. This resolution specifically includes human rabies transmitted by dogs.

The target of ongoing control activities is to transform high-risk areas of rabies in Latin America to moderate/low-risk areas. PAHO and its partners agreed to achieve a Latin America free of human rabies transmitted by dogs in 2015.

Two important instruments to achieve this goal are: *Sirvera*, the regional information system, in which countries report their rabies cases and epidemiological information; and *Siepi*, which makes the information accessible to everyone. Both are coordinated and managed by the zoonosis team in the Pan-American Foot-and-Mouth Disease Center (PANAF-TOSA) in Rio de Janeiro, which has a VPH unit and is one of the specialized centres of PAHO.

The Inter-American Meeting at Ministerial Level on Health and Agriculture (RIMSAs) is an important political instrument.

Partnership and strategic alliances such as GARC for control efforts and PAHO/CDC and WHO collaborating centres (WHOC rabies) for research activities are also essential.

South-South cooperation is also vital for technical cooperation projects between countries such as those coordinated vaccination campaigns that have occurred in border areas between countries (e.g. Plurinational State of Bolivia/Peru and Honduras/El Salvador/Guatemala).

Collaborating centres such as the Zoonoses Control Center in São Paulo, perform activities with regard to stray dogs (neutering, vaccinating), follow-up of incidents, etc.

Chile, Mexico, Peru and Uruguay have declared themselves rabies-free countries (Variants 1 and 2). The declarations of Costa Rica and Nicaragua are in process while Argentina, Brazil, Colombia and the Bolivarian Republic of Venezuela have programmes in place to reach the target of becoming rabies-free countries.

PAHO is currently drafting the strategy and plan of action on rabies in humans transmitted by dogs with the target of having the region free of dog-transmitted rabies in humans by 2015.

COUNTRY EXPERIENCES

Rabies prevention and control, Kenya: the current situation from an animal health perspective

Peter Omemo

In general, the domestic dog is the major transmitter of rabies to humans in the developing countries and this is particularly true in Kenya. Rabies has existed in Kenya with varying incidence levels since 1912 (Hudson, 1944). Nevertheless, the magnitude of the problem has remained largely unknown since specimens from rabies-suspect animals in remote locations are rarely sent to the Central Veterinary Investigation Laboratory in Kabete for confirmatory diagnosis. Customarily, rabies prevention and control in Kenya is the mandate of the Department of Veterinary Services (DVS). Rabies control strategies in the country include the traditional mass vaccination of dogs, movement restriction, control of 'stray' dogs and community education. However, the major constraints to the effective control of rabies in the country are inadequate resource allocation, lack of integrated approach, poor infrastructure and lack of proper logistics, rather than a lack of technical competence in the country.

Rabies control in Kenya: summary of the current situation from a public health perspective

Eric Ogola

Hospitals and government stores in Kenya have only limited stocks of biologicals for rabies PEP – rabies vaccine and rabies immunoglobulin (RIG). The current human post-exposure rabies vaccination regime is five intramuscular doses; however, medical units report frequent noncompliance with the treatment regime due to high costs and unclear guidelines. RIG is virtually unavailable from government facilities, but at least one private hospital (the Nairobi Hospital) has stocks available for patients at a fee.

The actual incidence of human rabies in Kenya is unknown because the Health Management Information System (HMIS) only captures injuries in general, so dog bites and other injuries, including snakebites, are aggregated in the same category. Rabies cases or dog bite injuries are not recorded as such in the current system. Furthermore, Kenya is a malaria-endemic country, and a number of rabies cases are diagnosed and treated as cerebral malaria. Rabies diagnoses in humans are rarely confirmed, partly due to difficulties in receiving family consent for post-mortem examination. Currently, even suspect cases are not recorded.

The division of Disease Surveillance and Response, in the Kenya Ministry of Public Health and Sanitation, is trying to ensure the routine reporting of a number of zoonotic diseases. Rabies is set to be reported monthly from January 2013. This web-based reporting is to be facilitated by WHO through the provision of computers and training/sensitization before roll-out. Recently, a national zoonotic disease unit (ZDU) was created with the support of the CDC, and a district zoonotic technical working group (ZTWG) is supposed to be initiated. Kisumu district, which is rabies-endemic, already has a functioning technical working group.

The following suggestions and recommendations would strengthen rabies control in Kenya:

- Develop a national rabies control and prevention strategy.
- Institute a national PEP policy at no cost to the patient. This policy should include the incorporation of the intra-dermal (0.1 ml) as opposed to the intramuscular vaccine injection (1 ml).
- Implement a 4-dose instead of a 5-dose regime for PEP reducing the cost by 20 percent along with the burden of provision of vaccine to improve compliance by poor patients in Kenya.
- Develop health education and awareness creation on wound washing, based on sociological studies.
- Offer refresher courses for medical workers on the new proposed guidelines. Reporting, biosafety and intradermal injection regimes should be prioritized.
- Strengthen research capacity to study and assess new treatment regimes, new diagnostics and vaccine efficacy. GIS and spatio-temporal analysis should be incorporated into the surveillance of rabies, to facilitate modelling to identify hotspots and enable prediction of risk.
- Ensure that all regional veterinary laboratories have the capacity to test for rabies and report official results to the central veterinary laboratories.
- Institute both active and passive surveillance for rabies in dogs and humans, including laboratory testing of suspected rabid dogs.
- Institute dog vaccination plans with the aim of achieving 70 percent coverage.
- Ensure that municipal councils enforce animal ownership laws.

Rabies prevention and control practice in Chongqing, China

Zheng Zeng

Chongqing is the largest municipality in the world with 38 counties and districts. It is estimated that the dog population is between 2.1 and 2.3 million, and more than 90 000 people are bitten by dogs every year. Since 1996, 699 persons have died of rabies and 64 canine rabies cases were confirmed in the laboratory.

The Dog Administration Office, organized by the Public Security Bureau, Agriculture Bureau and Health Bureau, is the only official agency responsible for the control and prevention of rabies in Chongqing. NGOs, corresponding county-level agencies and township-level agencies are all involved in rabies activities. Since 2008, four laws and plans related to rabies control have been enacted and dog rabies has become the priority animal disease with a planned elimination by 2020. Massive technical training courses for veterinarians

and public awareness campaigns have been carried out with the help of FAO and OIE. Presently, a free dog vaccination policy is being implemented in all counties. Laboratory diagnostic capacity, three training of trainers (TOT) teams and two pilot rabies-free counties were established. There were 2 996 veterinarians and 1 359 primary school students in attendance at the on-site training courses.

Although human rabies cases have decreased from 175 (in 2007) to 32 (in 2012), some constraints and challenges remain. Therefore, policy-makers' support for the management of stray dogs along with public awareness and cooperation need to be improved over the next eight years.

Rabies in Bali, Indonesia

Eric Brum

Rabies was introduced in Bali in 2008 and spread rapidly throughout the island. At the time of this meeting, 141 human rabies deaths had been reported associated with this outbreak. Since implementation of mass vaccination of dogs in late 2010, the number of human and animal cases of rabies has dropped dramatically. From 2010 to 2011, human cases decreased by 72 percent, and by November 2012, human cases had dropped by 90 percent compared to 2010. Since September 2010, two mass vaccination campaigns have been completed and a third campaign was done in 2012. The first campaign was completed with external donor funding and implemented by a local NGO. The Government of Indonesia then assumed implementation responsibility for the second and subsequent campaigns. Keys to successful programme implementation have been: 1) the focus on a clear operational goal of vaccinating 70 percent of dogs in each subvillage throughout the island during each campaign; 2) daily short message service (SMS) reporting of all vaccination and post-vaccination survey results alongside a paper reporting system; 3) daily, weekly and monthly government coordination meetings during vaccination campaigns; and 4) development of campaign-specific standard operating procedures (SOPs) with in-service training of field staff.

Use of available single dose parenteral vaccine, locally-made dog catching nets, and long-lasting collars were the only disease-control specific technologies required. Challenges encountered include: 1) community and local leaders' general misunderstandings of the principles of effective rabies control (e.g. that dog elimination is ineffective); 2) difficulty in developing a larger number of highly-skilled dog catchers capable of catching dogs in open areas; 3) timely government procurement of large quantities of internationally-produced vaccine to enable campaign completion; 4) reluctance of veterinarians to vaccinate dogs less than 3 months old; and 5) lack of local availability of an affordable, long-lasting dog collar.

The rabies control strategy on which the Bali programme is based is focused on vaccinating dogs, verifying coverage and maintaining coverage between campaigns. Dogs are vaccinated using single dose long-lasting vaccine, with an emphasis on dogs and puppies kept outdoors. All dogs except growing puppies are marked with a long-lasting collar. Campaign vaccination coverage at the subvillage or village level is then verified with a post-vaccination survey done shortly after completion of vaccination by counting outside dogs with and without collars. If coverage is below 70 percent, additional vaccination is

performed. Following completion of each island-wide campaign, the rate of decrease in vaccination coverage can be slowed through reducing population turnover by: 1) dog sterilization and trash management to reduce canine birth rate; 2) providing better care and support to vaccinated dogs to prolong their lives; and 3) avoiding culling of vaccinated dogs. Vaccination coverage can also be supplemented between campaigns by ongoing vaccination of outside dogs and puppies by specially trained vaccination teams and vaccination of all dogs, including puppies, under care of private veterinarians.

In addition to the vaccination programme, an integrated bite case management (IBCM) system was developed between human and veterinary health counterparts to improve both the sensitivity of animal surveillance and the clinical management of human bite cases. Through IBCM, all human bite cases presenting at a human health facility are immediately reported to the veterinary counterpart in order to conduct an investigation of the biting animal. If the animal shows signs of rabies, it is euthanized and sent to the laboratory for fluorescent antibody test (FAT) testing. Healthy dogs are observed for ten days to confirm that they were not infected with rabies at the time of the bite. Following IBCM training, submission of rabies-suspect samples increased four-fold. Human health centres were also able to conserve post-exposure vaccine doses in those cases where the biting animal was deemed healthy.

Activities, opportunities and issues associated with programme implementation

BRAINSTORMING SESSION

Facilitator: James Zingesser

For this session, participants were asked to consider constraints to implementing rabies prevention and/or elimination programmes, based on actual experience. Where an opportunity presented itself, it was duly noted.

Activities that should be implemented as early as possible

Participants noted that several key activities can and should be initiated as early as possible in any rabies prevention programme:

- public health and hygiene education/training;
- training of animal health workers in:
 - handling of dogs;
 - marking of dogs;
 - prevention and/or treatment of injuries and possible exposure to rabies virus.
- laboratory diagnostics - all medical and veterinary officers should have access to reliable and accurate diagnostic services, with the capacity for emergency diagnostics within 72 hours of an incident. The short-term goal is to have this facility available in national laboratories, and the mid-term goal is to build laboratory capacity at the appropriate level, based upon need. This outcome would require:
 - training in laboratory diagnostics;
 - procurement/supply of laboratory equipment and consumables.

Short term (years 1–2)

When considering the first two years of implementing a rabies prevention programme, the following issues were raised:

- need for better understanding of the descriptive epidemiology of rabies in the country;
- need to develop a short-term plan to strengthen human and animal rabies surveillance systems;
- need to train national partners on the use of data for programme development and evaluation;
- need for better understanding of rabies prevention/control strategies;
- need to procure and store sufficient canine anti-rabies vaccine supplies.
- need to develop a national PEP strategy for public health;

- need for health education at all levels, involving the following stages:
 - develop materials (evidence-based, using social science methodologies);
 - field testing of materials;
 - produce sufficient quantities of educational materials;
 - train trainers to engage communities and deliver rabies prevention messages.
- need to increase public awareness among decision-makers and communities at risk;
- need to initiate development of a long-term plan for integrated, One Health rabies surveillance.

Medium term (years 3–5) to long term (year 5 and after)

In considering the third through fifth years of implementing a rabies prevention programme, the following concerns were raised:

- need to achieve uniform canine vaccination coverage in rabies-endemic areas;
- need to acquire and store sufficient human and canine anti-rabies vaccines for the medium term;
- need to develop sustainable laboratory diagnostics and surveillance systems;
- need to streamline cumbersome government procurement systems where necessary (this is also important in the long term);
- need to adopt cheap, permanent and safe techniques for marking vaccinated dogs (this is also important in the long term);
- need to secure a sustainable supply of effective biologicals (this is also important in the long term).

Regulatory issues

Where regulations exist, there are opportunities to use them to benefit rabies control programmes; however, regulatory issues can be impediments to programmes where government agencies are hesitant to establish or enforce regulations.

Key issues include whether or not suspected rabid animals are quarantined or sacrificed.

Professional development

The following areas for professional development were identified:

- Improve the confidence and skills of veterinarians and animal health workers working with potentially dangerous dogs. This goal should be a standard part of primary training for veterinary students in rabies-endemic countries, and should also be included in continuing professional development programmes where appropriate;
- In many countries, veterinarians who work with dogs are perceived to have lower status in the profession than veterinarians working with food animals. This perception may have an impact on the human resources readily available for rabies prevention activities.

Opportunities

The participants also identified the following opportunities:

- The Blueprint for Rabies Prevention and Control (www.rabiesblueprint.com) allows for sharing of experience, materials and resources as well as provides access to examples of educational materials that can be adapted to individual countries

- WRD as a powerful advocacy and public awareness tool (information is available at <http://www.worldrabiesday.org/>);
- Legislation already exists in many countries that facilitates collection of data on rabies, including countries where rabies in humans and animals is monitored by national surveillance systems;
- Laboratory-based surveillance has been established in some countries and, in some, it is mandated by law;
- Ministries can have experienced trainers available for surveillance teams (e.g. from rinderpest and polio eradication programmes);
- Where veterinary professional associations are active, the government can enter into a public-private partnership for the delivery of specific services;
- OIE and WHO have anti-rabies vaccine stockpiles for Southeast Asia and Africa, respectively.

The stepwise approach

THE PROGRESSIVE PREVENTION AND CONTROL OF TRANSBOUNDARY ANIMAL DISEASES (TADs) IN DEVELOPING COUNTRIES

Giancarlo Ferrari

“Would you tell me, please, which way I ought to go from here?”

“That depends a good deal on where you want to get to” said the Cat.

“I don’t much care where” said Alice.

“Then it doesn’t matter which way you go” said the Cat.

(Lewis Carroll, **Alice’s Adventures in Wonderland**, Chapter 6)

The prevention and control of transboundary animal diseases (TADs) in any country can be very challenging. In developing countries, where resources for animal disease control are limited or absent, TADs can readily become established as endemic, which frequently results in loss of livelihoods, and threats to food security and local economies. In TAD-free countries, the primary responsibility of the national animal health service is to establish early warning, early detection and early response to disease threats *before* they become endemic. Whereas, in countries where major TADs are already endemic, the first challenge for animal health services is to gain a better understanding of the epidemiological cycles and drivers of priority infectious diseases. This knowledge needs to be attained before control programmes can be launched.

It was with the sequential nature of animal health service activities in mind that the PCP-FMD was developed. As the Cheshire cat taught Alice, you must know where you are going if you want to find your path. The PCP-FMD provides a stepwise approach by which an FMD-endemic country can recognize where they are, and determine the best way to get to where they want to go in a sustainable manner. The pathway defines a series of stages, from zero to five, which range from a level of having no evidence-based knowledge of the disease to certification of disease-free status. The lowest level, Stage 0, is assigned to a country in which FMD is known to be present, but where there is a lack of structured information. One of the earliest and most important elements of the PCP-FMD is disease monitoring and/or surveillance, which provides data for planning, executing and evaluating the national control programme.

In the PCP-FMD, before moving from lower to higher stages, it is essential to fulfil the requirements of the previous stage related to: (i) an improved knowledge of the epidemiology of the infection in the target country; (ii) initial implementation of targeted mitigation and control measures towards specific risk-groups; and (iii) extension of mitigation and control measures at population level. The PCP-FMD guides national programmes through a process that could eventually lead to achieving the status of freedom from FMD infection according to the norms and standards of the OIE.

The principles underlying the progressive approach for FMD control can be used for many other diseases. In the case of rabies, a better understanding of the main epidemio-

logical cycles that sustain virus transmission (including the role played by different host species) and the implementation of targeted prevention and control activities addressing those identified risks are fundamental steps that will lead to the elimination of the dog-mediated human cases of rabies.

Discussion

The PCP-FMD comprises a set of control programme activities and stages that ultimately lead to FMD freedom. The regional roadmaps assist countries within regions to determine their stage in order to demonstrate how the region can move forward to eliminate the virus. The PCP uses risk analysis principles to identify and address critical control points and promotes the risk-based targeting of resources. Adaptation of the PCP approach to rabies prevention will require developing a risk-reduction approach and activities in each stage that are appropriate to mitigate the risk of rabies in humans. Surveillance will be of great importance and there also needs to be a clear coordination mechanism between animal and public health services. Because the vast majority of human rabies infections are caused after exposure to dog rabies, the main target will be to eliminate dog-transmitted human rabies.

Large countries could have different stages for different parts/regions of the country. Defining the different stages and identifying needs can help identify funding gaps so that proposals can be appropriately elaborated and submitted to potential donors.

Development of an approach and indicators

LESSONS LEARNED FROM GLOBAL PROGRAMMES

Tracking progress along the PCP-FMD

Melissa McLaws

The PCP for FMD control was developed by FAO and the European Commission for the Control of Foot-and-Mouth Disease (EuFMD) as a tool to assist FMD-endemic countries in the progressive reduction of the impact of FMD and load of FMD virus in their animal populations. The aim of the tool is to guide countries along a pathway of activities from measuring risk to managing risk with the eventual goal of their application for OIE recognition of freedom from FMD. The activities and achievements of the PCP-FMD are structured in discrete stages and it is important that countries using the PCP tool are able to identify clearly their particular stage along the pathway.

Standardized procedures and tools were developed to assess stages based on four key principles:

1. The process must be transparent to all.
2. The assessment should be evidence-based.
3. Methods must be standardized so that stages are comparable across regions.
4. The process must be user-friendly and not too arduous.

The primary objectives of the PCP-FMD are to allow countries to identify their own stage of programme development, and then to track their progress over time. In addition, the PCP provides clear descriptions of programmes at each stage in order to identify strengths and weaknesses in FMD control. This information may be useful for prioritization and identification of where external support could be useful and for the development of regional and global maps of the FMD situation.

A number of tools have been developed (or are under development) to assist with PCP-FMD stage assessment. First, a simple and rapid checklist was designed to track compliance with PCP-FMD guidelines (available at http://typo3.fao.org/fileadmin/user_upload/eufmd/docs/PCP/PCP_en.pdf). The checklist consists of a series of yes/no questions intended to determine if a country has achieved the outcomes defined in each PCP-FMD stage. Achievements are grouped as 'required' and 'recommended'. All 'required' outcomes must have been achieved in order to progress to the next stage, whereas 'recommended' outcomes are intended to enhance programme quality. To complement the questionnaire, a guideline document and glossary are available.

In addition to the self-assessment, EuFMD/FAO has also developed an external assessment form to be completed by a trained assessor from outside the country. This external assessment may be completed either through a mission to the country or through the review of a dossier.

FIGURE 1
2012 West Eurasia roadmap

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Kazakh			1	1	1	3	3	3	4	4	5	5	5
Kyrgyz			0	0	1	2	2	3	3	3	4	4	5
Tajik			1	1	1	2	2	2	2	3	3	3	3
Turkmen			0	0	1	2	2	2	3	3	3	3	3
Uzbek			0	0	1	2	2	2	3	3	3	3	3
AFG			1	1	2	2	2	2	3	3	3	3	4
IRN			2	2	2	2	2	3	3	3	4	4	4
PAK			1	1	1	2	2	3	3	3	4	4	4
East Anatolia (TR)													
Thrace (TR)			new	4	4	4	4	5	5	5	5	5	5
Marmara Aegean (TR)				2	2	2	3	3	4	4	4	4	4
Central Anatolia (TR)				2	2	2	2	2	2	2	3	3	3
Syria			1	1		3	3	3	4	4	4	4	5
Iraq													
Armenia			2	2	2	2	3	3	3	4	4	4	4
Azerbaijan			2	2	2	2	3	3	3	3	4	4	5
Georgia	pending		1	1	1	2	2	3	3	3	4	4	5

The self-assessment checklist was used in 2011–2012 in regional roadmap meetings by countries in South Asia, East Africa and West Eurasia. In East Africa and West Eurasia, each country submitted a PCP-FMD checklist prior to their meeting. During the meeting, each country gave presentations describing the current state of FMD control according to a specified template. On the basis of the checklist result and the information presented, a provisional PCP-FMD stage was assigned by an EuFMD/FAO committee (in West Eurasia) and was then discussed/approved by the roadmap Advisory Group for West Eurasia which includes country representatives. Following this approval, the provisional stages were presented at a meeting. Each country was given the opportunity to discuss the stage assignment, and up to three months to submit additional materials/evidence to support adjustment of the provisional stage. Further, each country was asked to project their anticipated progress along the PCP-FMD up to 2020. The past, current and projected PCP-FMD stages were then used to create a regional roadmap (Figure 1).

Experience gained from NTD programmes – a public health perspective

James Zingser

NTD programmes have been important to global health since 1974, when WHO launched the Onchocerciasis Control Programme (OCP) in collaboration with FAO, the World Bank, and the United Nations Development Programme (UNDP). That programme was designed to protect 30 million persons at risk for onchocerciasis in 11 sub-Saharan African countries. The global campaign to eradicate Guinea worm disease began at the CDC in 1980. In 1986, The Carter Center began leading the global campaign, in conjunction with CDC,

UNICEF and WHO. At that time, there were an estimated 3.5 million cases of Guinea worm disease annually in 20 dracunculiasis-endemic countries in Asia and Africa. Onchocerciasis has been successfully controlled in many countries, and in 2012, there were only 542 Guinea worm disease cases reported in four African countries.

In this report, the author is drawing on personal experience in four global NTD programmes: Guinea worm eradication, and onchocerciasis, trachoma and lymphatic filariasis control. The success of these programmes has relied on innovative approaches to working directly with communities to administer medications or change behaviour, along with epidemiological surveillance and programme management at the global, regional and national levels.

The key lessons learned in these four NTD programmes have been:

- epidemiological surveillance is powerful;
- opportunities must be seized;
- health education is essential;
- programme managers are a necessity and must be brought together at least once each year.

Surveillance systems are important. Epidemiological data can successfully be collected and analysed at all levels of a national programme. Eradication programmes demand routine collection of case and management data from each village. The Guinea worm eradication programme has shown that village-based surveillance is feasible. Data must be accurate and timely in order to be useful for decision-making, which is the primary purpose of data collection. Accurate routine data are also invaluable in advocacy for the programme, supporting requests for resources and documenting progress made.

Take advantage of opportunities. Disease control programmes take time. In one sense, decades are but a brief moment compared with the millennia humankind has been plagued with tropical diseases, including rabies. However, healthcare workers, managers, politicians and donors all succumb to fatigue in a matter of years. Funding and enthusiasm wax and wane. When interest in a neglected disease rises, we must take full advantage of the opportunity as it will not last.

Behaviour change is crucial and health education is the key. Technological advances are important components of any health programme, but so is change of behaviour. The key to changing behaviour is health and hygiene education, which is relatively inexpensive and extremely portable. Communication and education materials can be readily adapted to different cultures, languages and socio-economic milieu, and often these materials can be integrated into other health programmes.

Programme managers' meetings are important. Many NTD programmes have been strengthened and driven by programme managers' meetings. The establishment of an official national programme, and the selection of a dedicated programme manager are essential. However, having a programme manager is not sufficient. The manager must be motivated, learn to lead and have access to adequate resources. Regional and global managers' meetings have been shown to educate, motivate and build camaraderie. There is frequently a healthy competition between regional and national programmes. Most global programmes have two types of meetings. The first, is an annual programme managers' meeting, organized by subregion or language, in which frontline workers share experi-

ences. The second, is an annual global programme review meeting. These meetings bring together top decision-makers in the ministries responsible for the programmes, in the presence of their programme managers, so that they can listen to each other and discuss key issues. Participants may include Secretary-Generals or even Ministers. The programme review meetings are usually thematic, in that they focus on topics of special interest at that point in the programme. The locations for programme review meetings are frequently chosen to advocate for a national programme that needs help or to highlight one that has done something extraordinary.

The adoption of a PCP for human rabies of canine origin would be a significant tool to be used in programme manager meetings and programme reviews. The creation of clear stages and criteria for moving from stage to stage give managers common ground for comparing the progress of national programmes. A PCP could promote a competitive spirit and help programmes to focus on priorities. In addition, the adoption of the pathway would provide a common language and roadmap to be used by programme managers and their partners, including high-level decision-makers, when discussing programme strategy and evaluating programme success and challenges.

Discussion

During the discussion, it was noted that there are a number of experiences and best practices regarding rabies prevention that could be shared between countries and continents. For example, some successful experiences include the creation of Animal Health Clubs in schools in Sierra Leone or the community selection of a Mr and Mrs Rabies who receive basic health volunteer training so that they can become the focal point linking communities with health and veterinary services. Such ideas could be shared and disseminated to programme managers in other countries. Asia and Egypt have held successful programme manager meetings for Highly Pathogenic Avian Influenza (HPAI) programmes. In these meetings, national programme managers share best practices and discuss successes and challenges in HPAI control and prevention.

Some participants expressed the concern that disease control activities should not be delayed due to a lack of national surveillance. Even before the actual rabies situation is fully assessed in a country or region, lives can be saved through the introduction of dog vaccination, animal bite wound care and overall public awareness.

Decision-makers should be informed that surveillance systems can include simple and rapid studies that can yield important results for relatively little cost. For instance, a rapid survey demonstrated that the dog population in the United Republic of Tanzania had been overestimated in the past, leading to a lower vaccination coverage calculation, a finding that had a significant impact on policy decisions and planning for the national rabies programme. On a cautionary note, participants were reminded that the very word "surveillance" can discourage policy-makers in some countries.

There was also discussion on how modern epidemiological surveillance can be used to inform decision-makers and guide rabies prevention programmes. Molecular epidemiology can shed light on the significance of the movements of animals and their viruses within and between countries. For example, in countries where dog meat is consumed, dogs might be transported over long distances. In Indonesia, there is significant movement between

islands both by fishermen and as part of an important commercial trade for hunting dogs. In recent years, rabid dogs have been transported into Europe from Morocco and other rabies-endemic countries. At present, Australia is funding a risk assessment of the potential introduction of dog rabies from rabies-endemic countries in the region.

This public health perspective on zoonoses was appreciated also for the demonstration of leadership that intergovernmental organizations can provide for disease control programmes. World Health Assembly resolutions have had a tremendous impact on building international consensus for disease control, elimination and eradication programmes. Similar support from intergovernmental animal health organizations would be beneficial for global rabies prevention. NTDs and NZDs, as conceived by WHO, are diseases that are closely linked to poverty, and should be addressed as high priorities by both WHO and FAO.

Foot-and-Mouth disease: PCP as a policy development tool

Keith Sumption

Climbing enormous mountains is best done in stages. This philosophy fuels the PCP initially developed for FMD by the EuFMD Commission with EMPRES in FAO. The pathway was created to assist FMD-enzootic countries to identify sustainable national strategies for managing FMD risk. It was first used in a regional meeting in Shiraz, Iran in 2008 to compare the national FMD management activities of participating countries. The acceptance and successful use of the PCP framework by the participating countries led to the development of a long-term, regional approach to FMD management. Basic principles of the PCP are to ensure that:

- management is simple;
- national policy is clear and based on a comprehensive assessment of options and responsibilities;
- every activity has a rationale;
- measurable benefits are achieved at every stage.

The PCP-FMD is a framework that facilitates national policy setting, gap analysis and monitoring. The PCP-FMD is now used in national programmes for policy development and to set realistic national milestones for veterinary activities. Although the pathway was developed at FAO, it is currently used by many countries, not only those with FAO support.

The PCP-FMD is composed of five stages that guide planning and management of efforts to increase the level of control up to application to the OIE for official recognition of freedom from FMD (with or without vaccination). Stage 1 assists in the identification of appropriate control options. Stage 2 involves the implementation of the chosen policy. In Stage 2 it is not expected that control measures will reduce FMD incidence across entire animal populations. Interventions may be privately financed or come from a combination of public funding (e.g. in border regions) and private funding (e.g. livestock keepers supported vaccination programmes). Stage 2, therefore, does not necessarily imply that large investments are necessary at the national level, but if the private producer is to pay for preventive measures, he/she will expect adequate information for decision-making and access to effective vaccines. This stage, in itself, will create demand for information and results to guide vaccine selection. However, Stage 3 normally requires significant national capacity

and sustained investment to achieve progressive elimination of virus circulation. National capacity is required to regulate internal trade and ensure sufficient immunity is maintained in critical populations in order to prevent virus circulation.

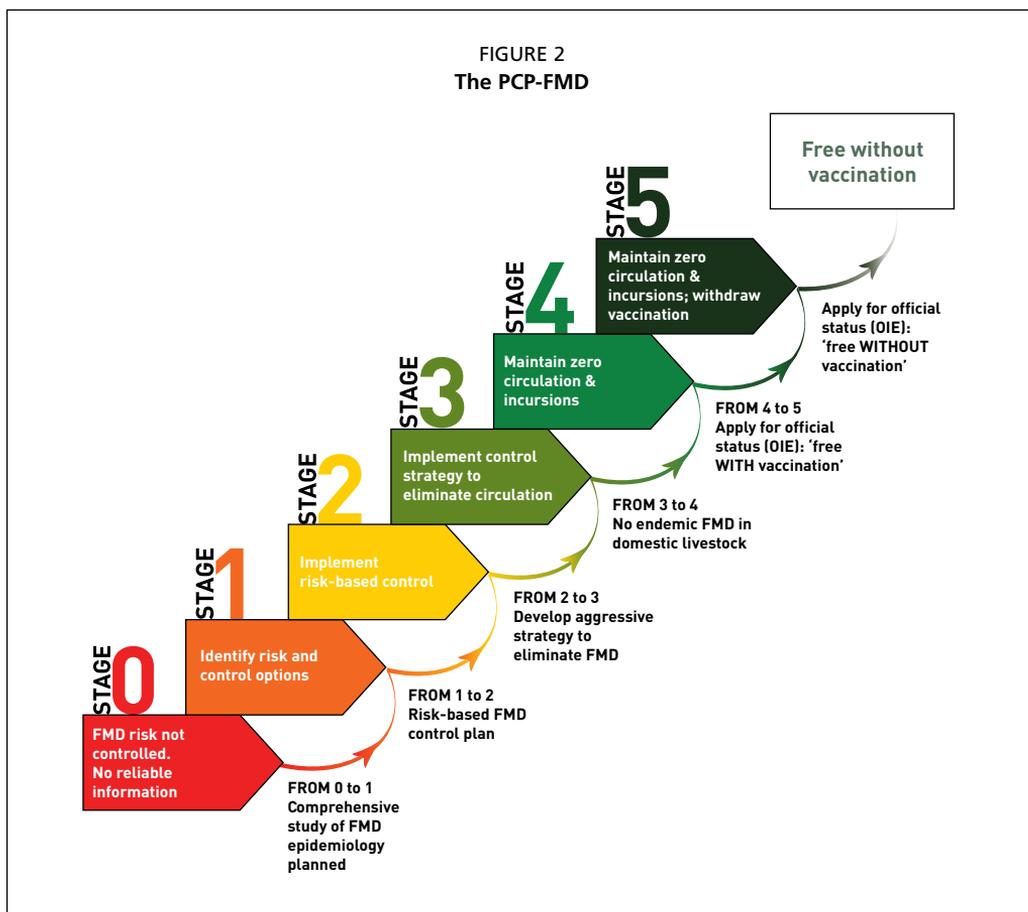
The first entry point is usually the development of a comprehensive national FMD control strategy. This strategy development is the focus of Stage 1. It does not presume national resources will exist for a massive control campaign, but at this stage the impact of the disease is assessed as are the interests of stakeholders, the risk-management options, and the willingness of public and private sectors to share the costs of control. The end result should be a consensus on what *can* be done, mainly with national resources. Options could be anything from a policy of leaving preventive measures to livestock keepers to a set of public and private measures to prevent losses in key sectors. Mass vaccination through public funding is not the only option, but selective (risk-based) measures can be politically difficult to administer, so the PCP process helps decision-makers to assess and weigh these options.

Common issues faced when first using the PCP approach to engage national policy-makers include the tendency of some experienced animal health authorities to assume that mass vaccination is the *only* intervention and, consequently, to view the problem to be too vast to solve. Conversely, less experienced animal health authorities may have unreal aspirations of a rapid climb up the PCP ladder. The PCP approach has value in managing both sets of policy-makers; balancing practicality with ambition. National strategic goals are clarified, but the ways to achieve those goals are left to the countries to determine.

In Stages 1 and 2, prevalence and virus typing are far more important than detection of individual events, which gives decision-makers an overview of the national or regional situation. The PCP approach looks at public and private responsibilities and benefits, asking: Who is affected? Who benefits? Who can pay? In an age of austerity, governments may be tempted to leave FMD control to the private sector, but even so, government has to accept responsibilities to ensure vaccines are available, effective and safe. Setting targets for disease reduction is also tricky for ministries. For example, what level of disease can be considered acceptable by stakeholders if they are the ones who pay for services? The evidence-based policy setting process in the PCP-FMD assists the public and private sectors to reconcile responsibilities.

In Stage 3, where the aim is to prevent virus circulation, the approach moves from monitoring to surveillance. Therefore, much greater emphasis is placed on actions to be taken when virus is detected. The PCP-FMD makes a distinction between *monitoring* a programme (for impact) and *surveillance* (to detect events that require action). In addition, when Stage 3 is reached, there are options to apply for OIE endorsement of the national FMD control programme. This recognition is distinct from official freedom, which is the target of Stage 4 (free with vaccination) and Stage 5 (free without vaccination).

Overall, the success of the PCP has been that it engenders a sense that progress is achievable and gives tangible outcomes to countries embarking on FMD control. The PCP-FMD has filled a major gap between those 'lost countries' which had no available data and countries with more sophisticated health management systems. The PCP-FMD is simple, comprehensive and credible (progress to each successive stage must be validated with evidence).



Discussion

Participants were curious about how to motivate countries to use the PCP-FMD. The experience of the FMD programme showed that many senior officials from FMD-endemic countries found the PCP approach attractive for solving their national problems. Not only did they appreciate the utility of the PCP process itself, but they also enjoyed comparing their stage with those of their neighbours at regional meetings. The regional meetings have helped to create accountability, and the indicators for national progress enable gaps to be identified for national activity planning. There has been a spontaneous adoption of the PCP by some countries after one exposure to the tool.

PCP stages can be considered outcomes, and both donors and national programme managers appreciate the PCP-FMD as a means to measure outcomes and results. Some early resistance to adopting the PCP related to a misconception that it was an elimination pathway. However, it is now generally accepted that elimination is but one possible outcome, and that measurable benefits are appreciated in the early stages. In addition, the approach can support compartmentalization and commodity-based trade.

The transparency of the PCP-FMD process allows decision-makers to identify distinct responsibilities for the public and private sectors. The PCP approach provides data that can

be used to encourage investment in control and elimination programmes, with outcome indicators facilitating monitoring of the investment.

The startup costs for introducing the PCP-FMD regionally have been remarkably modest. EuFMD/FAO costs have included a few regional workshops in Africa and Asia, as well as two global meetings held in Paraguay and Thailand. The global meetings were more expensive, but served as important milestones. One major consideration is provision for training PCP experts and trainers. Each region must have trained subject matter experts to assist participating countries in using the framework and writing national project and strategy documents. The investment for country-level programmes is not great, but it is not insignificant. The cost for countries in Stage 1 of the PCP-FMD has been approximately US\$150 000, based on a need to estimate prevalence of infection and impact (which is often greatly under-recognized).

Experience of EuFMD/FAO has shown that recognition of the framework and consensus building by partner organizations is important. This approach would apply as well to rabies as it does to FMD.

Discussion: naming the stepwise approach to rabies control

Preliminary discussions about possible names for the approach resulted in initial consensus on “a progressive control pathway towards rabies elimination” or “PCP-Rabies”. However, subsequent discussions by partner organizations in rabies prevention and elimination, which have included many of the workshop participants, have led to an agreement on the name: a stepwise approach to rabies control.

FIRST DRAFT OF THE STEPWISE APPROACH TO RABIES CONTROL

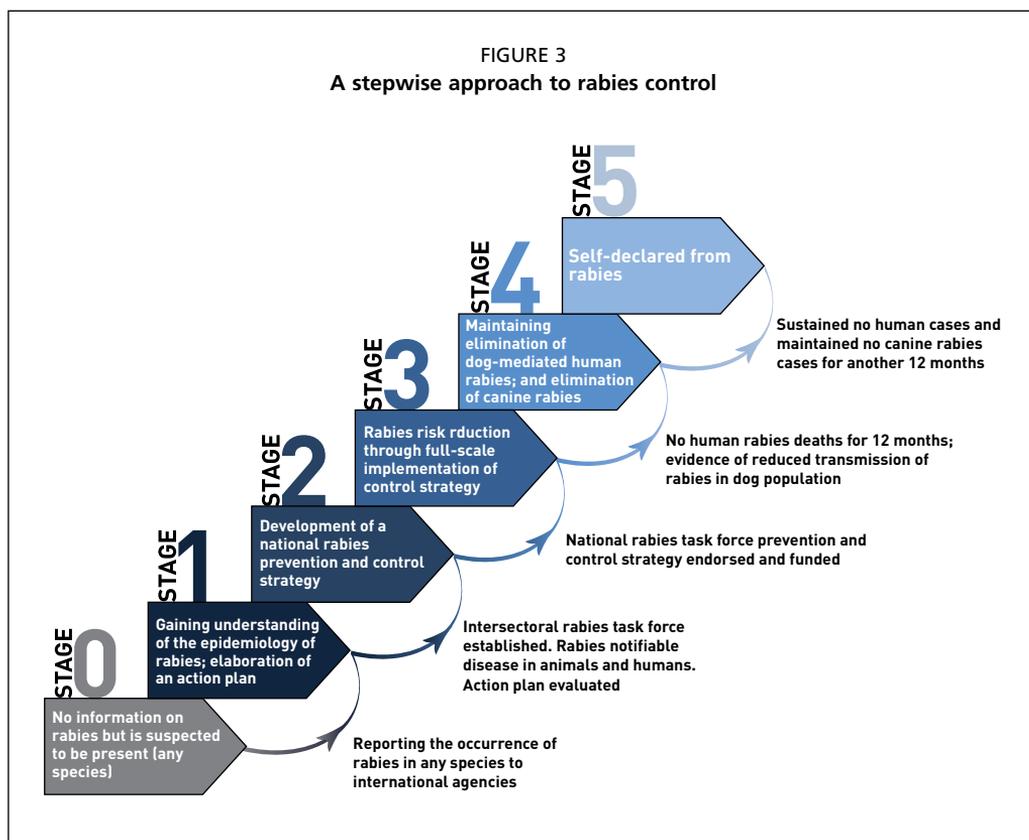
Meeting participants discussed the format and content of a detailed stepwise approach for rabies prevention extensively. Six distinct stages, numbered zero to five, are being defined, along with corresponding activities to be undertaken by the animal and public health sectors. Each stage includes the following areas:

- legislation
- data collection and analysis
- diagnostics
- prevention and control
- information-education and communication.

For each stage of the pathway, it is very important to define goals and criteria for moving to the subsequent stage. The meeting participants were able to produce a very good initial draft of the stepwise approach that was further developed with additional input from regional and national partners.

NEXT STEPS

There are several upcoming regional and international events that can be used to further the PCP towards rabies elimination. During the early 21st century HPAI panzootic, inter-ministerial committees were set up in many countries. Since then, a number of countries have adapted these committees to address a wider range of zoonotic diseases, while in other countries these committees have become dormant. For rabies, it would be important



that countries establish interministerial task forces or rabies working groups to address the control of this disease in the different relevant sectors. In Kenya, the setting up of the ZDU could be an important step forward and a model for addressing rabies and other zoonotic diseases that require cross-sectoral collaboration and coordination.

Upcoming regional meetings

- Bali rabies meeting (J. McGrane participating);
- Gabon One Health meeting November 2012 (K. de Balogh participating);
- PENAPH First Technical Workshop, 11–13 December 2012 Chiang Mai, Thailand (M. Martinez participating);
- Prince Mahidol Award Conference, 28 January to 2 February 2013, Bangkok, Thailand (K. de Balogh presenting poster and organizing side-event on NZD);
- Tripartite FAO/OIE/WHO 5–7 February 2013 Rome, Italy (background paper on rabies to be prepared);
- Southern and Eastern African Rabies Group, 12–14 February 2013, Dar-es Salaam, United Republic of Tanzania (S. Cleaveland and K. de Balogh participating; workshop on the PCP envisaged);
- OIE General Assembly, 26–31 May 2013, Paris, France;
- PRP meeting 15–18 July 2013, Switzerland (presentation on PCP-Rabies scheduled).

Funding considerations

Experience in developing the PCP-FMD has suggested that global, regional and national components should be included in the initial budget estimates. A PCP-Rabies would have costs associated with both the public health and animal health sectors. Laboratory equipment and training should be considered in the overall budget, both regionally and nationally. Laboratory support and training has already been done with the support of various organizations, including CDC and FAO (through the USAID-supported IDENTIFY project).

A survey of rabies-endemic countries was recommended to identify ongoing rabies programmes so that required funds could be calculated. Persons in the different rabies networks could help to provide information for the questionnaires, and regional meetings could be used to gather this information. In addition, sending questionnaires and providing countries with information on the PCP-Rabies could also serve to inform and advocate for rabies prevention programmes. Large conferences, like the OIE rabies meeting in 2011 in the Republic of Korea, should include fund-raising components. The Tripartite (FAO, OIE, WHO) as well as the Global Framework for the Progressive Control of Transboundary Animal Diseases (GF-TADs) should actively engage in fundraising.

Closure

(Katinka de Balogh)

Great progress was made in this meeting, though there is considerable work to be done to review the steps and develop indicators as well as to finalize the preliminary discussion document. A wider group of experts will review the PCP document including members from the PRP, WHO consultation group, OIE rabies reference laboratories, select chief veterinary officers and representatives of the Pasteur Institute, RabMed control and ICONZ.

The PCP-Rabies has been conceived as a living document that will certainly require numerous iterations through extensive consultation with technical experts and national decision-makers. All of the participants were thanked for their valuable contributions to developing the PCP-Rabies, which we intend to be a decisive step towards the elimination of human rabies of canine origin.

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Annex A

Agenda of the meeting

FAO HQ, ROME, 6-8 NOVEMBER 2012



Agenda and list of participants

DEVELOPING A
STEP-WISE APPROACH FOR
RABIES PREVENTION AND CONTROL

WORKSHOP
Espace Gabon (A024)



DEVELOPING A STEP-WISE APPROACH FOR RABIES PREVENTION AND CONTROL

6-8 NOVEMBER 2012

DAY 1: Tuesday 6th November 2012

09:00-09:45	Welcome	J. Lubroth K. de Balogh
	Objectives of the workshop	
	Introduction of participants	
	SESSION 1. Rabies Prevention and Control (past and present) – Chair: J. McGrane (FAO)	
09:45-10:30	Available control strategies/tools/ approaches and guidance on rabies prevention and control including resources	M. Martinez (OIE) F. Meslin (WHO) (15 minutes each)
10:30-10:45	World Rabies Day and Partners for Rabies Prevention, Rabies Blueprint	S. Cleaveland (GARC)
10:45-11:00	Coffee break	
11:00-11:15	Regional initiatives	S. Cleaveland (SEARG) K. Wantanee (ASEAN) F. Meslin (RITA)
11:15-11:45	Country experiences	P. Omemo (Kenya) E. Ogola (Kenya) Z. Zheng (China) J. McGrane (Bali)
	SESSION 2. Identification of constraints and opportunities for rabies prevention and control in rabies endemic countries	
11:45-12:15	Brainstorming session	Facilitation: J. Zingesser
12:15-13:30	Lunch break	
	SESSION 3. The stepwise approach and its application for rabies – Chair: M. Martinez (OIE)	
13:30-14:00	Developing a step-wise approach for rabies prevention and control	G. Ferrari V. Guberti
14:00-14:30	Discussion	Plenary discussions
14:30-15:15	Defining the stages for rabies	Group work; A. Africa B. Asia
15:15-15:45	Tea break	
15:45-16:30	Continuation of group work and presentations	
16:30-17:00	Presentation of PANAFTOSA/PAHO	F. Mayer (via skype)
17:00-17:30	Wrap-up of the Day 1	

DAY 2: Wednesday 7th November 2012**SESSION 4. Development of a stepwise approach and definition of indicators – Chair: F. Meslin (WHO)**

09:00-09:15	Recap from previous day and introduction into Day 2	
09:15-09:45	Presentation on indicators and the indicator check list	M. McLaws <i>(by skype)</i>
09:45-10:15	Experience with regional and global coordination for neglected tropical disease (NTD) programmes	J. Zingesser
10:15-10:45	What factors will influence the use of a stepwise approach and what needs to be in place for initiating the approach and assessing progress?	Plenary or working groups
10:45-11:00	Coffee break	
11:00-11:15	Development of national strategies and regional roadmaps	K. Sumption (FAO)
11:15-12:30	Developing national rabies control strategies and regional rabies roadmaps	Group discussion
12:30-13:30	Lunch break	

SESSION 5. Developing an action plan for a the step-wise approach – Chair: S. Cleaveland (GARC)

13:30-14:30	How to develop an action plan to move the step-wise approach from concept to action	Plenary and working group
14:30-15:00	Working group presentation and discussions	Plenary
15:00-15:30	Tea break	
15:30-16:45	Finalising the action plan on how to move the stepwise approach forward at global, regional and national levels	
16:45-17:00	Closure	

DAY 3: Thursday 8th November 2012**SESSION 6. Finalizing country and regional action plans and report**

Annex B

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Annex C

Key elements of effective cross-sectoral collaboration

Key supporting elements	Key operational elements
Political will and high-level commitment	Joint cross-sectoral coordination mechanisms
Trust	Routine communication
Common objectives and priorities	Joint simulation exercises
Shared benefits	Data sharing
Strong governance structures, aligned legal frameworks and recognition of existing international standards	Joint risk assessment
Adequate and equitably distributed resources	Active cooperation on disease control programs
Identification and involvement of all relevant parties	
Coordinated planning of activities	
Guidance on implementation of cross-sectoral collaborations	
Capacity development	
Strong and effective health systems within the individual sectors	

Source: High Level Technical Meeting, Mexico City, Mexico November 2011 (available at <http://www.fao.org/docrep/017/i3119e/i3119e.pdf>)

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12. Rift Valley fever vaccine development, progress and constraints, 2011 (E)
13. Influenza and other emerging zoonotic diseases at the human-animal interface, 2011 (E, Ar)
14. Challenges of animal health information systems and surveillance for animal diseases and zoonoses, 2011 (E)
15. Lessons learned from the eradication of rinderpest for controlling other transboundary animal diseases, 2012 (E^e)
16. Optimization of feed use efficiency in ruminant production systems, 2013 (E^e)
17. Declaration of global freedom from rinderpest – Thirty-seventh Session of the FAO Conference, Rome 25 June-2 July 2011, 2013 (E^e)
18. Developing a stepwise approach for rabies prevention and control, 2013 (E)

Availability: October 2013

Ar - Arabic	Multil - Multilingual
C - Chinese	* Out of print
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More than 50 000 people die from rabies worldwide every year. Most of the victims live in developing countries in Africa and Asia, and are exposed to the rabies virus through dog bites. Every case of rabies prevented is a life saved, so there is an urgent need to implement rabies prevention diligently and globally. In November 2012, the Food and Agriculture Organization of the United Nations (FAO) and the Global Alliance for Rabies Control (GARC) convened 21 experts in canine rabies surveillance and prevention at FAO headquarters in Rome, Italy, to develop a new tool to aid health programme planners and managers. Participants included rabies experts from two rabies-endemic countries (Kenya and China), academic institutions, GARC, the World Health Organization (WHO), the World Organisation for Animal Health (OIE) and FAO. Building on successes and lessons learned in the use of the FAO-developed progressive control pathway for Foot-and-Mouth disease, the workshop participants developed the first model for a stepwise approach to rabies prevention and control. The approach comprises six stages, ranging from Stage 0, where no information on rabies is available in a suspected rabies-endemic area, to Stage 5, where valid and timely epidemiological surveillance data confirm the elimination of rabies in humans and canines. The stepwise approach is intended for adoption and adaptation by national rabies control and elimination programmes as a tool for managing rabies surveillance, control and prevention.

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