



INTER-REGIONAL CONFERENCE
MIDDLE EAST & HORN OF AFRICA

“RVF: NEW OPTIONS FOR
TRADE, PREVENTION
AND CONTROL”

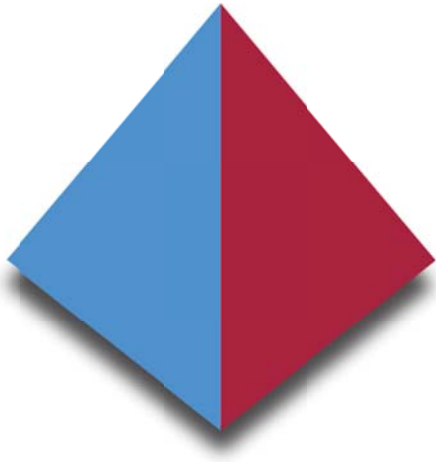
21 - 23 April 2015
Djibouti City, Djibouti

OIE Sub-Regional Representation for Eastern Africa
FAO Emergency Centre for TADs (ECTAD) Eastern Africa
Nairobi, Kenya



GF-TADs
GLOBAL FRAMEWORK FOR THE
PROGRESSIVE CONTROL OF
TRANSBOUNDARY ANIMAL DISEASES





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REPORT

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*“RVF : new options for trade,
prevention and control”*

21.04.2015 – 23.04.2015

Djibouti City ▼ Djibouti

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Nairobi ▲ Kenya

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World Organisation for Animal Health OIE
 12, rue de Prony
 75017 P A R I S FRANCE

oie@oie.int www.oie.int

Food and Agriculture Organisation FAO
 Viale de terme di Caracalla
 00153 R O M E ITALY

fao_hq@fao.org www.fao.org

OIE Regional Representation for the Middle East
 4th floor, Min. of Agriculture, Al Kaake Bldg, Jnah
 B E I R U T LEBANON

+ 961 1 843 467

rr.mideast@oie.int www.rr-middleeast.oie.int

FAO Regional Office for the Near East and North
 Africa. 11, Al-Eslah Al-Zerai Street, Dokki
 C A I R O EGYPT

+ 202 3331 6000 - 6007

fao-rne@fao.org www.fao.org/neareast/en/

OIE Regional Representation for Africa
 Parc de Sotuba Park
 P.o.box 2954
 B A M A K O MALI

+ 223 20 24 60 53

rr.africa@oie.int www.rr-africa.oie.int

FAO Regional Office for Africa
 2, Gamel Abdul Nasser Road
 P.O. Box GP 1628
 A C C R A GHANA

+233 (0) 302 610930

fao-ro-africa@fao.org www.fao.org/africa/en/

Sub-Regional Representation for Eastern Africa
 4th floor, Taj Tower,
 Upper Hill Road, Upper Hill
 P.O. Box 19687
 00202 N A I R O B I KENYA

+ 254 20 271 3461

srr.eastern-africa@oie.int www.rr-africa.oie.int

FAO ECTAD Office for Eastern Africa
 United Nations Office Nairobi (UNON)
 Block P, Level 3, United Nations Complex
 UN Avenue, Gigiri
 N A I R O B I KENYA

+254 20 76 25928

bouna.diop@fao.org www.fao-ectad-nairobi.org

ACRONYMS

AHC	Animal Health Certification
ARC	Agricultural Research Council [South Africa]
ARIS	Animal Resource Information System [AU-IBAR]
ASF	African Swine Fever
AU	African Union
AUC	AU Commission
BSL	Bio-Safety Level
C-AHRN	Chief Animal Health Regional Network
CAHW	Community-based Animal Health Workers
CBPP	Contagious Bovine Pleuro-Pneumonia
CCPP	Contagious Caprine Pleuro-Pneumonia
CDC	Centres for Disease Control and Prevention [US]
CIRAD	<i>Centre de Coopération Internationale en Recherche Agronomique pour le Développement</i> [France]
COMESA	Common Market for Eastern and Southern Africa
CP	Communication Plan
CVI	Central Veterinary Institute [Netherlands]
CVL	Central Veterinary Laboratory [Yemen]
CVO	Chief Veterinary Officer
DAFF	Department of Agriculture, Forestry and Fisheries [DAFF]
DIVA	Differentiating infected from vaccinated animals
DNA	Deoxyribo-Nucleic Acid
DREA	Department of Rural Economy and Agriculture [AUC]
DVS	Department of Veterinary Services
EA	East(ern) Africa
EAREN	Eastern Africa Regional Epidemiology Network
EARLN	Eastern Africa Regional Laboratory Network
EC	European Commission
ECTAD	Emergency Centre for Trans-boundary Animal Diseases [FAO]
ELISA	Enzyme Linked Immuno-Sorbent Assay
ENSO	El Niño Southern Oscillation
EU	European Union
EWS	Early Warning System
FAO	Food and Agriculture Organisation [UN]
FMD	Foot and Mouth Disease
GALVMed	Global Alliance for Livestock Veterinary Medicines
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GF-TAD	Global Framework for the progressive control of Trans-boundary Animal Disease
GMO	Genetically modified organism(s)
HoA	Horn of Africa
IAEA	International Atomic Energy Agency [UN]
IBAR	Interafrican Bureau for Animal Resources [AU]
ICPALD	IGAD Centre for Pastoral Areas and Livestock Development
IGAD	Inter-Governmental Authority for Development
IHR	International Health Regulations [WHO, 2005]
ILRI	International Livestock Research Institute [Kenya]
ILTC	Inter-Laboratory Test Comparison(s)
KEMRI	Kenya Medical Research Institute
KSA	Kingdom of Saudi Arabia
LIDESAS	Livestock Development Strategy for Africa [DREA]
LITS	Livestock Identification and Traceability System(s)
MCDA	Multi-Criteria Decision Analysis
MoA	Ministry of Agriculture
MoH	Ministry of Health
MS	Member State(s)

NASA	National Aeronautics and Space Administration [USA]
ND	Newcastle Diseases
NDV	ND Virus
NOAA	National Oceanic and Atmospheric Administration
OBP	Onderstepoort Biological Products [South Africa]
OIE	World Organisation for Animal Health
OVI	Onderstepoort Veterinary Institute [ARC]
PAN-SPSO	Participation of African Nations in SPS Standards-setting Organisations [AU-IBAR]
PANVAC	Pan-African Veterinary Vaccine Centre [AU]
PCR	Polymerase Chain Reaction
PPR	<i>Peste de petits ruminants</i>
PVS	Performance of Veterinary Services [OIE]
REC	Regional Economic Community
REMESA	<i>Réseau Méditerranéen de Santé Animale</i>
RNA	Ribo-Nucleic Acid
RSC	Regional Steering Committee [GF-TAD]
Rt-PCR	Reverse Transcriptase PCR
RVF	Rift Valley Fever
RVFV	RVF Virus
SMP	Standard Methods and Procedures
SMP-AH	Standard Methods and Procedures in Animal Health [AU-IBAR]
SNT	Serum Neutralisation Test
SOP	Standard Operating Procedure
SPS	[Agreement on the application of] Sanitary and Phytosanitary Standards [WTO]
STSD	Surveillance of Trade-Sensitive Diseases [AU-IBAR]
TAD	Trans-boundary Animal Disease(s)
UAE	United Arab Emirates
UK	United Kingdom
UNDP	United Nations Development Programme
US	United States
USAID	United States Agency for International Development
USD	United States Dollar
VETGOV	Strengthening Veterinary Governance in Africa [AU-IBAR]
VNT	Virus Neutralisation Test
WHO	World Health Organisation [UN]
WTO	World Trade Organisation

This report can be downloaded from www.rr-africa.oie.int/docspdf/en/2015/RVF/Report.pdf

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12, rue de Prony, 75017 Paris, France



PREFACE

Under the auspices of the FAO & OIE *Global Framework for the progressive control of Trans-boundary Animal Diseases* (GF-TADs), some 70 veterinary and medical professionals and scientists met in Djibouti from April 21 to 23rd, 2015 to reassess the situation of *Rift Valley Fever* (RVF) on both sides of the Red Sea : “*new options for trade, prevention and control*”.

The Conference was attended by government representatives of 18 countries including Bahrein, Comoros, Djibouti, Egypt, Ethiopia, Jordan, Kenya, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Somalia, South Sudan, Sudan, Syria, Tanzania and Uganda.

The conference was officially opened by the Djibouti Minister of Agriculture, Livestock, Water and Fisheries, H.E. Mohamed Ahmed Awaleh. Other high profile guests were the Somali Minister of Livestock, Forestry and Range, H.E. Hussein Saïd, the Director of the Agriculture and Environment Division of the *Inter-Governmental Authority on Development* (IGAD), M. Mohamed Moussa, the FAO Resident Representative, Dr. Emmanuelle Guerne-Bleich, the FAO Regional Representative for the Near East and North Africa, Dr. Markos Tibbo, the OIE Regional Representative for the Middle East, Dr. Ghazi Yehia, the Director of AU-IBAR, Prof. Ahmed El-Sawalhy and the Deputy Director of AU-PANVAC, Dr. Charles Bodjo. The WHO was represented by Dr. Pierre Formenty from the WHO Emerging and Dangerous Pathogens Team in Geneva.



The meeting was organised around 5 formal thematic sessions, interspersed with two working group sessions and a visit to the Djibouti Livestock Export Quarantine Facility, operated by the PRIMA International Company. The thematic sessions were

- Session 1 : setting the scene
- Session 2 : challenges to disease control
- Session 3 : trade issues
- Session 4 : prevention, biothreat and early warning
- Session 5 : regional coordination

The experts and participants, through formal presentations, case studies and mock negotiations, as well as through the visit of the quarantine station, were given the opportunity to exchange views on the current spread of RVF infection in Western, Southern, Eastern Africa, the Horn of Africa and the Middle-East, the new developments regarding vaccines and diagnostics, but also the delays in the registration, at national levels, of not-so-new vaccines such as the "Clone 13" vaccine, the consequences of the revised Code Chapter on RVF for international trade in live animals, issues of certification and transparency, forecasting and disease preparedness, as well as regional initiatives in support of Rift Valley fever control at regional (IGAD, African Union) and international (GF-TADs).

Major discussions evolved around new vaccines with the potential to reconcile prophylaxis with the maintenance of trade (DIVA vaccines : differentiating infected from vaccinated animals), the escalating costs and dwindling availability of commercial diagnostic kits, the imminent threat of a new epizootic phase in countries such as South Sudan, Kenya, Tanzania, and others, based on the fact that 2015 is year 8 after the last outbreaks that occurred in the region and that the ENSO (*El-Nino Southern Oscillation*) prediction model shows a consistent increase in chances of climate abnormalities occurring towards the end of this year (2015). Participants recommended making use of all available information and tools, including the recently updated decision support framework for Rift Valley fever and the WHO-OIE Operational Framework on Good Governance of human and animal health services.

Inputs into the meeting were provided by the African Union (AU-IBAR and AU-PANVAC) and the Inter-Governmental Authority on Development (IGAD), the regional economic community for the Horn of Africa, along with speakers from international organisations such as FAO, OIE, WHO and ILRI, and private and public stakeholders in research and trade, such as CDC-Kenya (Kenya), CVI Lelystad (Netherlands), Deltamune (South Africa), GALVmed (UK), KEMRI (Kenya), OBP (South Africa), ARC-OVI (South Africa), MCI (Morocco) and NASA (US).

The organisers were grateful for the financial support provided by the Governments of Great Britain (UK) and the United States (US) through the OIE World Animal Health and Welfare Fund and the AU-IBAR Standard Methods and Procedures in Animal Health project (SMP-AH) respectively. The considerable support provided by PRIMA International C° was equally acknowledged

More information : <http://www.rr-africa.oie.int/en/news/20150422.html>

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Session 0

Opening Session

WELCOMING ADDRESS BY THE OIE REGIONAL REPRESENTATIVE FOR THE MIDDLE EAST

Ghazi Yehia

Representative
Regional Representation for the Middle East
OIE
Beirut, Lebanon



I have the pleasure to welcome you to the opening of the *Rift Valley fever* (RVF) follow-up inter-regional workshop.

Permit me to start by expressing our gratitude to the Minister of Agriculture, Livestock, Water and Fisheries for accepting to hold this seminar in Djibouti, and also to Dr Ibrahim Moussa Cheikh and all the officials and team of the Veterinary Services in Djibouti who contributed to the organisation of the seminar.

The animal resources become increasingly more important as substantial source of food, so that the international community has the common objective of developing livestock and livestock production. Nowadays, new food resources are most needed for poverty alleviation and combat against hunger.

Also the infectious animal diseases are the main source of risks threatening the development of livestock husbandry and production due to the numerous zoonoses and the huge economic losses caused by their spread and the negative impact on the public health. Widespread of animal diseases means a high cost of treatment and big loss of production which constitute a barrier to the implementation of country's national development plans. Ladies and gentlemen,

The meeting aims to improve RVF control and to facilitate safe legal trade in livestock from the *Horn of Africa* (HoA), building on the activities identified by the Global Partnership workshop held in Kenya (Mombasa, 2012).

RVF is a vector borne zoonotic viral disease transmitted between livestock and people; it can cause severe and fatal disease in humans. RVF is considered by many to be a potential bioweapon. Control of RVF focuses on controlling infections at the animal source.

Trade within and between the HoA and the Arabian Peninsula is important for socioeconomic and cultural reasons and to maintain the livelihoods of poorer African farmers (in Sudan, South Sudan, Somalia, Djibouti, Ethiopia and Kenya). Unregulated and illegal trade between these regions carries a significant risk for spreading RVF and contaminating animals and humans. A practical solution to trade between the two regions would also reduce the likelihood of illegal trade.

To facilitate safe legal trade, the OIE has updated its international trade standards in the OIE Terrestrial Animal Health Code to account for the specific epidemiology of RVF and to facilitate trade in areas where infections are present. Current RVF vaccination strategies, although vaccines are much improved from previous versions, do require further refinement to properly implement the newly adopted OIE Standards.

The meeting will focus on practical implementation of the RVF Chapter of the OIE's Terrestrial Animal Health Code and will bring together key stakeholders from the public and private sector (trading partners and vaccine manufacturers) to enhance dialogue between the public and private sector with the aim of enhancing trust to implement the OIE standards. Furthermore the workshop should provide an update on early warning systems and their prediction capacities of high risk periods for disease occurrence.

Ladies and Gentlemen,

Today's meeting is very important and we are most confident that you will all join efforts for collaboration and coordination. I wish you all success and enjoyable stay in this welcoming city of Djibouti.

**WELCOMING ADDRESS BY THE OIE REGIONAL REPRESENTATIVE
FOR EASTERN AFRICA**

Patrick Bastiaensen

Programme Officer
Sub-Regional Representation for East Africa and the Horn of Africa
OIE
Nairobi, Kenya



I must start by apologising for the absence of the OIE Representative for Eastern Africa, Dr Walter Masiga, whom I represent here today. He is recovering after surgery and doctors have recommended that he not undertake any air travel until further notice. He strongly regrets not being here with us, knowing that he had worked vigorously for the organisation of this Conference. I must also warmly thank the authorities of the Republic of Djibouti, represented here by the Minister of Agriculture, Livestock, Water and Fisheries, Mr Mohamed Ahmed Awaleh, for agreeing to host this important inter-regional conference on the progress made in trade methodologies, prevention and control of RVF.

Ladies and gentlemen, from a personal point of view, this is the third conference I've had the pleasure to co-organise, i.e. Bloemfontein, South Africa, in 2009 and Mombasa, Kenya, in 2012. The location chosen for this third conference is obviously no coincidence. Djibouti is emblematic of the livestock trade that takes place between the HoA and the Middle East : a thriving business, dynamic, innovative and unifying, but which is conducted by the grace of the inter-epizootic periods that characterize this RVF.

This conference is also timely from a historical point of view. Indeed, the last episodes of the disease in this region took place there nearly ten years ago, which mean we should expect a new episode in a few months. The operative word now should be "vigilance". Colleagues from FAO and NASA will talk about this.

On OIE side, important progress has been made in normative terms with the approval of new standards and guidelines that are intended to facilitate trade in animals susceptible to the virus (and their products), despite the circulation of the virus, but without endangering human and animal populations in the importing countries. The war in Yemen and the attacks in Garissa in Kenya have shown how politically volatile the region still remains and how important it is to maintain trade flows for the well-being of people on both sides of the Red Sea, without forgetting the importance of religious calendars.

Colleagues, I am particularly pleased to have in our midst representatives from other parts of Africa that are currently, or have been in the past, heavily affected by this virus. I refer to the speakers from North Africa and Southern Africa. Welcome!

To conclude, I would like to thank the numerous institutions and programmes which have provided financial support to the conference, to begin with our FAO friends with whom we work within the framework of the *Global Framework for the progressive control of Trans-boundary Animal Disease* (GF-TADs) Agreement. I also want to thank the African Union, through the Inter-African Bureau for Animal Resources, represented here by its Director, Prof. El-Sawalhy and the *Intergovernmental Authority on Development*, IGAD through the Centre for Pastoral Areas and Livestock Development, for the financial support which enabled the travel of many representatives of the HoA and East Africa.

Finally, we are extremely grateful for the support of PRIMA INTERNATIONAL COMPANY which facilitated the travel of many representatives from the Gulf countries and the Middle East and invites us to visit the Animal Quarantine Centre of Djibouti on Thursday.

Thank you all, thank you also to those private companies and institutions that have self-funded the travel of their representatives. Also thank you to the United Kingdom and the United States of America who have financially supported the previously mentioned programmes and institutions, which enables us to meet here in Djibouti in large numbers. I wish you all a great conference and I thank you for your kind attention.

WELCOMING ADDRESS BY THE FAO REPRESENTATIVE TO DJIBOUTI AND IGAD

Emmanuelle Guerne-Bleich

Resident Representative
Djibouti and IGAD
FAO
Djibouti, Djibouti



It is with great pleasure that I take the floor, on behalf of Dr. Graziano da Silva, FAO Director-General, to mark the occasion at the opening ceremony of the Interregional Conference on RVF, bringing together the countries of the HoA and the Middle East. Let me first thank the OIE Director-General for taking the initiative of this meeting and for having labelled it as a GF-TADs meeting. The FAO is fully on board as evidenced by the participation of colleagues from the Rome headquarters, the FAO Regional Office for North Africa and the Near East and the *Emergency Centre for TADs* (ECTAD) Regional Unit for Eastern Africa.

The meeting in Djibouti marks another phase in a series of meetings already organised by the OIE, FAO, ILRI and other partners to discuss the RVF. I remind you of the workshop organised by FAO in Rome in March 2014, dealing with the current state of vaccines against RVF and diagnostic means. The workshop report is currently available.

FAO continues to pay attention to this disease : within the *Mediterranean Animal Health Network* (REMESA), FAO and OIE support the establishment of a regional surveillance system for RVF. From this year onward, the AFRA RAF/5068 project on vector-transmitted diseases plans to focus on the surveillance of RVF.

In collaboration with CIRAD, and within the framework of the *Multi-Criteria Decision Analysis* (MCDA) project, work has been conducted on the identification and classification of risk factors in Tanzania and Uganda. I can also cite the V-MERGE research project funded by the European Commission and involving 17 partners, under CIRAD coordination. This project will improve access to RVF data and studies for better coordination.

Finally, a RVF genetic module is being developed in collaboration with the *Swiss Institute of Bio-Informatics*. It will enable us to link epidemiological and genetic data.

As you well know, RVF is a priority disease for the countries of the IGAD region because it is a major zoonosis - therefore likely to cause loss of life, but also because of its impact on the livestock trade. To this end, FAO will continue to support the efforts undertaken by AU-IBAR and IGAD in the context of the SMP-AH and STSD projects. As a technical agency, FAO will spare no effort to pursue collaborations with other international and regional technical organisations, research institutes and universities to provide the necessary assistance to our member countries.

Let me conclude my remarks by thanking the Government of Djibouti and particularly you, Hon. Minister, for all the assistance provided in conducting our mission to Djibouti. My sincere thanks also go to the OIE and all of you present here. I wish you fruitful deliberations and a pleasant stay in Djibouti. Thank you for your kind attention.

OPENING ADDRESS BY THE REPRESENTATIVE OF AU - IBAR

Ahmed El-Sawalhy

Director
Inter-african Bureau for Animal Resources
AU
Nairobi, Kenya



I have the honour to express, on behalf of the African Union Commission and on my own behalf, our pleasure to welcome you to Africa and to Djibouti for this important Inter-regional Conference on Rift Valley Fever.

I also take this opportunity to thank the OIE for organizing this Conference and for inviting AU-IBAR to participate in the meeting.

I must also pay tribute to the Government of Djibouti through the Ministry of Agriculture, Livestock, Water and Fisheries, and the Directorate of Livestock and Veterinary Services, for working tirelessly and putting in place excellent arrangements for the success of this Conference.

Distinguished guests, ladies and gentlemen,

The African Union *Inter-African Bureau for Animal Resource* (AU-IBAR) is a specialised technical Office of the *Department of Rural Economy and Agriculture* (DREA) of the *African Union Commission* (AUC). The mandate of AU-IBAR is to support and coordinate the sustainable development and utilisation of animal resources to enhance nutrition and food security and contribute to the wellbeing and prosperity of the people in the Member States of the AU.

As you all know, the countries in Eastern Africa and the HoA are endowed with huge livestock resources that represent the highest proportion of livestock populations in Africa. According to FAO's 2012 estimate, IGAD Member States possess 45% of Africa's cattle, 71.4% of Africa's camels and 35% of Africa's small ruminants population. As a result of such enormous resources, livestock supports the livelihoods, household food security and nutrition of millions of citizens. Furthermore, livestock contributes significantly to the GDPs of most countries accounting on average 57% of agricultural GDP in the region.

Unfortunately, the performance of the livestock sector in the region is hampered by numerous challenges including drought, environmental degradation, conflict, low capacity at national and regional level to coordinate and harmonize disease surveillance and control of animal diseases, among others. These constraints are major hindrances for the full exploitation of the potential of the livestock sector in the region in order to contribute to improved livelihoods.

Distinguished guests, ladies and gentlemen,

Animal diseases, especially the *transboundary animal diseases* (TADs), lower the performance of the livestock sector in the region and ten out of the fifteen known TADs are prevalent in the region. Furthermore, the region suffers from a massive burden of other endemic as well as emerging zoonotic diseases.

TADs are the main causes of sanitary restrictions to livestock export trade in the Region. Among the TADs RVF is one of the serious diseases because of its impact on public and livestock health, and trade performance of the livestock sector in the Region. RVF has been the cause of devastating recurrent livestock import bans by the Middle East countries and according to some estimates, Somalia alone lost an income of USD 435 Million due to the import bans that lasted from 1998 to 2002.

Ladies and gentlemen,

Recognizing the role of livestock and its potential to improve the livelihood of livestock value chain actors, AU-IBAR together with the technical partners with financial support from key donors including EC and USAID is implementing a number of interventions to support the prevention and control of TADs in order to promote safe intraregional and regional trade in livestock and livestock products. Such interventions include facilitating effective participation of African Countries in activities of the OIE, International Plant Protection Convention, Codex Alimentarius and WTO-SPS committees, during the formulation of international standards through the Project for enhancing *Participation of African Nations in Sanitary and Phytosanitary Standards setting Organizations* (PAN-SPSO).

Given that TADs are a shared concern in the region, AU-IBAR in partnership with the *IGAD Centre for Pastoral Areas and Livestock Development* (ICPALD) with financial support from the *United States Agency for International Development* (USAID/EA) and the EU is supporting the Countries in the Region to build their capacity for surveillance and disease control through the *Standard Methods and Procedures in Animal Health* (SMP-AH) project that aims to standardize procedures for detection of, and response to specified trade-significant TADs and the *Surveillance for Trade Sensitive Diseases* (STSD), AU-IBAR is also supporting surveillance and disease control in Somalia through the Reinforcing Animal Health Services project. The other intervention with activities in the Region is the *Veterinary Governance* Project (VET-GOV).

Ladies and gentlemen,

Considering the impact of RVF on trade performance of the livestock sector in the Region, AU-IBAR fully supports initiatives, such as this one, that bring together the livestock exporting and importing countries in order to address shared sanitary concerns in livestock export trade.

It is my sincere hope that this Forum will enable both parties to come up with a common understanding on the required sanitary measures as per the updated provisions of the RVF Chapter of the Terrestrial Animal Health Code with a view to facilitate safe and stable trade of livestock and their products between the two Regions in compliance with OIE standards and guidelines.

I also look forward to such a Conference in the future in order to continuously address emerging needs for safe and stable trade.

Distinguished guests, dear participants,

Finally, I would like to thank once again, the OIE and FAO for organising this meeting within the framework of GF-TADs and for inviting AU-IBAR. I look forward to productive deliberations.

OPENING ADDRESS BY THE REPRESENTATIVE OF AU - PANVAC

Sanne Charles Bodjo

Senior Diagnostics Officer
Pan-African Veterinary Vaccines Centre
AFRICAN UNION
Debre – Zeit, Ethiopia



Let me first, on behalf of the Chairperson of the Commission of the African Union, Her Excellency Mkosazana Dlamini Zuma, the Commissioner of the Department of Rural Economy and Agriculture, Her Excellency Rhoda Peace Tumusiime, and in my personal capacity, express our sincere thanks to the OIE for the invitation that was extended to the *Pan-African Veterinary Vaccine Centre* of the African Union (AU-PANVAC) to participate in this important meeting and work together on options for the prevention and control of RVF and on ways to facilitate the marketing of livestock.

Ladies and gentlemen, distinguished participants,

As you know, livestock in Africa is faced with major issues, amongst which animal diseases occupy a place of prime importance. The main animal diseases have a cross-border nature, affect many countries and have an impact on trade in animals and products of animal origin. RVF, a disease present in this region of Africa, is one of these transboundary diseases with an undeniable importance, also because of its zoonotic nature.

Indeed, RVF can adversely affect livestock trade between countries. For example, outbreaks recorded in 1997 - 1998 in Kenya and Somalia, have had a considerable impact on the marketing of animals (cattle, sheep and goats) from these countries to those of the Middle East. Indeed, the ban imposed by the countries of the Middle East on livestock imports has had dire consequences, especially in Somalia where losses due to the 16 months' ban (from February 1998 to May 1999) were estimated at almost USD 109 million for the region of Somaliland only. Even after 2009, when the countries of the Middle East lifted the bans on animal imports, East Africa has had to endure several years of revenue loss due to fears about the disease.

Ladies and gentlemen, distinguished participants,

As you see, the importance of transboundary diseases such as Valley Fever Rift requires a regional or continental coordination and the establishment of an early warning system to enable the development of control programmes. Such early warning systems depend on effective veterinary services' linkages, one of which is the diagnostic laboratory to confirm the suspicions of illness. This in turn requires adequate laboratory facilities and effective (and time-efficient) diagnostic tests at a relatively affordable cost. The currently marketed tests for the diagnosis of RVF come at a relatively high cost to African laboratories. Even so, these diagnostic kits also require improvement to enable earlier detection of the disease and help differentiate vaccinated animals from those infected.

Research avenues for the development of new diagnostic tools need therefore to be promoted and supported, in particular for :

- Rapid tests for use in the field, for the early detection of RVF cases;
- Vaccines and tests to distinguish vaccinated from naturally infected animals.

In order to compensate for the relatively high cost of diagnostic tests for animal diseases, a mandate was given to AU-PANVAC by the AU Member States to *"produce and distribute essential biological reagents for the diagnosis of animal diseases"*

Since 2010, AU-PANVAC has started implementing this mandate with the establishment of the *Production unit for reagents and laboratory diagnostic tests*. Biological reagents and diagnostic tests (monoclonal antibodies, ELISA tests for the detection of antibodies against PPR virus of and *mycoplasmatacae* responsible for CCPP) have been developed and are undergoing the last stages of validation according to OIE standards.

AU-PANVAC intends to continue its efforts, in close cooperation with other laboratories, to develop new diagnostic tools for priority animal diseases identified by member states, of which RVF is part.

Ladies and gentlemen,

AU-PANVAC, in addition to its activities pertaining to the quality control of veterinary vaccines, therefore also aims to contribute to the control of animal diseases in Africa through the development and production of diagnostic reagents.

I would like to conclude my remarks by thanking once again, the OIE and also the Government of the Republic of Djibouti for hosting this workshop.

Thank you for your kind attention.

OPENING ADDRESS BY THE EXECUTIVE SECRETARY OF THE INTER-GOVERNMENTAL AUTHORITY ON DEVELOPMENT

Mohamed Moussa Mohamed

Director
Agriculture and Environment Division
IGAD Secretariat
Djibouti, Djibouti



It's a pleasure and indeed an honour to welcome you all, on behalf of H.E. Amba Mahboub, the Executive Secretary of IGAD to this important RVF Conference.

Allow me at the onset, to express IGAD's profound appreciation and gratitude to the Government and people of Djibouti for hosting the meeting and for the support provided during the organization of the Conference. Special thanks to H.E. Mr Awaleh for honouring the opening ceremony of this Conference. I would also like to thank the OIE, FAO, AU-IBAR and IGAD for organizing this Conference in Djibouti, the IGAD headquarter.

The IGAD region covering 8 countries in Eastern Africa, is the richest region in livestock resources. The major economic driver of the IGAD Member States is agriculture with the livestock sector, mostly raised under pastoral systems, employing about 75% of the population and contributing an estimated 57% of the regional *Agricultural Gross Domestic Product* (Agricultural GDP). The Region is the leading exporter of live animals in Africa contributing 42% of the exports from the continent.

To be specific, the region exported 8.6 and 9.2 million live animals to the Middle East and North African countries in 2012 and 2013 respectively. The major bottlenecks, however, to improve our market share in the livestock trade, are limited capacity to control and prevent *transboundary animal diseases* (TADs) and limited coordination capacity, among others.

We remember the negative impact that heavily affected the livelihood of the various livestock actors, mainly of the producers, when RVF occurred in the region. Somalia alone had an economic loss of about USD 435 million in the two bans (1999 and 2002). The bans affected all countries in the region who had the disease and who had not.

Ladies and gentlemen, considering the high livestock wealth in the region, high demand of livestock and livestock products within and outside the region, the need to support member states to improve food security and income of the communities, IGAD has taken several concrete steps to promote livestock development, one being the establishment and operationalization of the IGAD *Centre for Pastoral Areas and Livestock Development* (ICPALD). Today ICPALD is supporting Member States in coordinating and implementing of the regional livestock projects enhancing TADs control and livestock trade. IGAD has also formulated and approved a regional animal health policy framework and the process of domestication is under way in the *Member States* (MS).

Moreover, IGAD is aggressively mobilizing resources for building resilience and enhancing pastoral livelihoods in MS through IGAD *Draught Disaster Resilience and Sustainability Initiative* or IDDRSI that has a primary objective of ending drought emergencies in the HoA. The regional projects and the resilience initiative are all contributing to TADs control, including RVF.

Once again, I thank OIE, FAO, AU-IBAR and IGAD for organizing this inter-regional conference on RVF and bringing together relevant countries and stakeholders to discuss on "*New options for trade, prevention and control of RVF*", thereby enhancing livestock trade from the region.

IGAD confirms its commitment to jointly work with OIE, FAO, AU-IBAR and other partners, importing countries and *Gulf Cooperation Council* to strengthen and enhance the control and prevention efforts of Member States on RVF. I look forward to a fruitful meeting and wish you all an enjoyable stay in Djibouti.

**OPENING ADDRESS BY THE MINISTER OF AGRICULTURE,
LIVESTOCK, WATER AND FISHERIES OF DJIBOUTI**

Hon. Mohamed Ahmed Awaleh

Minister
Ministry of Agriculture, Livestock, Water and Fisheries
Djibouti, Djibouti



It is with pleasure that I chair today's opening ceremony of this important Conference focused on prevention and control of RVF, in your presence. I warmly thank the OIE and FAO for choosing Djibouti for this Conference.

As you know, the Republic has always played an important role in the area of cattle trade between the countries of the HoA and those of the Arabian Gulf. The first quarantine centre, designed according to international standards, was established in Djibouti and started operations in late 2006.

On this occasion and on behalf of President of the Republic, allow me to once again thank the Kingdom of Saudi Arabia for its willingness to lift the ban on livestock trade from the HoA, a ban which was put in place because of RVF.

Its small size, its harsh weather conditions, its strategic regional position, its (air)port facilities and its liberal economy focused on the service sectors, represent for the Republic of Djibouti important advantages for the regional development of the livestock trade.

I would also like to recall that the Republic of Djibouti continues its facilitation efforts to secure a singular cattle trade. Improving port infrastructures, including the construction of an animal-port, the refurbishment of road and rail corridors, the strengthening of technical and human capacities of the institutions involved in this area, are all examples of this government effort.

Ladies and gentlemen, you are well aware that RVF is the most important sanitary hurdle in terms of commercial livestock trade. When it appears it causes mortality in both animal and man, hence the importance of the establishment of national and regional policies to reduce the risk of this disease appearing.

Because of the transboundary movements of animals, this periodic disease is subject to passive surveillance in the context of national and regional programmes. At national level, surveillance targets the risk areas in the country, in close collaboration with FAO and the health services of the French army forces, stationed in Djibouti.

The best performing quarantine centre in the region also participates in prevention and surveillance activities with regard to this disease. Cattle, exported from the port of Djibouti is, submitted to strict disease control measures, including routine immunisation against major diseases such as RVF.

At regional level, transboundary disease control programmes related to livestock trade are ongoing. In view of gaining a better understanding of the situation and achieve better control, there is need to conduct surveillance activities and field studies of these important animal diseases, the main ones being PPR, RVF, FMD and sheep-and-goat pox. These regional programmes are funded primarily by the EU and USAID, under the auspices of the AU-IBAR and FAO. The ultimate goal being to achieve harmonisation of animal health policies for the member countries of IGAD and of COMESA.

There is no doubt that this conference will allow the experts that you are to take stock of the situation, to share experiences and make robust resolutions, not only in terms of the prevention and control of RVF, but also other transboundary diseases related to the cattle trade.

I wish you a nice stay in Djibouti and the best of success in your work.

Session 1

Setting the scene

RECALL OF PREVIOUS MEETINGS, THEIR OUTCOMES AND RECOMMENDATIONS

Susanne Münstermann

Programme Officer
Scientific and Technical Department
OIE
Paris, France



Rift Valley fever (RVF) has been the subject of several previous conferences and meetings organised by the OIE or FAO or organised jointly. This underlines the importance of RVF as one of the priority diseases for the regions and subsequently RVF can also be found as one of the diseases in the 5-year action plans of the *Global Framework for the Control of Transboundary Animal Diseases (GF-TADs)* for the two regions. A summary of the recommendations and the action plans for GF-TADs will be presented. For those that have already been presented in previous meetings such as in Mombasa in 2012, reference is made to the respective online reports.

Cairo, Egypt, 2007: <http://www.oie.int/doc/ged/D4246.pdf>

Bloemfontein, South Africa, 2009: http://www.rr-africa.oie.int/en/en_index_annex19.html

Rome, Italy, 2008: http://www.who.int/csr/resources/publications/WHO_HSE_GAR_BDP_2009_2c.pdf

Rome, Italy, 2011: <http://www.fao.org/docrep/014/i2310e/i2310e00.pdf>

Mombasa, Kenya, 2012: <http://www.rr-africa.oie.int/docspdf/en/2012/RVF/REPORT.pdf>

Recommendations from the last RVF Technical Workshop organized by FAO in Rome in 2014 can be found here : <http://www.fao.org/3/a-i4466e.pdf>

The recommendations are presented in two sets, the first of which supports and reiterates those that were made during all the above listed previous meetings, while the second set of recommendations lists the specific and new recommendations emanating from this meeting, which was targeted mainly at vaccine producers and researchers to report on their recent findings, while CVOs from a selected number of countries were in attention.

The second set of recommendations includes the following:

- At least three vaccine candidates (DDvax, NDV-GnGc, MP-12) are being evaluated in registration trials and may offer new options in the near future.
- Production and quality assessment of vaccines in line with the OIE Manual is encouraged.
- Accurate serological tests for camels (IgM and IgG) and vaccines need to be developed.
- Laboratory diagnostic capacity for RVF needs to be strengthened, including ring trials (with the support of FAO, OIE, IAEA).
- Routine vaccination of populations at elevated risk is encouraged.
- South Africa is encouraged to share experiences such as communication strategies and educational tools targeting farmers during outbreaks.

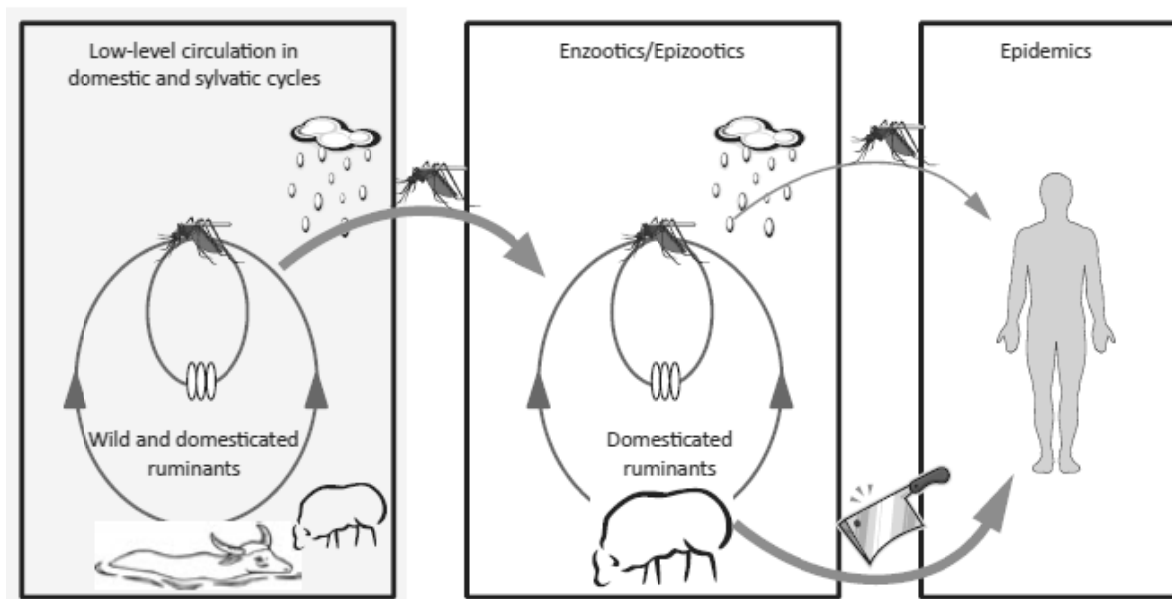
RVF IN THE HORN OF AFRICA, EAST AFRICA, AND THE MIDDLE EAST A HISTORICAL OVERVIEW

Bouna Diop

Regional Manager
ECTAD Eastern Africa
FAO
Nairobi, Kenya



RVF is a *Phlebovirus* arthropod-borne zoonosis that primarily affects sheep, goats, cattle, camels, buffalos, dromedaries, antelopes, wildebeest, and humans. Sheep are the most susceptible while goats and cattle are somewhat less susceptible. While animals get infected through mosquito bites, most human cases are attributed to contact with body fluids released during slaughtering or contact with viremic animals. Nevertheless, man can also be infected via the bite of infected mosquitoes. The virus is transmitted by a large and diverse number of arthropod species and therefore it has potential to spread widely and rapidly when environmental conditions are conducive.



Text and credit

RVF was first described in Nakuru District of Rift Valley province in Kenya in 1912 occurring as sporadic cases. The virus, however, was first isolated in 1931. Between 1912 and 1936, RVF was confined to Nakuru District which is prone to flooding and where livestock were raised in proximity with wildlife. No RVF outbreaks were reported between the periods 1936 to 1950. From 1951 to 2007, eleven RVF epizootics were recorded with an average inter-epizootic period of 3.6 years.

RVF reports outside Kenya begun in 1950s where between 1951 and 2007, large RVF epidemics have been reported in many African countries. In 2000, the disease was detected in the Arabian Peninsula, having spread outside of Africa for the first time.

Somalia experienced the last two major RVF outbreaks in Eastern Africa. Between December 2006 and February 2007, the disease was reported in both humans and livestock in many regions including: Gedo, Lower and Middle Juba, Lower and Middle Shabelle, and Hiran.

In Sudan, the first evidence of RVFV presence was described in 1936 while the first recorded epizootic occurred only in 1973 in sheep and cattle in White Nile State. Since then, RVF sero-positivity has been shown in different Sudanese states. The last outbreak occurred in 2007 in several Sudanese states along the white and blue Nile.

In Tanzania, the most notable epidemic occurred in 2006-2007 although events were also reported from 1947 to 1998. Average inter-epidemic period is 7.9 years (3-17). During the period 1930 to 1979, the cases were confined to four districts in northern Tanzania. From 1980 to 2007, RVF was reported in more areas located in north to east, central, and southern regions.

In Egypt, the largest RVF outbreak occurred in 1977–1978. Despite biannual vaccination with inactivated vaccine, a second outbreak occurred in 1993–1994. The vaccination campaign (using Smithburn vaccine) performed during the outbreaks of 1996–1997 and 2003 did not stop the disease. The reasons remain undetermined but could have contributed to the unusually short inter-epidemic periods observed in Egypt.

In September 2000 RVF epizootics were identified in Saudi Arabia and Yemen. The Tihama/Jizan regions of Yemen and the southwest Saudi Arabia (Gizan region) were principally involved.

RVF remains a regional concern and more collective action is needed to prevent and control the disease.

RECENT RVF OUTBREAKS IN NORTH AND WESTERN AFRICA

Alessandro Ripani & Rachid Bouguedour*

(*) Programme Officer
Sub-Regional Representation for North Africa
OIE
Tunis, Tunisia



RVF is a viral vector-borne disease caused by a single serotype of the *Bunyaviridae* family affecting human and animal health. The disease - characterized mainly by high rates of abortion and neonatal mortality - is nowadays present in the African continent and Arabian Peninsula mostly occurring in climatic conditions which facilitate the breeding of mosquitos.

Data reported in the published literature revealed virological or serological evidence of RVF virus circulation in the West African region prior to 1987 without noticeable clinical manifestations. The first substantial outbreak in the West African region which caused more than 200 human deaths was

reported 1987 after the building of the Diama dam in the framework of the Senegal River Project. This construction - and its related floodings - led to the changes of some local ecological characteristics such as the creation of more water accumulation points so as to increase mosquito breeding sites.

After 1987 outbreaks were reported regularly from the West African region but generally in the zones at the border between Senegal and Southern Mauritania - along the Senegal River - which is considered a suitable environment for vector populations.

The unexpected occurrence of RVF in the northern Sahelian region of Mauritania in late 2010 with major impact on both human and animal health, confirmed that this disease represents a serious threat for the entire Maghreb area. For this reason, the *Mediterranean Animal Health Network* (REMESA) platform - which is an official network that created an undoubted sustainable link between the CVOs on both sides of the Mediterranean - identified RVF as one of the priority diseases to control in the North African region. In this context - and under the umbrella of REMESA the first External Quality Assessment study for molecular and serological detection of RVF virus was organized in order to perform a preliminary assessment of the diagnostic capability of the laboratories involved in the surveillance of this disease in the REMESA zone.

Today an endemic zone can be recognised in the Western part including Mauritania and a zone - so called *Little Maghreb* (Morocco-Algeria-Tunisia) - where the disease has never been detected up to date. It is also acknowledged that an active surveillance is in place in Mauritania and permanent passive surveillance along with occasional sero-surveys in the *Little Maghreb*.

The re-occurrence of RVF in Mauritania in October 2013 confirmed that this disease is a continuous threat for the entire region and that more targeted actions are necessary to build an effective surveillance system in the region. In this context, the OIE Sub-Regional Representation for North Africa is providing support to these countries to implement such activities in line with the OIE International Standards.

RECENT RVF OUTBREAKS IN SOUTHERN AFRICA

Rachel Maluleke & Phelix Majiwa*

(*) Researcher Virology Department
Onderstepoort Veterinary Institute
ARC - OVI
Pretoria, South Africa



RVF is a disease which affects a wide variety of animals including humans, sheep, cattle, goats, camels and some wild animals. The virus responsible for the disease is spread by competent mosquito species, such as *Aedes* and *Culex*.

Since the disease was first diagnosed in Kenya in 1931, it has been reported in, among other countries, South Africa, Botswana, Namibia, Zambia, Mozambique, Madagascar, Egypt and Senegal. It is characterised by high levels of mortality among young animals and abortion in animals. The susceptibility of the animal host depends on age and animal species. Outbreaks of RVF normally follows heavy rainfall and floods.

Since the first case of RVF was observed in the 1950s in South Africa, there have been sporadic outbreaks at unpredictable intervals. The latest outbreak was reported in

South Africa in 2010 with 14,342 animal cases and 8,877 animal deaths. During this period, 242 laboratory-confirmed human cases with 26 deaths were identified.

The disease has severe direct and indirect socio-economic impacts. Direct impacts include the dying of animals and humans affected by the disease. In-direct impacts include decrease/loss of production (e.g wool, beef and milk). People whose livelihoods depend on these kinds of income suffer as a result of RVF outbreaks.

Six countries in SADC reported RVF outbreaks in the period spanning 2005 to 2014. Those countries were Tanzania, Madagascar, Namibia, Botswana, Swaziland and South Africa. In all the countries, the outbreaks followed heavy rainfalls. The outbreaks occurred in both commercial and small scale farms. The majority of animals affected were sheep and cattle. Goats and buffaloes were also affected, but to a lesser extent. To manage the outbreaks, animals were vaccinated and movement of animals inside the countries were controlled.

During the same period, no RVF outbreaks were reported in Lesotho, Angola, DRC, Malawi, Mauritius, Mozambique, Zambia and Zimbabwe. Thus these countries are considered free from the disease. However, it is possible that there was no surveillance done or the virus might be circulating at levels beyond detection limits.

RVF is a notifiable disease in South Africa. Farmers are advised to vaccinate their animals against RVF. The vaccines that are currently available in South Africa are Smithburn, inactivated vaccine and Clone 13. High mortality rate of young animals, abortion in animals and febrile disease in humans are indicative of RVF. Veterinary and human health authorities should be informed immediately, to investigate the situation.

The challenges faced by South Africa regarding RVF are that the disease is sporadic, people are not always ready when the outbreaks occur and vaccines cannot be stockpiled for various reasons. The other challenge is that the initial symptoms of RVF can be confused with other diseases that cause abortion. During the period 2005-2014, 8 600 samples from animals were tested for RVF at ARC-OVI. Public education programmes/farmer awareness and other publicity campaigns are often done to make stakeholders aware of the nature of the disease, consequences of livestock diseases and the benefits of preventing such diseases.

Session 2

Challenges to disease control

AVAILABLE CONTROL OPTIONS

Kariuki Njenga

Chief Research Officer
Kenya Medical Research Institute
KEMRI
Nairobi, Kenya



The periodic RVF epidemics in the *Horn of Africa* (HoA) have a significant impact on lives and livelihoods of people living in the region, and they negatively affect the local, national, and regional economies.

As a step towards improving management and response to the epidemics, regional and international experts developed a decision support tool for the purpose of identifying the sequence of events related to increasing and decreasing the RVF epizootic risk, compiling a list of interventions that can be used to prevent and control the epidemics, and matching these interventions with the specific stage of the RVF disease cycle 1.

During the normal phase (non-epidemic period) of the RVF cycle, the primary option available for controlling the disease is livestock vaccination.

During the pre-outbreak (outbreak warning) and outbreak phases of the disease, the available control options include livestock vaccination, quarantine and slaughter ban, vector control, and public education.

To be effective, livestock vaccination requires a clear national policy that identifies areas at high risk and a position on routine vaccination and emergency vaccination in the face of a threat of an RVF outbreak.

Unfortunately, there are few broadly licensed RVF livestock vaccines; and to our knowledge, no country in the HoA has a clear policy on RVF vaccination. In addition, livestock vaccination is not recommended during an outbreak.

Public education, livestock quarantine, and slaughter ban are perhaps the most effective measures against disease spread during an outbreak. There is often a problem of sustaining quarantine and slaughter ban for a long time since many affected areas have pastoralist livestock production systems and food of animal origin is the primary diet.

Vector control, primarily through aerial spraying, is often attempted during heavy flooding that accompanies RVF outbreaks but it has limited effectiveness due to expansiveness of the affected areas and cost.

Danny Goovaerts

Consultant
Research Department
GALVmed
Lichtaart, Belgium



Both inactivated as well as live attenuated vaccines are available and have been in use for a long time in the field. However there still is a gap between safety and efficacy of these vaccines and a need for improved RVF vaccines for livestock.

Recently several improved live attenuated, vector, DNA, subunit or replicon vaccine candidates are under development, in the licensing process or licensed.

For some, promising results or proof of concepts have been demonstrated with respect to safety and efficacy of these vaccine candidates.

The biggest challenge however will be the task of further commercialization to bring these candidates to the market and to implement them in a well-designed control program.

RVF, despite being a serious economical and enzootic endemic disease in a large part of Africa as well as in some countries of the Middle East, is from a commercial vaccine market aspect a rather low or moderately attractive disease. The disease besides being endemic also has a characteristic epidemic outbreak cycle depending on climate, rainfall and flooding. Based on limited economic damage in between large epidemic outbreaks it is difficult to economically justify or support vaccination or vaccination campaigns to control the disease.

As a result the motivation for the broad consistent use of RVF vaccines and consequently the incentive for commercial companies to seriously invest in RVF vaccine development is rather limited. Vaccine or antigen banks can play a role in an improved availability of RVF vaccines for emergency use. All of this highlights the need for a well-designed vaccination strategy in a RVF control program.

Combination vaccines offering protection against not only RVF but also against other important ruminant diseases, resulting in broader and long term protection with one immunization, have the potential to decrease overall costs, increase uptake of RVF vaccination, expand the market and therefore be attractive both to vaccine manufacturers as well as to end users. Their development and commercialization should therefore be strongly encouraged.

External control and quality harmonization of RVF vaccines is needed as well as a more centralized quality control and regulatory platform. This could certainly play a role in creating an equal level playing field, harmonizing regulatory requirements and therefore increase attractiveness to companies to invest in RVF control.

VACCINES : VACCINES CURRENTLY USED IN THE FIELD AND THEIR ISSUES

*Boitumelo Moethloa, Nobalanda B. Mabizela
and Bethuel Nthangeni**

(*) Chief Scientific Officer
Research and Development Department
Onderstepoort Biological Products (OBP)
Pretoria, South Africa



RVF outbreaks have adverse impact on the livestock industry and with the disease being a zoonosis, the impact is most often spread into the human population. The most effective method of controlling this vector-borne disease is ensuring that susceptible livestock populations have immunity achieved through consistent annual vaccination programmes.

Currently *Onderstepoort Biological Products* (OBP) has three registered vaccines for the control of RVF disease. An inactivated aluminium-hydroxide adjuvanted RVF virus vaccine isolated in 1974 from an infected bovine and adapted for growth in baby hamster kidney (BHK-21) cells. This vaccine requires a booster vaccination and annual re-vaccination.

The second available vaccine is the modified RVF Smithburn virus strain which is an attenuated live vaccine used since 1951. This vaccine is able to provide lifelong immunity making it a cheaper alternative to the inactivated vaccine. However, due to the residual virulence of the Smithburn strain; there is a potential risk of the virus to cause teratogenicity when administered to gestating adults.

The third vaccine available is the RVF Clone 13 vaccine which is a live attenuated vaccine isolated from a benign human case in Central Africa Republic. The strain contains a large deletion in the NSs gene which renders the virus a-virulent in mice, hamsters and livestock. The major challenge that has been associated with RVF Clone 13 has been instability and short shelf life of the vaccine product. This presentation will highlight research activities focused on identifying appropriate methods and facilities for bulk RVF Clone 13 antigen storage to allow vaccine availability to customers in a limited time frame during high demand periods.

The study will also provide some insights in the possible RVF vaccination strategies of certain African countries based on OBP RVF vaccine product registration status and requests.

Louis Maartens

Research Veterinarian
Research & Development
Deltamune
Lyttelton, South Africa



Although the currently-available vaccines have made major contributions to the control of RVF in endemic areas, safety concerns with some of these products and the regulatory requirements of countries at risk in non-endemic areas drive the search for novel improved vaccines against this globally-important disease.

Many different vaccination platforms, including reverse genetics technology, recombinant (vector) vaccines, DNA vaccines and adjuvanted subunit vaccines are currently in various stages of evaluation.

Major advances have been made in the assessment of safety and efficacy of a promising new RVF vaccine candidate developed through the use of reverse genetics technology. This attenuated strain, which lacks the non-structural NSs and NSm genes on the small and medium genomic

segments respectively, showed an excellent safety profile in laboratory animal models as well as in the target livestock species. A series of trials in pregnant-ewes indicated that this strain provides robust immunity against RVF which can fully-protect heavily-pregnant animals against clinical signs, viremia and abortion. Vaccination experiments in first-trimester pregnant ewes (42 days of gestation) clearly demonstrated that RVF virus lacking these non-structural virulence factors has a negligible abortogenic potential and, when used correctly, also an extremely low teratogenic potential. Entomological studies also showed that the absence of the NSm-gene impairs insect transmission, which together with the absence of significant levels of viremia in the vaccines, practically eliminates the possibility of spreading in the environment and gaining virulence under conditions of natural selection. This vaccine candidate is now approaching the pre-registration phase of the assessment process. Approval has been granted by the South African *Department of Agriculture, Forestry and Fisheries* (DAFF) to use the vaccine outside containment and applications for authorisation to do field trials will be submitted in the near future.

Significant progress has also been made with regards to the safety and efficacy testing of a novel Newcastle disease virus-vectored vaccine expressing the Gn and Gc glycoprotein genes of RVFV. The potential environmental risk of this recombinant virus was assessed under BSL3 containment in a series of safety trials. The results of these studies indicated that NDV-GnGc remains localised at the site of inoculation, does not cause significant levels of viraemia in the vaccines and does not spread from vaccinated target species (sheep) to in-contact control animals or birds (sheep and chickens). Deliberate vaccine administration to avian hosts resulted in seroconversion of the vaccines, but unlike natural NDV, the recombinant virus failed to infect fully-susceptible in-contact control birds or birds exposed to the tissues of vaccines by the oral route. Based on the favourable outcome of the environmental safety study, DAFF approved further vaccination experiments outside BSL3 containment. Subsequent trials focussed on optimisation of the vaccine formulation by the addition of different adjuvants suitable for use with live antigens. Two formulations were identified which induced demonstrable levels of neutralising antibodies and durable immunity (> 5 months) protective against clinical disease and viraemia. A full safety and efficacy evaluation in the pregnant ewe model is planned for this vaccine candidate in the near future.

VACCINES : NOVEL VACCINES (2)

Mehdi El-Harrak, S. Daouam & K. Tadlaoui*

(*) Director of R & D
MCI Santé Animale
Rabat, Morocco



RVF is a vector borne disease, endemic in most Sub Saharan countries, including West Africa and has spread to the Middle East since 2010 causing huge economical loses in livestock (ruminant and camels) and also human fatalities.

Vaccination is the only way to prevent and control the expansion of the disease. Live attenuated vaccines are preferable to inactivated ones because of higher immunogenicity, lower price and no need of a booster vaccination.

The available live vaccines are either thermolabile (Clone 13) or cause abortion and teratogenic effects (Smithburn strain).

In this study, we isolated a thermostable vaccine candidate (Clone 61) from the Clone 13, which is a naturally attenuated strain because of NSs gene deletion. This virus has been produced on Vero cells, heated at 56°C and resistant viral particles were selected. Three cycles of heating and cloning were performed and the most resistant clones were purified using the high dilution method. The C61 showed a characteristic and precocious cytopathic effect, high titer and better stability if compared to other clones or the original C13 strain.

A pilot batch of RVF C61 vaccine has been produced and tested for efficacy in cattle, sheep, goats and camels using virus neutralization test. Good levels of antibodies have been detected as soon as two weeks after vaccination and they last for a minimum of one year, probably more. The vaccine is stable at 4°C for two years and could represent an efficient tool for Rift Valley fever control in endemic countries, once commercialised.

The new Clone 61 vaccine candidate is derived from the deleted Clone 13 strain and is unlikely to reverse to virulence in addition to its potential as a DIVA vaccine. Vaccinated animals showed very low or no viremia at all when tested by PCR which reduces the risk of diffusion.

C61 candidate RVF vaccine should now be tested on large scale for mass vaccination in the field.

DIAGNOSTIC TESTS FOR RVF AND ROLE OF REFERENCE LABORATORIES : WHAT IS AVAILABLE?

Baratang Alison Lubisi

Head of Virology Department
Onderstepoort Veterinary Institute
ARC-OVI
Pretoria, South Africa



Rift Valley Fever virus (RVFV), a *Phlebovirus* in the *Bunyaviridae* family, causes RVF, an economically devastating zoonotic disease in Africa and the Arabian Peninsula. Vaccination remains the only practical control measure for susceptible livestock, and there is no vaccine registered for humans. Diagnostic testing is usually done for disease confirmation, epidemiological studies, vaccine efficacy evaluations and export certification, using serological, virus isolation, RNA detection and antigen identification methods. Biosafety and biosecurity regulations, type of specimen submitted and history of the animal, and assay availability, affordability, validation status,

purpose, turnaround time and DIVA capacity, remain major challenges in RVF diagnoses.

As part of endeavours to address some of these challenges, the OIE Reference Laboratory for RVF based at *ARC-Onderstepoort Veterinary Institute* undertakes the following:

1. Invests in providing a safe working environment to include personnel vaccination, purchase of personal protective equipment and maintenance of BSL3 facilities for working with live RVFV;
2. Develops or establishes various assays to meet different testing requirements;
3. Continuously validates the methods through formal and extensive processes, including participation in *inter-laboratory test comparisons (ILTC)*;
4. Harnesses collaborations with researchers elsewhere in the world for exchange of materials, technical skills and information used in research, including diagnostic assay development, optimization and validation.

Great strides have been made in the development of different RVF diagnostic methods to date. Nonetheless further investigations are key to addressing limitations of the currently available tests. Reference Laboratories can mobilise financial and other resources, and have the skills needed to provide diagnostic testing for various purposes, execute technical training in diagnostic testing, produce reagents, develop and validate test methods, contribute to quality assurance of the methods through ILTC with other laboratories, and generate knowledge and tools that could be used in development of novel diagnostic tests or improvement of current assays.

Baratang Alison Lubisi & Ghazi Yehia

Head of Virology Department
Onderstepoort Veterinary Institute
ARC-OVI
Pretoria, South Africa

Representative
Regional Representation for the Middle East
OIE
Beirut, Lebanon



RVF is an economically devastating zoonotic disease caused by the RVF virus (RVFV), a *Phlebovirus* in the *Bunyaviridae* family. Abortion storms and mortalities among neonates in susceptible animal species, and flu-like symptoms which can progress to death in humans, characterise RVF. The disease was first diagnosed in sheep in the Rift Valley of Kenya in 1931 and was found to be enzootic in many African countries since then. The first incursion of RVF outside the African continent was recorded in Saudi Arabia, followed by Yemen in 2000. Animals get infected with RVFV through bites of infected mosquitos or in-utero. Humans contract the disease through manipulation of carcasses of infected animals, consumption of infected and unpasteurized milk or, similar to other susceptible animals, through bites of infected mosquitos.

The clinical signs caused by RVF are not pathognomonic and laboratory confirmation is crucial for mobilisation of resources and institution of control measures during outbreaks. Reference Laboratories often perform disease confirmation since they have the expertise and resources necessary to perform the different assays required for the purpose.

There are only two OIE Reference Laboratories for RVF, situated in the northern and southern hemispheres, in France and South Africa, respectively. Their locations are not in, or at close proximity to all the RVF enzootic regions to facilitate prompt outbreak responses.

The OIE twinning project on RVF between ARC-*Onderstepoort Veterinary Institute* (OVI) in South Africa and the *Central Veterinary Laboratory* (CVL) in Yemen is aimed at increasing RVF diagnostic capacity in Yemen, in the form of different antibody ELISAs, the *Virus Neutralisation Test* (VNT), RT-PCR and qRT-PCR and virus isolation in different media, and various aspects of laboratory quality assurance.

The established scientific and technological expertise will hopefully earn the CVL OIE reference laboratory status for RVF, which would benefit the entire Arabian Peninsula region through self-sufficiency in the early detection and diagnosis of the disease, thus contributing to good veterinary governance.

A PRACTICAL PERSPECTIVE ON CURRENT RVF DIAGNOSTICS AND FUTURE DEVELOPMENTS

Louis Maartens

Research Veterinarian
Research & Development
Deltamune
Lyttelton, South Africa



RVF is a peracute to acute viral disease of mammals, notably of ruminants and man. Antigen can be detected in the blood and serum of infected animals for a limited period of time (generally from the second to the third day until the fifth to the seventh day post infection). In extreme cases (e.g. in very young animals) viremia can be detected as early as sixteen hours post infection and in some individuals the viremic stage can persist up to day 12. Surviving animals show a prominent neutralising antibody response (demonstrable from about 5 days post infection). This response usually peaks 14 to 21 days post infection, and slowly declines to a stable plateau which may persist for many years. Further characterisation of the humoral response may provide important epidemiological information since the presence of IgM antibodies in the serum of animals is a reliable indicator of recent infection (detectable

from the fourth day post infection until approximately day 50), while the presence of IgG in the absence of IgM signifies previous infections with negligible risk of active replication.

Antigen can be detected in the blood, serum and plasma of viremic animals or in the tissues of infected animal carcasses using a variety of diagnostic tests. Infectious virus can be demonstrated by standard virus isolation in cell culture or suckling mice. A large variety of *reverse transcriptase polymerase chain reactions* (rt-PCR) have been developed with significant advantages in terms of sensitivity, specificity and reaction time. A recently-developed multiplex rt-PCR allows the differentiation of certain RVFV vaccine strains from field strains. Refinement of the different rt-PCR techniques is taking place continuously. *Virus neutralisation tests* (VNT), although laborious, are still considered the golden standard for antibody detection against RVF, since cross-reactivity with other closely-related bunya viruses does not interfere with the interpretation of this assay. The VNT is, however, not suitable for handling large sample volumes.

The versatility and suitability of *enzyme linked immune-sorbent assays* (ELISA) for large sample volumes, resulted in considerable development and continuous improvement of these techniques. A variety of indirect and competitive ELISA's, are available. Most of these have excellent sensitivity and specificity profiles but, are restricted in terms of their use for samples from multiple animal species. An IgM-detecting blocking ELISA is available which can be used across the species barrier and enables efficient detection of recent infections.

There is a need for inexpensive, reliable pen-side tests to facilitate prompt and accurate field diagnoses. Although promising results have been obtained with immune-chromatographic lateral flow assays, these tests are still not readily available for use in the field and in many instances lack sufficient sensitivity.

Climatic change and the potential of RVFV to spread to previously uninfected areas, sparked renewed interest in the development of multiplex assays to facilitate syndromic testing in humans and animals (e.g. a multiplex test for arbovirus infections). Preliminary results obtained with assays based on microarray or fluorescent microsphere immunoassay technology (Luminex), are encouraging but none of these are freely available yet.

CHALLENGES TO CONTROL RVF DISEASE : RESEARCH REQUIRED TO IMPROVE DIAGNOSTICS

Sanne-Charles Bodjo & Nick Nwankpa*

Senior Diagnostics Officer
Pan-African Veterinary Vaccines Centre
AU
Debre – Zeit, Ethiopia



RVF is a zoonotic disease and one of the *Transboundary Animal Diseases* (TADs) which can dramatically affect livestock trade between countries. The ban on livestock imports instituted by Middle East countries to Eastern Africa countries after the 1997/1998 RVF outbreak in Kenya and Somalia, affected export trade particularly in Somalia. Losses due to the ban from February 1998 to May 1999 were estimated at USD 109 million for the Somaliland region alone. By the time the ban on animal imports was lifted in 2009, East Africa had already endured many years of lost income because of prevailing fears concerning RVF.

RVF is caused by a single serotype of a mosquito-borne virus member of the family *Bunyviridae*, genus *Phlebovirus*.

Implementation of appropriate control measures for RVF requires good early warning and early detection systems. The laboratory diagnostic tools for the detection of RVFV RNA, antigens and antibodies are essential to confirm disease outbreak. The currently available diagnostic tests for detection of RVF need to be improved for early screening and surveillance of the RVF disease. There is a need to develop rapid pen side tests or field based tests which are currently not available but would be important for field testing. There is also a need to differentiate natural infection from vaccinated animals through the development of new RVF vaccines and companion diagnostics. Syndromic approach to diagnosis (neonatal mortality and abortion) should be considered in the development of new multiplex assays which can differentiate RVF from other pathogens like *Brucella*.

The relatively high cost of commercial diagnostic kits currently available in the market pose a major challenge to African laboratories, which may not be able to afford it. AU-PANVAC with its continental mission "*to promote the use of good quality vaccines and reagents for the control and eradication of animal diseases in Africa*" has embarked on the development and production of essential diagnostic reagents to support AU MS veterinary laboratories for the diagnosis of priority diseases. During the consultative workshop organized in collaboration with African laboratories at the AUC Headquarters in 2013, laboratories identified RVF as one of the priority diseases for their diagnostic activities and requested support from AU-PANVAC in this regard. Following that Workshop, a strategic framework document on AU-PANVAC Diagnostic activities was prepared and the development and production of biological reagents for RVF is indicated in that document.

Session 3

Trade issues

Susanne Münstermann

Programme Officer
Scientific and Technical Department
OIE
Paris, France



The OIE Terrestrial Animal Health Code details conditions to enhance and render trade in live animals and their products safe in the Section 5 covering everything from certification, transport, transit, quarantine requirements and inspection on arrival. In this context, the OIE allocates a lot of importance to the quality of the Veterinary Services that supervise these different measures on the side of the exporting and importing country and Section 3 of the Code is devoted to describing the quality criteria that Veterinary Services should comply with and how they can be evaluated using the *Performance of Veterinary Services* tool (the PVS pathway).

More specifically addressing RVF, the Code Chapter 8.13 was revised in 2013 and accepted by the OIE General Assembly of Delegates in 2014 in order to provide OIE Member Countries with more flexible options to deal with the specificities of this disease, mainly the fact that countries, once they experienced an outbreak, can never be considered again free of the diseases and the fact that countries can find themselves in extended inter-epizootic periods.

Accordingly the revised Code Chapter differentiates between countries/zones free of RVFV, countries infected with RVFV during an inter-epizootic period and those during an epizootic period.

Recommendations for the importation of live animals or their products are subsequently aligned with these three country situations.

It should be noted that vaccination is now offered as an option in each of the three situations, underlining the importance of the availability of effective, safe and affordable vaccines for countries in the Region, manufactured in line with the provisions as described in the OIE Manual, Chapter 2.1.14.

Furthermore, the importance of surveillance using different approaches in inter-epizootic and epizootic periods is highlighted. However, surveillance for virus detection in the vector is not recommended.

While the revised Chapter maintains that hides, skin, wool and fibre are safe commodities as they are, it now also considers fresh meat and meat products as safe provided ante- and post mortem inspection has been carried out without any findings and that meat has been properly matured.

In conclusion, the revised Code Chapter offers feasible options for countries to maintain trade even in the face of a localised outbreak, provided that Veterinary Services comply with the requirements and maintain a high standard of performance to guarantee that preventive and control measures have been implemented.

**CURRENT LIVESTOCK TRADE BETWEEN THE HORN OF AFRICA AND
THE MIDDLE EAST : THE NEW RVF OIE CODE CHAPTER AND
WHAT IT MEANS TO INTER-REGIONAL TRADE**

Chip E. Stem

CEO
Livestock Trade Services, Ltd
Nairobi, Kenya



Historically, the HoA and the Arabian Peninsula have been partners in trade. Dhows would carry livestock from Africa and return with spices and other goods. This trade continued for centuries, perhaps millennia and with the oil boom of the 20th century livestock trade expanded rapidly as the oil economies became wealthier and sought more meat in their diet. In the latter half of the 1900s, livestock trade further expanded with the rapid development of Mecca and the dramatic increase in Hajj and Umra pilgrims. From these historic times all the way until the early 1980's the HoA and Sudan were the predominant suppliers of livestock to the Arabian Peninsula. By the late 1970s livestock export from Somalia alone reached numbers of 2.5 – 3.0 million.

This trade was abruptly interrupted due to a series of import bans by GCC states, beginning in 1983 with a ban on export from the HoA due to the fear of the spread of rinderpest. Sudan largely escaped the bans, but livestock export from there was affected due to the long-standing civil war and trade deals between political figures on both the importing and exporting sides which were considered unfavourable terms by livestock producers and exporters.

Thus from controlling approximately 85% of the livestock imports into the Arabian Peninsula, the HoA / Sudanese market share dropped to approximately 15% and was filled by distant countries, principally Australia and Uruguay. With the establishment and opening of the Djibouti quarantine in 2006, African livestock export trade has experienced phenomenal growth. For example in its second year of operation the Djibouti quarantine exported 3.1 million head. Once the Somali quarantines were established, export increased dramatically once again. For example in 2012, UNDP data gathered from quarantine records and port data showed that the quarantines of Berbera, Bosasso, and Djibouti exported 5.7 – 5.9 million head. IGAD data for 2014 list 3.6 million head exported from Berbera, 1 million head exported from Bosasso, and 5.2 million head exported from Port Sudan, a total of nearly 10 million head.

Concurrently, animal welfare concerns expressed by Australians resulted in a change in the government's legal and policy framework, which caused Saudi Arabia, by far the largest Arabian importer, to halt the importation of livestock from this country. However, the current boon for African export trade which has placed billions of dollars into the hands of the regions' pastoralists remains threatened by livestock disease.

This is because of two reasons : first, is the perception on the part of the importing authorities of a conflict of interest in the management of the quarantines – traders manage and staff the quarantines and their veterinarians and technicians often perform the inspections.



Black market trade under the cover of darkness. Picture courtesy of Livestock Trade Services

Importing authorities have commented that the traders often “cheat” and report that they frequently experience problems with diseased livestock on importing ships resulting in a rejection of the entire shipment or worse, diseased animals entering their country and causing outbreaks which unfortunately has been the case in several Arabian and Middle Eastern countries.

Second, epizootic trans-boundary diseases and in particular RVF epizootics have had a serious impact in some of the importing countries and there is a strong memory of the serious epidemic 15 years ago in the Arabian Peninsula which resulted in over 300 human deaths. Because of the risk of RVF in a situation such as the Hajj, it has become an emotive disease and its occurrence on the exporting side could potentially result in a reaction on the part of the importers that is based on fear rather than science. Further, the old Chapter on RVF in the Terrestrial Code required updating so that science-based decisions made by both the exporters and the importers could be made to protect the integrity of the trade, prevent the spread of disease and increase confidence between the parties.

The new Code chapter, if followed, can prevent the introduction of RVF into the Arabian and Middle East importing countries while minimizing disruptions in trade. The changes in the Code are fundamental and hopefully will be the basis for proactive decisions on the side of the exporting Veterinary Authorities to restrict or and control trade and animal movement in the face of an outbreak ensuring that diseased livestock are not exported. Furthermore, by maintaining open communications between the parties, it is hoped that in the future, long term import bans placed by the importing authorities can be prevented.

This presentation will highlight the changes to the Code and help to demonstrate that if The Code is followed, then disease free trade between these two regions can flourish for the benefit of both sides.

IMPORTING COUNTRY PERSPECTIVE : SAUDI ARABIA

Abdelhamid Ahmed Mohamed Elfadil

KSA / Consultant Epidemiologist
Sudan University of Science and Technology
Khartoum, Sudan



The region affected most by the consecutive RVF outbreaks, is the South West of the *Kingdom of Saudi Arabia* (KSA). In the 2000/2001 outbreaks, the viruses isolated were almost identical to those identified in Africa (1990/91, 1997/98). The outbreaks started in August 2000 and lasted until April 2001. The affected areas were mostly situated in Jazan (66% of cases) and Asir (27% of cases) with most cases occurring in September 2000. Across all regions 886 were reported, of which 683 (83%) were laboratory-confirmed. The case fatality rate was 14%.

In animals, the infection rate was 9.7% in sheep, 7.9% in goats, 1.3% in camels and 1.2% in cattle. At the time of the epizootic, the control measures were largely based on (mass) vaccination, followed by partial and ring vaccinations at a later stage (using live –attenuated vaccine).

Later epidemiological studies defined factors associated with RVF in the KSA as dense mosquito populations (OR 4.2), high rainfall (5), proximity of lakes and ponds (4.2) and lush vegetation (2).

Factors associated with RVF active virus circulation were a high IgM level, abortion and the genotype (sheep vs. goats). In humans risk factors were identified as exposure to both mosquito bites and animals (76%), mosquito bites only (22%), animals only (1%). Sixty-two (62) % of affected human cases reported abortion storms in animals and 51% reported out-of-the ordinary animal deaths

The economic impacts of RVF (and the subsequent bans) on trade are easily understood when looking at the statistics : 20 million pastoralists in East Africa are highly reliant on sales of livestock to Saudi Arabia, about 10-15 million head of livestock are exported to Saudi Arabia annually, the small ruminants trade to Makkah is estimated to be worth USD 600 – 900 million per annum.

The way the RVF outbreak affected the industry in KSA was through the closure of livestock markets in the affected regions for about one year, the 4-year long ban of animal movement from affected regions to markets in Saudi Arabia, and the 4-year long ban on importation of livestock from Africa, aside from the stamping out of 23,829 smuggled small ruminants to Makkah (worth USD 4,000,000).

Active surveillance for RVF continues to this day and is conducted annually in the rainy season. The main purposes are to detect new infections (IgM) or clinical disease and to monitor herd immunity (IgG). To date no clinically affected herds were diagnosed. In addition, eleven sentinel herds were located in high risk areas (7 in Jazan, 2 in Asir, 1 in Makkah and 1 in Albaha) and these are monitored every 2-3 months for IgM & IgG. Through these animals, RVF virus circulation was detected in 2004 in Jazan & Asir, and in 2006 in Jazan. In 2014, 10 out of 213 animals tested positive for RVF (IgG) but no IgM cases were diagnosed, nor clinical cases.

Session 4

Prevention, biothreat and early warning

SURVEILLANCE SYSTEMS IN PLACE

Zelalem Tadesse

Coordinator of the STSD project
Inter-african Bureau for Animal Resources
AU
Nairobi, Kenya



The IGAD region is endowed with the highest ruminant population in Africa. However, the region is also severely affected by the impacts of animal diseases including RVF. The HoA region is a global hotspot for the emergence of RVF epizootics as evidenced by recurrent waves of outbreaks over the past decades. Occurrence of RVF epizootics has significantly affected the region by causing mortalities of animals and humans as well as sustained restrictions on export of animals and animal products.

Taking lessons from past experiences, most of the countries in the IGAD region have put in place surveillance systems targeting RVF. The main objective of RVF surveillance in the region aims at early detection of epizootics in order to trigger rapid response and curb subsequent devastations that maybe caused by the disease. To guide their surveillance activities, most countries have identified high risk areas for

RVF epizootics using historical data on geographical distribution of previous outbreaks. The surveillance systems in place largely focus on detection of the pathogen and evidences of RVFV activity. During inter-epizootic periods, targeted surveillance is undertaken in most countries to monitor RVFV activity in high risk areas through detection of RVF antibodies, which is a practice consistent with the recommendations of chapter 8.13 of the OIE Terrestrial Code. The sampling method applied in this case is random selection of individuals from susceptible ruminants in high risk areas (Ethiopia, Kenya, and Sudan) or from sentinel herds established to monitor RVFV activity (Kenya, Uganda). As identification of high risk areas is largely informed by the geographical extent and mapping of previous epizootics, targeted surveillance based on such descriptive analysis may not be sensitive enough to capture all future outbreaks.

Furthermore, RVF surveillance systems are linked with meteorological alert systems in most countries. Surveillance is usually heightened and triggered when forecasts of favourable/predisposing environmental phenomenon particularly predictions of excessive rainfall are received from meteorological agencies and other responsible regional agencies. The application of meteorological data and information as RVF early warning mechanism apparently enhances the efficiency and effectiveness of surveillance systems. In preparedness for an unfortunate event of RVF epizootics, countries of the region have developed emergency preparedness plans that spell out the surveillance SOPs that should be complied with in order to determine the extent of the outbreak for effective and rapid containment of the disease, which is also consistent with the provisions of chapter 8.13 of the Code.

However, surveillance systems in most countries don't usually involve vectors, which is an important activity to identify areas with low and high vector densities. Such information on RVF vector activities, as described under chapter 8.13 of the Code, could facilitate safe trade of ruminants and their products. Furthermore, the identification and designation of high risk areas should be informed by an analytical study that combines disease data as well as information on risk factors. In this regard, a plan has been finalized to undertake a cross-sectional study of RVF including its potential risk factors aiming at developing risk maps using analytical methods and tools.

Stéphane de la Rocque

Programme Officer
OIE – WHO Liaison
OIE
Brussels, Belgium



Experience gathered from emergencies of major zoonotic infectious diseases, including the wave of Rift Valley fever outbreaks from 2006 to 2010, confirmed that collaboration between human and animal health systems is crucial to effectively manage such events. Human and animal health systems need to be robust, have sufficient capacities and work in close partnership to address common issues regarding early detection, assessment and rapid response, whilst respecting international standards. OIE and WHO are the intergovernmental organizations mandated to improve animal and human health respectively, on a global scale; they assist countries with strengthening their capacities and improving their compliance under the normative frameworks of

the international standards described in OIE's Terrestrial and Aquatic Animal Health Codes and the *International Health Regulations* (IHR, 2005).

The use of these normative frameworks has provided opportunities to engage human and animal health systems in a constructive and operations-oriented dialogue, exploring ways to improve their coordination. Stemming from this, significant results have been recently obtained and are in line with good governance principles. To support countries improve their governance systems, the OIE and WHO have developed complementary tools to assess national capacities and analyse gaps in their compliance to OIE international standards and IHR (2005). OIE and WHO have also conducted an in-depth analysis of the differences and synergies between the frameworks and tools used in the two sectors. Joint WHO IHR/OIE PVS Pathway national bridging workshops offer a structured approach to help countries identify strengths and weaknesses and accordingly define concerted corrective measures and strategic investments. Participation in these workshops helps countries define national strategies targeting capacity building at the human-animal health interface. This approach has been tested in pilot countries and will be included in future programmes undertaken by OIE and WHO.

In his presentation, the speaker will use his experience from RVF outbreaks management campaigns to describe the process and potential outputs. These RVF outbreaks have actually largely inspired the development of this approach and concrete case studies are used to illustrate the approach which finally contributes to globally promoting the importance of a One Health approach, while accelerating progress towards Global Health Security.

CONTINGENCY PLANNING FOR RVF : KENYA

Austine Bitek

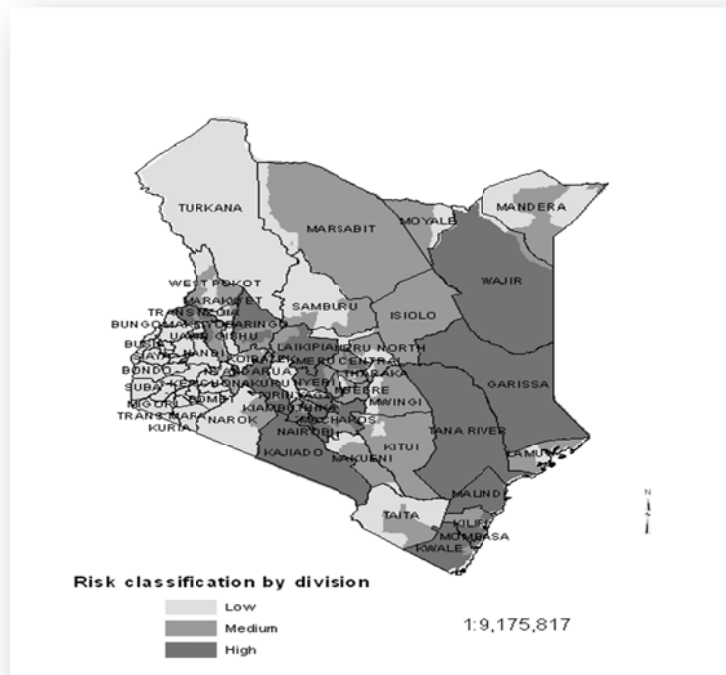
Veterinary Epidemiologist
Ministry of Agriculture, Livestock and Fisheries
Zoonotic Disease Unit
Nairobi, Kenya



RVF is a mosquito-borne viral disease that poses a significant global threat to humans and livestock. In East Africa, RVF usually occurs as explosive epizootics with prolonged inter-epidemic periods of between 8 to 10 years. In Kenya, the 2006/2007 RVF outbreak induced estimated losses to the economy of more than USD 24.5 million, based on the outbreaks' negative impacts on both agriculture and other sectors. The episodic nature of the disease and the rapid evolution of outbreaks create special challenges for its mitigation and control.

Since 2008, the Government of Kenya and partners have developed a Contingency Plan for RVF prevention and control. The Contingency Plan describes how the

Government and partners prepare for and respond to Rift Valley Fever outbreaks. This systematic plan invests in ensuring capacity and focuses on early detection and rapid response to outbreaks of RVF in the country. A RVF early warning system have been established to assess the risk of occurrence of a major RVF epidemic before it arrives and to enable national veterinary services to anticipate the risk and react promptly and effectively to prevent the disease's devastating impact on animal and human health. In the contingency plan, key decision points and actions have been identified within the RVF outbreak cycle (inter-epidemic, pre-outbreak, outbreak and recovery phases) that inform actions to be taken in each phase.



Kenya RVF risk map. ZDU, Kenya

Bernard Bett

Scientist
Food Safety and Zoonosis
International Livestock Research Institute
ILRI
Nairobi, Kenya



In the eastern Africa region, RVF epidemics occur in irregular cycles that make it difficult for mitigation agents to implement effective interventions in the face of an outbreak. Furthermore, the existing prediction systems do not offer an adequate lead time given that there is inadequate knowledge on drivers and processes that promote outbreaks. The RVF Decision Support Framework has therefore been developed to guide timely, evidenced based decision-making in the control of the disease considering that uncertainties on decision making can paralyse the deployment of effective response measures. The last (2006/2007) outbreak for instance caused substantial socio-economic impacts in the region due to by delays in the recognition of

risk and in making decisions to control the disease.

The framework breaks the RVF epidemic cycle into five explicit steps and matches them with appropriate actions. These steps identified in the framework include: (i) inter-epidemic period, (ii) pre-outbreak period (classified into early warning, localised rain, flooding and mosquito swarms), (iii) outbreak period (classified into suspected and confirmed outbreak sub-phases), (iv) recovery phase including a 45-day period when no further livestock cases are observed, and (v) post-outbreak recovery and reflection. Interventions matched to these epidemic stages are: capacity building and training, communication, advocacy and public awareness, national and regional coordination, early warning, surveillance, disease prevention, case management, regulation of trade and markets for livestock, resource mobilisation, establishing or strengthening institutions and policies, and risk and impact assessment. The development of the framework has involved multiple partners, decision-makers to ensure ownership and relevance to the decision-making challenges that have been experienced during previous RVF outbreaks. The framework has also been aligned with the One Health principles by specifying interventions for both veterinary and human health sectors at each decision point.

For the framework to be effectively operationalized, three key issues will have to be addressed: (i) a national RVF emergency fund has been established and procedures and modalities put in place to enable the fund to be made available rapidly in response to predetermined criteria, (ii) an effective communication system has been established including a clear chain of command and feedback from the Chief Veterinary/Medical Officers to field officers and communities, and (iii) that approved RVF Contingency Plans integrate the framework in their designs.

Assaf Anyamba

Research Scientist
GESTAR/USRA & Biospheric Sciences Laboratory
Goddard Space Flight Center
NASA
Greenbelt, MD, United States



RVF outbreaks are known to follow periods of anomalously high rainfall in Eastern Africa. Past studies indicate that periods of such above-normal rainfall in equatorial eastern Africa are associated with warm *El Niño Southern Oscillation* (ENSO) events.

In June 2014, the *National Oceanographic and Atmospheric Administration's (NOAA) Climate Prediction Center* issued a consensus model forecast indicating a 70 % chance for the development of a warm ENSO event in the late summer (Niño-3.4 index: between 1.0°C and 1.4°C) and 80% in the fall. However given the delayed development of the event, a revised forecast was issued early in the fall

indicating about 60-65% to peak at weak strength during the late fall and early winter (3-month values of the Niño 3.4 index between +0.5°C and +0.9°C).

The RVF risk mapping model did not identify any areas at potential risk in September, however in October – November some contiguous areas in South Sudan and Sudan were mapped to be are potential risk - where ecological conditions would support the emergence of RVF vectors. A series of advisories were posted on the RVF Monitor website (<http://www.ars.usda.gov/Business/docs.htm?docid=23461>) and shared with international partners (OIE, FAO and WHO) advising enhanced vector surveillance in areas shown to be at risk. Some of these areas in Sudan reported outbreaks of undiagnosed haemorrhagic fever and cholera in several locations in El Gezira state (<http://www.promedmail.org/>). Lack of a clear and strong coupling between the atmosphere and the warm Sea Surface Temperatures or SSTs in the eastern equatorial Pacific Ocean and weak warming in the Indian Ocean, resulted in a poor and aborted rainfall season in large parts of East Africa. Overall, the above normal rainfall belt remained in the northern half of the region and areas at potential risk for Rift Valley fever activity persisted in Sudan and South Sudan throughout the remainder of the season.

The immediate future seasons portends elevated risk due to lapsed time since the last regional epizootic, restocking of livestock after the 2010-2011 drought period and the higher probability of a medium (+1.5) to strong (+2.0) El Niño event during the coming seasons. It is advisable therefore for all national and regional early warning institutions to be on alert and prepare for early surveillance.

THE JOINT EARLY WARNING RELEASE

Daniel Beltrand-Acrudo

Animal Health Officer
AGAH
FAO
Rome, Italy



In December 2014, climate models predicted persistent above-average rains and risk of flooding in East Africa. In response, FAO, OIE and WHO warned countries to remain vigilant about RVF. The availability of near-real time satellite-based RVF climate data, such as rainfall, temperature and vegetation indices, provides an opportunity to monitor climatic conditions that are linked to vector abundance and population dynamics. This has facilitated the development of cost-effective *Early Warning Systems* (EWSs) for vector-borne diseases, including RVF. The aim of such EWSs is to monitor the first signals of a possible increase in vector abundance and RVF risk and provide information for prevention and risk mitigation.

Given the predicted risk for potential RVF activity based on abnormally high rainfall in the identified areas of the Republic of Sudan, the Republic of South Sudan, the Federal Republic of Somalia, the Republic of Kenya and the United Republic of Tanzania, FAO, WHO and OIE encouraged these countries to:

- Heighten their level of surveillance for RVF in human and animals in at-risk areas;
- Increase their level of preparedness, and implement targeted vaccination in known at-risk areas;
- Raise awareness and communicate with communities the risk of emergence of the disease in animals first and later in humans.

The EMPRES Watch Bulletin can be downloaded from www.fao.org/3/a-i4295e.pdf



Session 5

Regional coordination

OIE VACCINE BANKS

Susanne Münstermann

Programme Officer
Scientific and Technical Department
OIE
Paris, France



The establishment of a global or regional vaccine bank, irrespective of the disease targeted, will entail the following steps : (a) the publication of an international call for tender, (b) the selection of supplier(s), (c) the negotiation and signature of a contract, (d) the production of an initial stock of vaccines, (e) the purchase order and production of vaccines upon request from countries and (f) the supply/delivery of the vaccines to agreed international airports.

Once established, countries can access these vaccine banks by submitting an official request, by the OIE Delegate, to the OIE Director General, with the support from OIE regional offices. A vaccine request form with the requested number of doses and timeframe of delivery has then to be submitted, along with the confirmation that appropriate cold chain infrastructure is present. It also requires a justification of the request, based on the disease situation in the country

Requests are processed by the OIE Headquarters and flight details and shipping documents finalised with vaccine suppliers and then provided to the country. After the vaccines have been delivered to the country, the OIE Delegate is requested to provide the OIE with updates and progress reports, including information on the vaccination campaign period (dates), the number of vaccines eventually used, the number of animals vaccinated, the vaccination schedule implemented (vaccination of which species, age group, etc...), the geographical area covered, and possible information on post-vaccination monitoring.

The benefits for Member Countries of the OIE are numerous :

Quality

- Vaccines supplied to countries are of high quality and comply with OIE international standards;
- Vaccines are delivered with the required flexibility and based on the request/availability of the country;
- Important reduction in the risks associated with storing large quantities of formulated vaccine in sub-optimal conditions;
- The virtual stock / replenishment mechanism ensures that produced vaccines do not expire before being used;

Logistics

- Timely dispatch of emergency stocks in line with field needs;
- Possible delivery of relatively small or large quantity of vaccines;
- Limits possible costs associated with the multiplication of local registration and vaccine purchases;
- The burden of storage lies with the selected vaccine supplier(s), rather than with the purchasing countries or international organisations;

Cost effectiveness

- Economies of scale - a cost reduction per vaccine unit or dose;
- Financial mechanisms allowing direct purchase by countries (OIE as sole supplier);

Improved coordination

- Harmonisation and coordination of regional control programmes or the implementation of global / regional control strategies;
- Support for multi-party vaccination campaigns (e.g. public-private partnerships and NGOs)

To date, OIE has established several vaccine banks across the world. The vaccine bank for avian influenza is funded through a multi-donor approach* involving the European Union, Canada, and the UK, for a total of 62 million AI vaccines delivered (as per April 1st, 2015), mostly to Egypt and Vietnam. The OIE Rabies Regional Vaccine Bank has so far supplied 3.7 million doses to Asian countries and 3.2 to other countries, including several African countries (Mali, South Africa, Togo). The OIE Regional Vaccine Bank for PPR in Africa has supplied vaccines to the pilot control areas of Ghana and Burkina Faso mostly, but also to Mali and Togo, for a total of 14 million doses. Finally the OIE Regional Vaccine Bank for FMD in Asia, has delivered some 3 million doses in 5 Asian countries

This proven track record raises the question : is there scope and justification for an OIE regional vaccine bank for RVF in (Eastern) Africa and the Middle East ?

Bouna Diop

Regional Manager
ECTAD Eastern Africa
FAO
Nairobi, Kenya



The *Global Framework for the Progressive Control of Transboundary Animal Diseases* (GF-TADs), launched in 2004 is a joint initiative of OIE and FAO to achieve the prevention and control of *transboundary animal diseases* (TADs). The initiative is built on experiences in the past showing that progress in controlling TADs at country level is not likely to be successful and sustainable unless the efforts are part of a coordinated regional approach/embedded into supra-national frameworks.

The GF-TADs for Africa was established in 2006 with a view to respond to priority diseases of the continent. It is governed by a *Regional Steering Committee* (RSC) chaired by FAO with AU-IBAR as vice-chair;

the Secretariat is provided by the OIE Representation for Africa. CVOs, members of the OIE Commission for Africa and representatives from the Regional Economic Communities (RECs) and partners attend the RSC annual meetings. The GF-TADs for Africa operates under the overall guidance and supervision of the GF-TADs Global Steering Committee.

The GF-TADs for Africa's 5-year Action Plan 2012-2016 target different objectives including (i) facilitating regional and cross-border collaboration, including networking activities; (ii) improving national and regional knowledge and sharing quality information/data on priority animal diseases; (iii) providing technical guidance to improve disease prevention, surveillance, early detection, notification and rapid response systems; (iv) improving diagnostic laboratory capacity and performance at national level and supporting the establishment/reinforcement of national and regional vaccine production laboratories, reference laboratories; (v) supporting the reinforcement of Veterinary Services; (vi) ensuring the appropriate advocacy for animal disease prevention and control activities; and (vii) developing alliances and foster collaboration between public Veterinary Services, private veterinarians and livestock professional organisations.

The Plan focuses on 7 priority diseases: PPR, FMD, RVF, rabies, ASF, ND and CBPP.

The GF-TADs Africa 9th Steering Committee meeting held on 8 – 9 July 2014 in Ouagadougou adopted different recommendations including:

- a) The GF-TADs for Africa Action plan be completed with baseline situation provided by countries, AU-IBAR, FAO, OIE, RECs and other relevant partners for the following diseases: FMD, PPR, CBPP, ASF and RVF;

- b) The Secretariat of the *ALive* Executive Committee, supported by key partners of GF-TADs for Africa, ensure a proper advocacy at the highest authority to promote ownership of the GF-TADs for Africa mechanism and its 5 year Action Plan by the RECs and Members Countries;
- c) African countries be encouraged to continue their progression in the OIE PVS Pathway, especially by requesting, when relevant, PVS Evaluation Follow-up mission and taking ownership of the outcomes in order to improve the good governance of their Veterinary Services and to ease access to funding both internally and externally using round tables with donors.

Under the GF-TADs for Africa aegis, different initiatives have been taking place including the preparation of the ASF regional strategy, the Progressive Control Pathway for FMD (PCP-FMD) Roadmap meetings, as well as the RVF conference in Djibouti.

Ghazi Yehia

Representative
Regional Representation for the Middle East
OIE
Beirut, Lebanon



The previous GF-TADS RSC for the Middle East gathered in Dubaï (UAE) in April 26, 2012, and in Amman (Jordan) in September 22, 2013, succeeded to raise a regional consensus on the governance aspects of the GF-TADS and on the terms of reference of a regional action plan for the period 2012-2016 aiming in particular at generating information and data for monitoring the regional activities related to the priority TADs; and establishing a reporting mechanism of the GF-TADS Middle East activities, linked to the Global GF-TADS Secretariat.

The specific objectives of this 5 years action plan are to:

- a) promote the control and eradication of specific TADs in the region;
- b) provide strategic direction to the Secretariat;
- c) foster cooperation between member countries, donors, *Regional Specialized Organisations* and the *Regional Support Units*;
- d) and, together with the Secretariat, to ensure guidance for field, laboratory, epidemiological events and control efforts.

Actions conducted by the GF TADs RSC addressed priority diseases prevailing in the region such as FMD, PPR, RVF and lumpy skin disease, through assistance to organise regional meetings to discuss and agree on common procedures for the surveillance and control of these diseases, including the assessment of national plans and elaboration of regional strategies.

Among others, the RSC will continue to:

- facilitate collaboration and maximize synergies among the countries and stakeholders in the region;
- and promote adequate governance of Veterinary Services in accordance with OIE standards through capacity building programmes at national and regional levels.

The next RSC meeting will be held in the margins of the 13th Conference of the Regional Commission for the Middle East, to be held in Doha, Qatar or to be held in Beirut, Lebanon in November 2015.

James Wabacha, Zelalem Tadesse, Henry Wamwayi,
Samuel Wakhusama & Ahmed El-Sawalhy*

(*) Coordinator of the SMP-AH Project
Inter-african Bureau for Animal Resources
AU
Nairobi, Kenya



The *Interafrican Bureau for Animal Resources* (AU-IBAR) is a specialized technical office of the African Union Commission. Its mandate is to support and coordinate the sustainable development and utilization of animal resources to enhance nutrition and food security and contribute to the wellbeing and prosperity of the people in the MS of the *African Union* (AU).

Livestock contributes significantly to the livelihoods of Africa's people and to their national economies but TADs including RVFV pose a major challenge due to the negative effects on productivity and access to livestock markets.

To address the challenges facing the livestock sectors in Africa, the AU Heads of States and Governments recently approved the *Livestock Development Strategy for Africa* (LiDeSA) as a long-term framework for the transformation of the livestock sector. AU-IBAR is addressing RVF and other

TADs within the framework of LiDeSA.

To improve information sharing among the MS and *Regional Economic Communities* (RECs), AU-IBAR compiles and disseminates information on the sanitary status. Further support to animal health information systems is being provided through the rolling out of the *Animal Resources Information System* (ARIS) in the AU MS through trainings and the provision of information and communication equipment.

To enhance knowledge on the epidemiology of RVF to aid decision making on prevention and control of RVF outbreaks, cross-sectional surveys for RVF are being undertaken in IGAD MS.

AU-IBAR and the IGAD *Centre for Pastoral Areas and Livestock Development* (ICPALD) through the *Standard Methods and Procedures in Animal Health* (SMP-AH) project with financial support from USAID are supporting regional coordination and harmonization of animal disease surveillance, prevention and control in the HoA. The coordination and harmonization of the control of RVF and other TADs is based on the *Standard Methods and Procedures* (SMPs) approach. This involves capacity building for laboratory testing, surveillance and disease control and the application of SMPs as protocols for the prevention and control of RVF in line with OIE standards. To guarantee the health status and welfare of livestock for export, veterinary personnel in quarantine stations have been trained on sanitary processes and certification. Support has also been provided for the development of SMPs for export quarantine stations. Technical and managerial capacity for veterinary personnel from the HoA has also been enhanced through trainings. The capacity of veterinary vaccine production laboratories is also being strengthened and AU-IBAR is coordinating and promoting the participation of AU MS in animal health standard setting processes. The development of responsive policy and regulatory environment for the delivery of veterinary services is also supported. To enhance coordination, communication and information sharing on livestock trade among countries in the HoA and with importing countries in the Middle East, AU-IBAR and ICPALD are supporting a livestock commodity association, the North Eastern Africa Livestock Council or NEALCO.

Ameha Sebsibe

Head, Livestock Programme
Centre for Pastoral Areas and Livestock Development
IGAD
Nairobi, Kenya



The *Intergovernmental Authority on Development* (IGAD) is a REC covering eight countries: Djibouti, Eritrea, Ethiopia, Kenya, Somalia, South Sudan, Sudan and Uganda. The livestock resources are estimated at about 373 million ruminants. The demand for livestock and livestock products in the region, in other regions within Africa and in Middle East countries is high. Proximity to the Middle East countries and adaptation to the taste of our animals in the Gulf are also opportunities. However, some IGAD MS are covering about 50% of live animal and less than 10% of the meat required annually by the Middle East. One major reason hampering the growth of market share is limited capacity to control trans-boundary diseases. There were also export bans on East African countries due to RVF which affected heavily the livelihood of producers and

traders.

ICPALD and AU-IBAR have been able to develop two project proposals; *Standard Methods and Procedures in Animal Health* (SMP-AH,) and *Improving Surveillance of Animal Diseases in IGAD MS* (STSD) and mobilize resources from USAID and EU respectively.

The main progress of the two regional projects and support to MS with special focus on RVF control is summarized below:

Under SMP-AH nine priority TADs were identified together with MS for special attention and joint efforts to control TADs and RVF is one of them. An SMP for RVF was also developed and validated with MS and development partners; the project is working with MS on streamlining of the SMP into the national development programmes. Veterinary Officers, laboratory technicians and export quarantine workers were also trained on epidemiology and surveillance, inspection, certification, diagnostic techniques and management skills.

With the support of the STSD project, ICPALD and AU-IBAR developed the *Regional Guidelines for Livestock Identification and Traceability Systems* (LITS) and *Animal Health Certification* (AHC) Systems and validated by MS and development partners. A regional LITs and AHC forum has also been established to provide guidance and support MS to exchange lessons in the area. MSs were also supported to improve their capacity of undertaking active animal diseases surveillance through personnel training for labs, provision of reagents, cars and motor bikes. RVF is one of the four diseases for which a cross sectional survey design was developed. A regional coordination mechanism on disease surveillance is also supported through the Animal health networks to enhance exchange of lessons and good practices and improve disease reporting. The regional framework for progressive control and eradication of PPR and other small ruminant diseases were also developed and validated. A regional PPR Control Coordination Committee embracing MS has also been established to provide guidance on development of national strategies and facilitate implementation and share lesson. The same regional Coordination Committee will also coordinate activities regarding RVF and other TADs.

Bouna Diop

Regional Manager
ECTAD Eastern Africa
FAO
Nairobi, Kenya



The regional epidemiology and laboratory networks were established in 2009 and 2008 respectively through FAO facilitation to coordinate animal health work in the region. The first, being the *Eastern Africa Regional Epidemiology Network* (EAREN) focuses on surveillance for early detection and reporting of animal diseases to enable planning, regional coordination and harmonization. The second, the *Eastern Africa Regional Laboratory Network* (EARLN), focuses on national laboratories for diagnosis to support early detection of diseases and their management plans.

The Regional networks, supported by functional national networks, serve to share expertise and information. The activities of national networks include collecting quality data, disease surveillance, risk analysis and early warning. The Regional networks seek to create a sustainable regional infrastructure for animal health, functioning in the long-term beyond individual finite projects. Plans to anchor the regional networks into the *Regional Economic Communities* (RECs) are on-going to ensure their sustainability. Until 2010, both regional networks met separately after which joint network meetings were adopted in order to give participants the opportunity to discuss early detection and warning for diseases. An epidemio-surveillance system encompasses both networks. To ensure sustainability and ownership by countries, two regional coordinators and their deputies were nominated in 2012 during the joint EAREN & EARLN meeting held in Mombasa, Kenya. The coordinators and deputies are based in different countries on rotational basis. Information on emergency and priority disease outbreaks and other epidemio-surveillance issues and activities is shared regularly. Currently, Ethiopia and Rwanda coordinate the EAREN activities, while Uganda and Kenya coordinate the EARLN. Since the establishment of EAREN and EARLN, two sub-networks based on diseases (FMD and ASF) have been established and actively meet annually. Other sub networks (rabies and CBPP) are being established as recommended in the last joint annual meeting held in September 2014 in Arusha Tanzania. The EAREN and EARLN networks meet annually, bringing together two representatives from each of the twelve countries in the region that act as focal points to discuss issues related to epidemiology and laboratory activities. This is augmented with representation from the current two sub-networks on FMD and ASF.

In 2013, an umbrella network of the *Chief Veterinary Officers* (CVOs) - the *Chief Animal Health Regional Network* (C-AHRN) - was established. Considered responsible for all activities related to animal health, the CVOs from all twelve countries participate in the meeting. The information to be shared by the countries is validated and endorsement by the CVOs before the sharing process usually done through the two coordinators. While functionality of the networks can be said to be more or less a success story and since IGAD has agreed to take a leading role in coordinating the regional networks, there is need to enhance sustainability and ownership by countries by mainstreaming the activities into the budgetary processes.

Session

Poster session

COMPARATIVE GENOME SEQUENCE ANALYSIS OF RVF VIRUS ISOLATES FROM 2008 TO 2010 OUTBREAKS IN SOUTH AFRICA

*Moabi Rachel Maluleke, M. Phosiwa, Baratang Alison Lubisi, G. Michuki^a,
P.S Kegakilwe^b, S.J Kemp^{a,c} & P.A.O Majiwa^d*

Onderstepoort Veterinary Institute
ARC-OVI
Pretoria, South Africa

- a. International Livestock Research Institute, Nairobi, Kenya
- b. Veterinary Services, Northern Cape Province, South Africa
- c. School of Biological Sciences, University of Liverpool, Liverpool, United Kingdom
- d. Department of Veterinary Tropical Diseases, University of Pretoria, South Africa

RVF is a zoonotic disease. Since the 1930s when it was first noticed in Kenya, the disease has appeared in other African countries and in the Arabian Peninsula. The disease affects both humans and animals, causing major losses in livestock and negative impact on the livelihoods of people who depend on them. Because of its zoonotic nature, RVF is recognized as a disease which is a threat to all who live in countries where its mosquito vector thrives. Because of the changing weather patterns, it is essential to institute and sustain in-country bio-surveillance of this disease using the best tools available, to stop potential outbreaks at source or effectively manage them if they were to occur.

Outbreaks of RVF usually follow weather conditions which favour increase in mosquito populations. Such outbreaks are normally cyclical, occurring once every 30 or so years. However, this is not always the case. For example, recent outbreaks of the disease in South Africa have occurred with increasing frequency and rather unexpectedly: in 2008 (in Mpumalanga, Limpopo and Gauteng), in 2009 (KwaZulu-Natal, Mpumalanga and Northern Cape provinces) and in 2010 (Eastern Cape, Northern Cape, Western Cape, North West, Free State and Mpumalanga). As of August 2010, there were 232 human cases, with 26 confirmed human deaths. In order to obtain comprehensive background information on the genetic composition of the RVF viruses circulating in South Africa, genome sequence analyses WERE undertaken on RVF viruses isolated from samples collected over time from animals at discrete foci of the outbreaks. The oldest isolate whose genome was analysed is from a 1955 case and the most recent one from a case in the 2010 outbreak.

Complete sequences have been obtained from 20 different isolates so far. We report on, and discuss, phylogenetic relationships among the isolates as reflected by their genome sequences, and implicit recombination among genes encoding glycoproteins Gc and Gn, which have a role in host protective humoral immune responses.

Agricultural Research Council
Onderstepoort Veterinary Institute,
No. 100 Old Soutpan Road,
Private Bag X05,
Onderstepoort 0110
Gauteng, South Africa
MalulekeR@arc.agric.za

SEROPREVALENCE OF RIFT VALLEY FEVER ANTIBODIES IN SOUTH AFRICAN SUIDS

*Baratang Alison Lubisi, P. Ndouvhada, T.V. Mareledwane, T. Tshabalala,
V. Mangwale, M-L Penrith^a & A.D.S Bastos^c*

Onderstepoort Veterinary Institute
ARC-OVI
Pretoria, South Africa

a. Department of Veterinary Tropical Diseases, University of Pretoria, Onderstepoort, South Africa

b. Mammal Research Institute, Dept of Zoology and Entomology, University of Pretoria, South Africa

RVF is a serious viral zoonotic disease causing wide-spread abortions, mortalities and illness in clinically susceptible species. The virus responsible for the disease is transmitted by mosquito vectors and epidemics coincide with periods of high rainfall when the vectors are abundant. However, low circulation of RVF virus (RVFV) and sporadic outbreaks of the disease often occur outside epidemic seasons, raising suspicion of existence of inter-epidemic maintenance hosts of RVFV, in the form of wildlife and other sub-clinically affected animals such as those in the Suidae Family.

The current study was aimed at determining the sero-prevalence of RVF antibodies in suids from the 9 provinces of South Africa, to determine whether these animals had been exposed to RVFV infected mosquitos, have subsequently been infected and sero-converted. Approximately 4000 sera collected between 2007 and 2013 were screened with an indirect RVF IgG ELISA and 700 of these, were tested using *serum neutralisation test* (SNT).

Overall ELISA sero-prevalence was 2.2 % and the rates per province ranged from 0.8 % to 6.3 %. Among the randomly selected sample subset tested, the SNT recovered a country-wide seroprevalence of 16.4 %, whereas ELISA prevalence was 0.1 %.

The SNT results indicate that the serological prevalence of RVF in South African suids is higher than what is discernible by the indirect ELISA, a result that is likely due to lower binding capacity of the ELISA conjugate to suid IgG. The results indicate that suids exposed to RVFV seroconvert, corroborating earlier findings by investigators in Egypt.

Further studies to investigate the role of these species in the epidemiology of RVF in enzootic areas are warranted.

Agricultural Research Council
Onderstepoort Veterinary Institute,
No. 100 Old Soutpan Road,
Private Bag X05,
Onderstepoort 0110,
Gauteng, South Africa
LubisiA@arc.agric.za

LINKAGES BETWEEN SOCIO-CULTURAL PRACTICES AND VULNERABILITY TO RIFT VALLEY FEVER (RVF) IN BARINGO COUNTY, KENYA

Edna Mutua

Graduate Fellow,
International Livestock Research Institute,
ILRI
Nairobi, Kenya

RVF is a zoonotic disease that affects domestic ruminants, particularly sheep, cattle and goats. In livestock and humans, RVF is spread through bites from infected aedes and culex mosquitoes. Additional avenues of human infections include contact with infected animal secretions, tissues and aerosols. In Kenya, RVF outbreaks have occurred ten times with the first recorded in 1931 and the last in 2006. During the 2006-2007 outbreak, RVF occurred in Baringo County for the first time. The outbreak was associated with ENSO related climatic anomalies.

Through an on-going study on community adaptation to Malaria and RVF, which specifically focuses on how culture influences disease, data on socio-cultural practices in livestock production has been collected through focus group discussions and key informant interviews among the Tugen and Ilchamus communities of Baringo County.

Preliminary findings show that both communities largely depend on livestock for their livelihoods. In terms of risk of exposure to RVF, both communities exhibit vulnerability based on their low level of awareness of the disease; consumption of meat from animals that die of diseases and unknown causes; disposal of dead animals; close contact with both healthy and sickly livestock; and management of human febrile illnesses.

The study concludes that both communities are vulnerable to RVF and recommends that they should receive targeted awareness creation messages on the occurrence, transmission and prevention of RVF in order to decrease vulnerability to human and livestock infections.

International Livestock Research Institute
ILRI
P. O. Box 30709-00100,
Nairobi, Kenya
e.n.mutua@cgiar.org

PERCEIVED RISK FACTORS AND RISK PATHWAYS OF RIFT VALLEY FEVER IN CATTLE IN IJARA DISTRICT, KENYA

*Nelson O. Owange, William O. Ogara, Jacqueline Kasiiti^a, P. B. Gathura, Sam Okuthe^e,
Rosemary Sang^{c,d}, Hippolyte Affognon^c, Onyango Ouma^b & Murithi Mbabu^a*

University of Nairobi,
Faculty of Veterinary Medicine,
Department of Public Health Pharmacology and Toxicology,
Nairobi, Kenya.

- a. Ministry of Agriculture, Livestock and Fisheries, State Department of Veterinary Services, Nairobi, Kenya.
- b. Institute of Anthropology, Gender & African Studies, University of Nairobi, Nairobi, Kenya,
- c. International Centre for Insect Physiology and Ecology (ICIPE), Nairobi, Kenya,
- d. The Center for Virus Research, Kenya Medical Research Institute, Nairobi, Kenya.
- e. Emergency Centre for Transboundary Animal Diseases (ECTAD) Eastern Africa, FAO, UNoN, Gigiri, Kenya.

Ijara district in Kenya was one of the hotspots of RVF during the 2006/2007 outbreak which led to human and animal deaths causing huge economic losses. The main constraint in the control and prevention of RVF is inadequate knowledge about the risks factors promoting its occurrence and maintenance. This study was aimed at understanding the perceived risk factors and risk pathways of RVF in cattle in Ijara to enable the development of improved community-based disease surveillance, prediction, control and prevention.

A cross-sectional study was carried out from September 2012 to June 2013. Thirty-one key informant interviews were conducted with relevant stakeholders to determine the local pastoralists' understanding of risk factors and risk pathways of RVF in cattle in Ijara district. The key informants rated the high presence of mosquitoes, availability of large herds of cattle and once in a while high rainfall leading to floods in the relatively flat land of the region to be the main risk factors. Close contact between wildlife and cattle was suggested to be another main risk factor for occurrence of RVF. The main risk pathways were infected mosquitoes that bite cattle while grazing and at watering points as well as the close contact between domestic animals and wildlife. The mobility of the cattle to markets and search of pasture suggested the likelihood of infection transfer over a wide area. The likelihood of contamination of the environment due to poor handling of carcasses and aborted fetuses during RVF outbreaks was considered an important pathway.

The findings pointed that availability of mosquitoes, livestock and wildlife as well as rainfall leading to floods were the main risk factors towards occurrence and maintenance of RVF in cattle in Ijara. On the other hand, the contact between livestock and wildlife around watering points and grazing fields were perceived to be the main risk pathways for RVF in cattle in Ijara. The transmission through poor handling of carcasses was perceived to be negligible. As a result there is need to carry out regular participatory community awareness campaigns on handling of both domestic and wildlife carcasses for preparedness, prevention and control of any possible RVF epizootics. Additionally, monitoring of environmental conditions to detect enhanced rainfall and flooding should be prioritized for preparedness.

Ministry of Agriculture, Livestock and Fisheries,
State Department of Veterinary Services,
Private Bag 00625, Nairobi, Kenya
kasiiti.orengo@gmail.com

Conclusions

CONCLUSIONS

*INTER-REGIONAL CONFERENCE ON RVF
NEW OPTIONS FOR TRADE, PREVENTION AND CONTROL*

21 – 23 Avril 2015
Djibouti

Considering that

- Rift Valley Fever is recognised as a priority disease for the Greater Horn of Africa and Middle East regions and has been integrated into the regions' 5-year action plan for GF-TADs
- RVF is a zoonosis and causes significant socio-economic impact during times of outbreak
- Livestock trade between the Horn of Africa and the Gulf countries is of significant importance to reduce poverty in the region especially in vulnerable populations such as pastoralist communities and women.
- The OIE has followed up on recommendations by previous meetings and has revised the Code Chapter on RVF including provisions for safe trade during inter-epizootic as well as during epizootic periods
- The tripartite (FAO, OIE, WHO) has developed One Health tools to facilitate reviews of competencies at the interface between Animal and Human Health Services
- The probability of new RVF outbreaks in the countries at risk such as Kenya, Somalia, Uganda, Tanzania, Sudan and South Sudan is high, given that this is year 8 after the last outbreaks and the high probability of a medium to strong El Nino event during the coming season, which may lead to above normal rains during the latter half of the year and that countries should therefore be considered as standing between the Early Warning Phase and the Alert Phase
- The Decision Support Framework developed by ILRI and partners has been updated and can assist the countries at risk to assess their level of preparedness
- The Clone 13 vaccine is still the only registered alternative to the Smithburn-based and inactivated vaccines, with registration only in South Africa and Namibia
- Despite the progress in research on promising new vaccines with potential DIVA capacity, durable immunity and improved safety, none of these candidate vaccines are on the market as yet.

The Conference concludes:

That the countries in the regions should develop an attitude of preparedness rather than reactivity once a crisis is imminent.

On surveillance, outbreak prevention and early response

- Countries should recognise that RVF outbreaks might occur in the region within the next 18 months, given the extended time period of 8 years since the last outbreaks and the increased susceptibility of populations due to the turnover in livestock populations after the last severe draught (2010 – 2011) and the ENSO prediction indications, and are urged to make the following preparations:
 - Urgently develop, evaluate and update, where appropriate, their national Contingency Plans using a One Health approach, e.g. by using the tools developed jointly by OIE/WHO/Worldbank with the support of FAO (Integrated IHR – PVS tool and Trans-sectorial Coordination Framework)
 - Develop concrete national action plans for the Early Warning Period based on the updated Contingency Plans and the updated Decision Support Framework
 - The national action plans should be prioritised and include updated risk maps and estimation of animal numbers in the risk areas
 - Countries should heighten surveillance in high risk areas, e.g. increased monitoring of sentinel herds where available; and increased surveillance in markets or places where large numbers of animals are traded or congregate
- Countries previously affected by RVF should consider to start carrying out targeted vaccination campaigns in high risk areas
- Regional African and Middle East organisations including AU-IBAR, IGAD and AU-PANVAC should assist countries at risk to develop a detailed vaccination policy strategy based on the national risk maps
- International and regional organisations are encouraged to support this operational planning, preferably within the framework of already ongoing existing projects or within joint advocacy platforms for donor funding

On vaccine development

- Vaccine producing laboratories are encouraged to speed up the process to commercialise candidate vaccines in order to overcome the shortcomings of the currently existing vaccines such as availability, safety, efficacy and stability in line with OIE standards for vaccine quality
- In order to increase the uptake of preventive vaccination during the inter-epidemic period by farmers and the

Veterinary Services, vaccine manufacturers are encouraged to develop live attenuated multivalent combination vaccines offering protection against multiple transboundary animal diseases and with an improved benefit/cost ratio as compared to monovalent RVF vaccines

- AU-PANVAC with the support of AU-IBAR is encouraged to carry out quality assessment of existing vaccines as well as an assessment of the production and delivery capacity of vaccine producers of registered vaccines (Smithburn, Inactivated, Clone 13) within a short time period
- OIE in collaboration with AU-PANVAC and IGAD should facilitate the establishment of RVF regional vaccine banks at regional level based on the results of the aforementioned assessment

On diagnosis of RVF

- Reference Laboratories and pharmaceutical companies are encouraged to increase the production of reagents necessary for serological detection of RVF IgM and IgG and to increase collaboration with AU-PANVAC for the evaluation, quality control, production and distribution of diagnostic assays/reagents to national laboratories
- Reference laboratories are encouraged to continue capacity building activities on RVF diagnosis and to consider twinning programmes within the framework of the OIE.

On trade

- Countries are encouraged to translate the revised OIE Code Chapter into their national legislation and regulations and reinforce its application; and to exchange information with trading partners on the disease situation in their countries
- Veterinary Services should regularly audit quarantine stations for compliance with national regulations and inter-governmental standards.
- IGAD and AU-IBAR are requested to support improvement of technical capacity of quarantine stations through the export quarantine network being formed

On communication

- International and regional organisations are urged to communicate these recommendations jointly via a Press Conference to attract sufficient attention
- National authorities should also disseminate these recommendations at the national level
- Countries should develop awareness campaigns among vulnerable populations such as farmers, abattoir workers, and other stakeholders
- National Authorities should establish regular communication channels between public health and veterinary authorities to ensure disease surveillance results are timely reported.

Annexes

CONFERENCE PROGRAMME



Tuesday, 21 April 2015		
<i>Time</i>	<i>Topic</i>	<i>Speaker</i>
08.00 – 09.00	Registration	Grace Omwega, Rita Rizk
09.00 – 10.30	Official Opening	
	Statement by OIE RR / Middle-East	Ghazi Yehia
	Statement by OIE SRR / Eastern Africa	Patrick Bastiaensen
	Statement by WHO	Pierre Formenty
	Statement by FAO	Emmanuelle Guerne-Bleich
	Statement by AU-IBAR	Ahmed El-Sawalhy
	Statement by AU-PANVAC	Charles Bodjo
	Statement by IGAD Secretariat	Moh. Moussa Mohamed
	Opening by the Guest of Honour	Mohamed Ahmed Awaleh
	Objectives of the meeting	Susanne Münstermann
	Participants' introductions and expectations	Participants
	Group photograph with Guest of Honour	Photographer
10.30 – 11.00	Coffee break	
	SESSION 1 : SETTING THE SCENE	
11.00 – 11.20	Recall of previous meetings, their outcomes and recommendations	S. Münstermann (OIE)
11.20 – 12.00	RVF in the Horn of Africa, East Africa, and the Middle East – a historical overview :	
	<ul style="list-style-type: none"> • Animal health • Public health 	Bouna Diop (FAO) Pierre Formenty (WHO)
12.00 – 12.40	Recent RVF outbreaks :	
	<ul style="list-style-type: none"> • in north-western Africa • in southern Africa 	Alessandro Ripani (OIE NA) Rachel Maluleke (ARC OVI)
12.40 – 13.00	Questions for clarification	
13.00 – 14.00	Lunch	

SESSION 2 : CHALLENGES TO DISEASE CONTROL		
14.00 – 14.20	Available control options	Kariuki Njenga (KEMRI)
14.20 – 14.40	Vaccination strategies, vaccine availability and quality control	D. Goovaerts (GalvMED)
14.40 - 15.20	Vaccines <ul style="list-style-type: none"> • Vaccines currently used in the field and their issues • Novel vaccines • Novel vaccines 	Bethuel Nthangeni (OBP) L. Maartens (Deltamune) Mehdi El Harrak (MCI)
15.20 – 15.40	Discussion	
15.40 – 16.00	Coffee break	
16.00 – 16.15	Diagnostic tests for RVF and role of Reference Laboratories: what is available?	Kariuki Njenga (KEMRI) Alison B. Lubisi (ARC – OVI)
16.00 – 16.15	Role of Reference Laboratories : twinning (South Africa – Yemen)	Alison B. Lubisi (ARC – OVI) Ghazi Yehia (OIE ME)
16.20 – 17.20	Research and development for RVF diagnostic tests: what is new? <ul style="list-style-type: none"> • Deltamune • PANVAC 	L. Maartens (Deltamune) Charles Bodjo (PANVAC)
17.40 – 18.00	Discussion	
20.00	Dinner Reception	

Wednesday, 22 April 2015		
<i>Time</i>	<i>Topic</i>	<i>Speaker</i>
	SESSION 3 : TRADE ISSUES	
09.00 – 09.20	OIE Code Chapters relevant to RVF and trade	S. Münstermann (OIE)
09.20 – 09.40	Current livestock trade between the Horn of Africa and the Middle East. The new RVF OIE Code Chapter and what it means to inter-regional trade	Edgar ‘Chip’ Stem (OIE ad-hoc group RVF)
09.40 – 10.00	Perspective from the importing countries : KSA	Abdelhamid El-Fadil
10.00 – 10.30	Discussion	
10.30 – 11.00	Coffee break	
11.00 – 13.00	Working session 1 : Case studies / Different scenarios	Gregorio Torres (facilitator)
13.00 – 14.00	LUNCH	

SESSION 4 : PREVENTION, BIOTHREAT AND EARLY WARNING		
14.00 – 14.20	Surveillance systems in place	Zelalem Tadesse (AU-IBAR)
14.20 – 14.50	Bridging WHO and OIE tools for the assessment of national capacities	S. de la Rocque (OIE/WHO)
14.50 – 15.10	Contingency planning for RVF : Kenya	Austine Bitek (ZDU Kenya)
15.10 – 16.40	Working session 2 (including coffee break) Case studies / Contingency plans	Gregorio Torres (facilitator)
16.40 – 17.00	Decision – support framework for East Africa	Bernard Bett (ILRI)
17.00 – 17.20	Early Warning Systems in place	Assaf Anyamba (NASA)
17.20 – 17.40	The joint Early Warning release	D. Beltrand-Acrudo (FAO)

Thursday, 23 April 2015		
Time	Topic	Facilitators
07:00 – 12:00	Visit of the Djibouti Quarantine Facilities (Prima)	Moussa Cheikh Ibrahim
12:00 – 13:00	Lunch at the Djibouti Quarantine Facilities (courtesy of PRIMA International C°)	
13:00 – 14.00	Reports from the Working groups of Sessions 1 and 2 and resulting recommendations	Rapporteurs
SESSION 5 : REGIONAL COORDINATION		
14.00 – 14.15	OIE Vaccine banks	S. Münstermann (OIE)
14.15 – 14.45	<ul style="list-style-type: none"> • GF-TADs – Africa • GF-TADs – Middle East 	Bouna Diop (FAO) Ghazi Yehia (OIE)
14.45 – 15.00	AU-IBAR	James Wabacha (IBAR)
15.00 – 15.15	IGAD	Ameha Sebsibe (IGAD)
15.15 – 15.30	Eastern African Epidemiology and Laboratory Networks (EAREN, EARLN)	Bouna Diop (FAO)
15.30 – 16.00	Discussion	
16.00 – 16.30	Tea break	
16.30 – 17.00	Conclusions	
	Closing remarks	



CASE SCENARIOS

Background (introduced by Gregorio Torres, OIE).

The Horn of Africa covers a large geographical area comprising several countries: Djibouti, Ethiopia, Somalia and Eritrea. In addition to those countries, the greater Horn of Africa also includes Kenya, Uganda and Sudan. The region is livestock rich, holding about 10% of the global livestock population and 40% of that of the entire African continent.



The livestock trade from the Horn of Africa to the Middle East, supplying live animals for religious festivities, including Haj and Ramadan, has developed over hundreds of years. Annually, this market alone requires about six million head of animals, mainly sheep and goats but also camels and cattle of which about 42% (2.5 million) come from the Horn of Africa and Sudan. Trade between the Horn and the Middle East has been estimated to be around USD 0.6 billion per year, being ten times greater than intra-regional trade. *Source* : Abbas B., Yousif M.A., Nur H.M. (2014). *Animal health constrains to livestock exports from the Horn of Africa*. Rev. Sc. Tech. Off. Int Epiz.

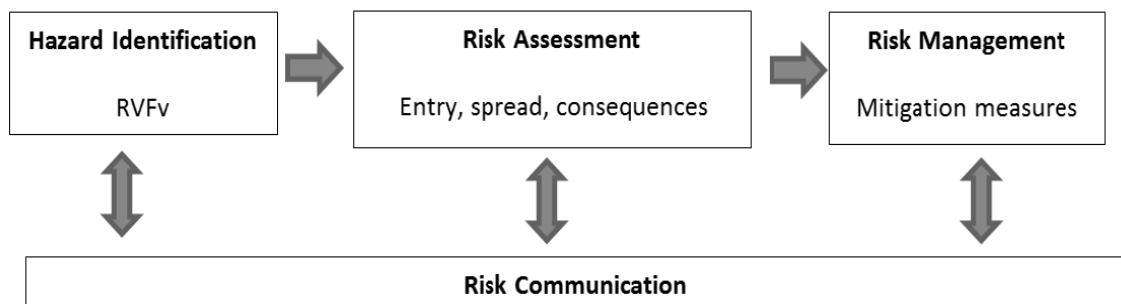
The *Gulf Cooperation Council* (GCC) region remains as one of the most important live animal markets in the world which has a great demand for animals produced in the region. Exporting countries wishing to have access to this market should fulfil provisions of international health standards.

International Standards of reference (www.oie.int)

- Terrestrial Code. Glossary
- Terrestrial Code Chapter 8.13 Infection with *Rift valley fever virus* (RVFV)
- Terrestrial Code Chapter 1.4 Animal health surveillance
- Terrestrial Code Chapter 1.5 Surveillance for arthropod vectors of animal diseases
- Terrestrial Manual Chapter 2.1.14 Rift Valley fever

Risk analysis framework

Animal import risk analysis is concerned with guiding the decision-making process to effectively manage the disease risk associated with the importation of live animals and their products (OIE). For the context of this exercise risk will refer mainly to the probability of RVFV entering the country and its impact on animal health.



Case scenario 1

Consignment: 50 sheep and 2 camels. All animals but one camel were born in the farm. The camel arrived at the farm one month ago. No reliable information on the origin of this camel is available.

Rift Valley fever status of the country of origin: Last outbreak of RVF in animals was reported to the OIE in 2003. After the outbreak, the veterinary authorities established an early detection surveillance system in coordination with public health authorities. No further cases have been notified to the OIE since 2003 despite the intensive surveillance.

As a result of this early detection system, a human case was detected 2 years ago. It was a 20-year old male who was visiting his relatives. His permanent residency was a country considered infected with RVF. The epidemiological investigations concluded that the patient was infected in his country of residency. As response to this case the veterinary authorities carried out active sero-surveillance in susceptible animals 10 km around the village where the case was found. All samples were negative.

Details of the movement: The animals will be transported directly from the farm of origin to the country of destination.

Questions:

1. What is the risk (very low, low, medium, high, very high) of introduction of RVFV through this movement?
2. Which article of Chapter 8.13 of the Terrestrial Code applies?
3. What are the mitigation measures you will request to allow this movement?
Please, provide the rationale if they differ from the Terrestrial Code provisions.



Case scenario 2

Consignment: 40,000 local breed sheep and goats with different origins and unknown history of previous vaccination.

Rift Valley fever status of the country of origin: Last big outbreak of RVF occurred 4 years ago. The outbreak was controlled by a mass vaccination launched by the government. Since then, 2 human cases have been officially reported. The epidemiological studies carried out to investigate the human cases demonstrated a certain level of sporadic virus circulation in ruminants without causing significant losses. The latest public health data available indicate a human prevalence of 2%. Currently, the vaccination in ruminants is voluntary. There is only non-official data of vaccination coverage available and it is assumed to be low.

Details of the movement: The movement is planned from an official coastal quarantine station which acts as hub before moving to the final importing country, probably within the *Gulf Cooperation Council* (GCC) region. There are no plans to vaccinate the sheep and goats with an approved RVF vaccine. The animals will be quarantined for 21 days in the approved coastal quarantine that is situated in an area with low vector activity and in which the quarantine operators routinely practice vector control through “fogging” with an approved and safe insecticide. Should any of the animals in the quarantine demonstrate a fever, they will be closely observed for signs of RVF disease.

Questions:

1. What is the risk (very low, low, medium, high, very high) of introducing RVFV through this movement?
2. Which article of Chapter 8.13 of the Terrestrial Code applies?
3. What are the mitigation measures you will request to allow this movement?
Please, provide the rationale if they differ from the Terrestrial Code provisions.

Case scenario 3

Consignment:

- 15,000 sheep and 1,000 camels. All camels are older than 1 year, all sheep and goats are older than 6 months. None of them have been vaccinated.
- 200 kg of wool from different origins.

Rift Valley fever status of the country of origin: The country is experiencing a large number of outbreaks. There is social alarm and the farmers report important losses in the affected areas. All the human and animal cases are concentrated in the Southern part of the country. The Central and Northern provinces are not affected. The Northern provinces have never been affected by previous RVFV outbreaks. The country has an approved quarantine station along the coast which is unaffected by the outbreak with the nearest case 350 km away and most cases and outbreaks more than 500 km away. Strict movement controls in the affected areas of the country have been put in place by the Director of Veterinary Services and vaccination strategies including ring vaccination are being practiced.

Details of the movement and proposed quarantine procedures: The sheep and camels come from farms located in a province in the North of the country bordering the country of destination. Before the shipment, all animals will be placed in an approved quarantine station following transport through areas of the country that remain clear and unaffected by the disease. The reception holding area is located 1 km from the quarantine. The quarantine is located in an area of low vector activity and mosquito fogging is practiced regularly in both the quarantine and the reception holding area. All animals will be vaccinated in the reception area with an appropriate vaccine and taken to the quarantine where they will be observed closely with temperatures monitored daily. All animals will be quarantined for 21 days following vaccination. Should any of the animals in the quarantine demonstrate a fever, they will be closely observed for signs of RVF disease.

The wool has been collected by a local dealer presumably from several farms situated all around the country.

Questions:

1. What is the risk (very low, low, medium, high, very high) of introducing RVFV through this movement?
2. Which article of Chapter 8.13 of the Terrestrial Code applies?
3. What are the mitigation measures you will request to allow this movement?
Please, provide the rationale if they differ from the Terrestrial Code provisions.

Case scenario 4

Consignment: 10 tons of sheep and goat and 1,000 kg of camel meat. Animals were slaughtered in a local slaughterhouse supervised by the veterinary authority.

Rift Valley fever status of the country of origin: The country of origin reported some cases of RVF two years ago. There were no further reports since then. However the level of surveillance in the country is unknown

Details of the movement: Before the shipment, the carcasses were matured at more than 4°C in a controlled temperature room for at least 24 hours.

Questions:

1. What is the risk (very low, low, medium, high, very high) of introducing RVFV through this movement?
2. Which article of Chapter 8.13 of the Terrestrial Code applies?
3. What are the mitigation measures you will request to allow this movement?
Please, provide the rationale if they differ from the Terrestrial Code provisions.

Case scenario 5

Consignment: 100 semen straws from a 3 year old Boran bull registered in the Boran Society. The donor bull was kept in an insemination centre authorised by veterinary authorities. The owner claimed that the bull was vaccinated less than one year ago but no vaccination records are available.

Rift Valley fever status of the country of origin: The country of origin reported some cases of RVF two years ago. There were no further reports since then. However the level of surveillance in the country is unknown

Details of the movement: The semen straws will be transported in a nitrogen flask.

Questions:

1. What is the risk (very low, low, medium, high, very high) of introducing RVFV through this movement?
2. Which article of Chapter 8.13 of the Terrestrial Code applies?
3. What are the mitigation measures you will request to allow this movement?
Please, provide the rationale if they differ from the Terrestrial Code provisions.

Case scenario 6

Consignment: 1,000 litres of camel milk and 250 kg of goat cheese.

Rift Valley fever status of the country of origin: The country of origin reported some cases of RVF two years ago. There were no further reports since then. However the level of surveillance in the country is unknown

Details of the movement: Local producers sell the milk to the only camel milk collection centre in the region. The milk collection centre has around 100 small producers associated. They deliver camel milk daily. The goat cheese is made from milk collected from local farmers in a creamery near the capital city.

Questions:

1. What is the risk (very low, low, medium, high, very high) of introducing RVFV through this movement?
2. Which article of Chapter 8.13 of the Terrestrial Code applies?
3. What are the mitigation measures you will request to allow this movement? Please, provide the rationale if they differ from the Terrestrial Code provisions.



Case scenario 7

Consignment : An order of 5,000 cattle, 30,000 sheep, 20,000 goats and 1,500 camels purchased from markets all over the country. It will be the largest consignment in the year to respond to high livestock demand by importing country due to Ramadan.

Rift Valley fever status of the country of origin: The country is currently considered to be in an inter-epizootic period, reporting epizootic events every 5-10 years. The last epizootic event was reported 8 years ago. This year, the country is experiencing abnormally high rainfall causing floods in areas of the country previously affected by RVF disease. There are already rumours and online press reports of people falling ill with an unknown disease and also increasing incidence of livestock abortions and mortality. In response to the environmental conditions and to the unofficial reports, the DVS has dispatched his rapid response team that investigates outbreaks in the affected areas, but at the moment, detailed field reports and lab results are not available.

The last official vaccination campaign was carried out as response to the last large RVF outbreak 8 years ago. No official vaccination has been carried out since then.

Providing healthy livestock is critical to maintain the trust between importing and exporting countries to ensure long-lasting trading relationship between both countries. Trading with RVFV infected countries could result in a trade ban with devastating consequences for the economy of the exporting country.

Details of the movement: Cattle are generally sourced from areas of the country that have not been seriously affected by RVF in previous epizootics. Upon questioning by the DVS office, the manager of the quarantine station reports that as much as 20% of the camel and goats will come from areas that have historically experienced RVF epizootics and additionally, some of the sheep are also coming from these previously affected areas.

The time schedule for the export is 28 days, covering : 17 days in the quarantine station, 1 day transit to and loading at the port in an area of the country that is not experiencing abnormally heavy rainfall, and 10 days on a clean and disinfected ship which is managed by the quarantine company. The quarantine station is located in a low vector activity area and the quarantine operators routinely practice vector control through “fogging” with an approved and safe insecticide.

A decision needs to be made as to whether and under what conditions this shipment should be made.

Questions:

1. What is the risk (very low, low, medium, high, very high) of introducing RVFV through this movement ?
2. Considering the socioeconomic consequences of the trade for the exporting country. Should this movement be allowed? If not, justify your answer.
3. If the movement is allowed. What measures described in the code (if any) or other additional measures would you use to mitigate the risk of introduction by this consignment and to build trust between both trade partners.



THE TASK OF THE WORKING GROUPS

Background

Planning and preparedness is critical to effectively response to a RVF outbreak. It requires inter-sectoral collaboration involving veterinary, public health authorities and stakeholders at all levels.

A contingency plan should be a well-articulated strategy document being both flexible and dynamic. It should define roles and responsibilities and it should provide details of the resources needed to effectively contain and eliminate the disease as well as an action plan for efficiently mobilise both human and material resources. All described actions aiming to prevent or minimize the disease impact in human and animal population should meet the obligation of international Standards, namely the WHO International Health Regulations (IHR 2005) and the OIE International Standards (Terrestrial Animal Health Code and Manual of Diagnostic tests and vaccines for Terrestrial Animal).

While it is not feasible to produce a model contingency plan that fits all situations and circumstances in the different countries, the main general principles should be taking in consideration when designing and evaluating national RVF contingency plans.

The objectives of this exercise are:

- Assess the state of play of the RVF contingency plans in the region
- Facilitate participants with understanding of the roles and limitations in the management of RVF outbreaks.
- Promote the evaluation and the updating of existing contingency plans highlighting the importance of establishing collaboration between Veterinary and Public Health Authorities in the preparedness and response to a RFV outbreak.

1. Surveillance for early detection

The main objective of the surveillance section of a contingency plan is the early detection to RVF outbreak or the detections of the putative risk factors that can determinate the presence of the disease.

The impact of a RVF outbreak usually corresponds to the number of epidemiological units or geographical distribution that have been affected at the moment the disease is first diagnosed. The suspicion or confirmation of a RVF case will trigger the actions described in the contingency plan.

Based on your own experience, which components should be included in the surveillance section of a RVF contingency plan? Please, identify the strength and weakness of your contingency plan. Enumerate at least three strong and three weak components related to disease control and prevention.

2. Disease control and prevention measures

Once the presence of the disease is confirmed it is necessary to implement the actions described in the contingency plan to minimise the impact and prevent the spread of the disease. The actions to be taken will be driven by the epidemiological scenario: inter-epidemic or epidemic.

Based on your experience, which components should be included in the disease control and prevention section of a RVF contingency plan? Please, identify the strength and weakness of your contingency plan. Enumerate at least three strong and three weak components related to disease control and prevention.



3. Communication and awareness

Risk communication involves an interactive exchange of information about risk among risk managers and other interested parties. Information protocol should be structured in a way that will facilitate prompt exchange of information between all of them and it must be a two-way process.

The dissemination and sharing timely, accurate and easily-understood information with stakeholders and general public is of paramount importance when managing and RVF outbreak. The communication strategy must be coordinated among health authorities to ensure consistent messages to the general public.

The goal should be: *“Be first, be honest, be right, be credible and be consistent”*

Based on your experience, which components should be included in the communication and awareness section of a RVF contingency plan? Please, identify the strength and weakness of your contingency plan. Enumerate at least three strong and three weak components related to communication and awareness.

4. Coordination and chain of command

Responding to an outbreak requires taking decisions based on analysis of the best information available from all sources. It requires the capacity to convert those decisions into clear coordinated indications which can be conveyed down the chain of command to those who are charged with the responsibility of carrying them out but also the ability to know that the indications have been carried out and with what results.

Based on your experience, which components should be included in the coordination and chain of command section of a RVF contingency plan? Please, identify the strength and weakness of your contingency plan. Enumerate at least three strong and three weak components related to coordination and chain of command of your contingency plan

5. Legal framework

Veterinary legislation is an essential element of the national infrastructure that enables Veterinary Services to efficiently carry out their key functions, including surveillance, early detection and reporting of diseases, rapid response, etc. The Veterinary Services actions to response to a RVF outbreak must be supported by effective and updated legislation.

Based on your experience, which components should be included in the legal section of a RVF contingency plan? Please, identify the strength and weakness of your contingency plan. Enumerate at least three strong and three weak components related to legal framework of your contingency plan.



1. Surveillance for early detection (Moderator: Stephane de la Rocque)

The Moderator reminded the audience on the classical drawing of the disease epidemiology with a very narrow time window for detection of disease in animals before the peak of disease spread.

Against this background, he listed the strong points for facilitating surveillance for early detection of RVF as follows:

- In most countries, based on history of the disease and retrospective data available, the hotspots for outbreaks are known and can be targeted for surveillance activities
- There is also sufficient knowledge of the ecology and epidemiology of the disease and its vector available
- However, the early warning surveillance should include meteorological monitoring as well as vector activity monitoring
- Surveillance protocols should be adjusted to this knowledge and should also include monitoring of sentinel herds
- Within geographical zones strategic points for surveillance need to be identified, for example on an island surveillance is particularly important at the port and airport
- It was noted that if the country is an exporting country there should be enough incentive to carry out surveillance in order to maintain this status
- Surveillance teams should be readily available, they should also make use of CAHW, if available and training efforts of all staff involved in surveillance should be undertaken
- The results of surveillance should be communicated in a clear and rapid manner
- The negative points were summarised as follows:
- Surveillance teams might face difficulties to access remote areas and suffer from lack of infrastructure to carry out their work effectively
- There is often a lack of human and financial resources to carry out surveillance
- Teams might suffer from lack of training, particularly in sample taking and sample shipment
- Passive surveillance can play a major role but might be hampered if livestock owners, particularly pastoralists do not have the culture of reporting
- Livestock owners might not always interpret abortions as an early warning sign for RVF, as it can be caused by so many other factors.
- The results of laboratory tests on surveillance samples might be delayed as there are no rapid tests available
- Although many countries have Contingency Plans available, they are sector specific and often lack inter-sectorial coordination
- A lack of exchange of data and information is often observed
- Government commitment to surveillance for a disease that occurs only sporadically might be missing
- In addition, willingness at local level to carry out such activities might also be missing
- Surveillance activities are often project based and therefore lack sustainability over longer time periods

2. Disease control and prevention measures (Moderator: Austine Bitek)

The moderator summarised the information he had received from the different groups into different categories. He first listed the components of disease control and prevention as understood by the groups:

- Livestock vaccination
- Surveillance – laboratory capacity
- Vector control
- Quarantine
- Public education/communication

On livestock vaccination, he listed the following points as important:

- Although RVF vaccines are existing since a long time, they are often not readily available to countries in the face of an outbreak since there is limited capacity to produce the vaccine in most of the infected countries
- The current vaccines have a short shelf life
- Therefore there is a need for regional vaccine banks
- Countries would like to receive guidelines on vaccination protocols during the different periods of RVF (after an outbreak, during the inter-epizootic period etc.)

On laboratory capacity, he listed the following points:

- Low diagnostic capacity in the affected countries
- Test kits to be used in laboratories are not readily available and very costly
- In general the capacity in laboratories to carry out PCR and virus isolation is limited

On quarantine, he noted the following observation:

- Countries have a good legislative framework for quarantine stations, but in some cases there is lack of reinforcement of this legislation

On vector control, he noted the following points:

- Effective insecticides and larvicides are available but they are expensive, often with residual effect on the environment
- However, coverage when using them is usually very low
- There is fear that repeated application might lead to resistance of the vectors to these chemicals

3. Communication and awareness (Moderator: James Wabacha)

The moderator presented the contributions from the groups in the following categories:

- (i) Information messages should include...
- (ii) Strength of communication and
- (iii) Weakness of communication.

On “*information messages should include...*”, he noted the following points:

- Include some basic information about the diseases:
 - Zoonotic and vector borne
 - Common signs in human and animal
 - Mainly animals affected
 - But animal products are safe
- Should be joint statements with Public Health to avoid conflicting messages
- Clear chain of command to release messages
- Only one authority and one focal person should be in charge of information dissemination
- An indication of the stakeholders to be targeted for the messages (vets, human medics, livestock owners, abattoir personnel etc)
- Include religious leaders in the awareness raising process
- An indication on the need for coordination at all levels, local/regional/sectors
- Messages should be tailored to periods before the outbreaks
- Messages should provide regular updates on activities
- Should clearly state that control efforts are under way
- Should state how the diseases affects the stakeholders
- Should emphasise transparency
- How to detect and to identify that it is RVF?
- Explain the mode of transmission
- Messages should target the high risk areas and use local languages wherever possible
- Include non-traditional modes of information dissemination like social media
- Include messages during the recovery phase to inform on when to resume routine practices
- Modes of information dissemination could be:
 - Radio, posters, TV, social media, official websites, print media, lectures/seminars
 - The goal should be:
be fast (not first), be honest, be right, be credible and consistent !

On the strength of communication, he noted:

- It is an effective tool in reducing the impact of the disease, support provision of accurate information and can avoid panic
- In some countries the Communication Plan (CP) for RVF is not in place, but a multi-sectorial technic working group is in place (e.g. Uganda)
- Some countries have a communication strategy in place
- Some countries have sufficient human capacity to undertake communication and awareness activities
- Some countries use their extension units, personal for this type of communication

On the weaknesses of communication, he noted:

- While there might be a CP available, it is not operationalized
- In some countries a CP is not available
- Given the long inter-epidemic period between RVF outbreaks, there is often a decay of messaging with low frequency
- Simulation exercises could be a good remedy for this, but they are not carried out
- Often communication and awareness activities are carried out only during outbreaks
- Some countries report low human capacity to undertake communication activities
- There is often poor information sharing across sectors
- Panic messages in the press- how to counter it? Lack of experience
- Inappropriate modes and methods of information content and dissemination might be used
- Inadequate monitoring and evaluation of the whole communication process (extend, interpretation of message, impacts et)
- Mechanisms to get the information to grass root stakeholders especially the pastoralists is not well established (use of CAHW, pastoral associations etc)



4. Coordination and chain of command (Moderator: Susanne Münstermann)

The moderator summarise the input she received from the groups as follows:

- For most countries represented in the groups there exists a coordination unit or mechanism between MoA/Livestock and the MoH; often this unit is based under the Prime Minister's Office, which often has a special Officer for Public Health affairs whose responsibility it is to relay the messages to the next lower levels. Only few countries have also other sectors such as environment or security forces integrated into this coordination unit.
- However, quite a number of countries mentioned that there is no proper equilibrium between the two sectors (MoA and MoH) and that often MoA dominates this coordination unit and often also the distribution of funds
- Furthermore, this cooperation appears to be most active during crisis periods, rather than during "peace times" as visible for example in the number of meetings that take place
- The difficulty to maintain a rapid processing along the top-down steps of the chain of command in decentralised countries was mentioned, particularly in countries where animal health is integrated into Municipality Administrations, leading to a slowdown of processes up to the extent that they are no longer able to implement any urgent matters
- The speed of information such as on suspicious surveillance results from the bottom to the top for the top to make decisions, seems also to be slow in the majority of countries.

5. Legal framework (Moderator: Samuel Wakhusama)

The moderator summarised the information received from the groups under different headings as shown below:

On statutory provisions:

- They can be found under the general Disease Control and Prevention Proclamations Acts

On notifications:

- While notification of a disease outbreak is regulated under the Acts, notification of outbreaks is in some cases seen as an indirect punishment to trade and therefore might be avoided. How can we improve on this situation and promote transparency in information sharing? There is a clear need for awareness increase and communication

On compensation upon destruction:

- Some countries have provisions for this in their CPs (Ethiopia, Tanzania), other don't (South Africa – but also no destruction)
- Problems of funding and potentially open to abuse where identified

On animal movement control and quarantine law:

- There is a unified quarantine law in the GCC States
- But there is no such harmonised regional approach in the Greater Horn of Africa region
- A need for harmonisation at national and regional level was identified
- The autonomy of provinces or counties makes it often difficult to implement movement control at country level in some countries – no legal support measures (e.g. S. Africa)

On penalties:

- They are currently vague and not specific to RVF – they are covered under the General Animal Disease Control Act in form of Proclamations, tending to be less specific for RVF

On enforcement of compliance:

- Inadequate capacity for policing (long borders)
- Smuggling, rustling
- In some cases no clear legal arrangement made to support enforcement

The moderator also identified other issues related to the regulatory framework, which are summarised as shown below:

On outdated legislation/inadequate legislation:

- A structure is present for a legal framework but the CPs are outdated and seem not a priority for some countries
- In some cases draft CPs were developed but were not approved – they are shelved
- In some cases, no *Veterinary Statutory Body* (Veterinary Board, etc) exists, e.g. Somalia

On vaccines:

- GMO vaccines are being developed but no adequate legal frameworks for approval are available in countries wishing to use them
- Vaccination to be carried out based on risk assessment but not legal enforcement in place in the event of an imminent outbreak
- In some countries, no clarity on who bears the cost of vaccinations in an anticipated outbreak situation, e.g. Kenya, Sudan the Governments pay, but the situation in other countries is less clear

On the “One Health” approach:

- There is the need for legal text in CPs to link Animal and Human health aspects

On coordination:

- Police, Veterinary Services, Administration, Public Health need close coordination – appears good in Kenya, poor in Tanzania (separate ministries do their own thing)

LIST OF PARTICIPANTS



COUNTRY REPRESENTATIVES

BAHRAIN

Dr Abbas Al Hayki
Senior Veterinary Officer
Control and Animal Health Directorate
Ministry of Municipalities
P.O.Box 251
Manama
☎ +973 17 79 74 26
☎ +973 17 69 46 73
☎ +973 39 64 64 86
aaalhayki@mun.gov.bh
abbas_99@hotmail.com

Dr Elmi Ali Ahmed
Vétérinaire
Direction de l'élevage et des services
vétérinaires
Ministère de l'agriculture, de l'élevage et de
la mer.
BP 297
Djibouti
ellmi@hotmail.com

COMOROS

Mr Miradji Soule
Chef de service santé animale
Direction nationale de l'élevage
Ministère de la production
BP 41
Moroni
☎ +269 775 60 26
☎ +269 775 00 03
☎ +269 333 09 04
soulemi@yahoo.fr
soulemi13@gmail.com

Dr Abdi Mahamoud Elmi
Vétérinaire
Direction de l'élevage et des services
vétérinaires
Ministère de l'agriculture, de l'élevage et de
la mer.
BP 297
Djibouti
☎ +253 77 64 64 18
ame-vet@hotmail.com

EGYPT

Dr Osama Mahmoud Ahmed Slim
Chairman (CVO)
General Organization for Veterinary Services
First Nadi El Said Street
Dokki - Giza
12618 Cairo
☎ +20 11 18 00 82 92
govs.egypt@gmail.com
drvet81@gmail.com
osamaslim53@gmail.com

DJIBOUTI

Dr Moussa Ibrahim Cheikh
Directeur de l'élevage et des services
vétérinaires
Ministère de l'agriculture, de l'élevage et de
la mer.
BP 297
Djibouti
☎ +253 77 86 06 00
pace@intnet.dj

ETHIOPIA

Dr Ali Ibrahim Mohamed
Chef de Service de contrôle alimentaire et
vétérinaire
Direction de l'élevage et des services
vétérinaires
Ministère de l'agriculture, de l'élevage et de
la mer.
BP 297
Djibouti
☎ +253 77 86 06 00
kifayaali118@hotmail.com

Dr Hadgu Mendefro
Senior Quarantine Expert
Veterinary Services Directorate
Ministry of Agriculture
P.O.Box 62347
Addis Ababa
☎ +251 11 64 61 969
☎ +251 11 64 62 095
☎ +251 913 26 221
mail2hadman@yahoo.com
hadgat.man@gmail.com

KUWAIT

Dr Gedion Yilma Defabachew
Public Health Veterinarian
Veterinary Services Directorate
Ministry of Agriculture
P.O.Box 62347
Addis Ababa
☎ +251 11 64 62 003
☎ +251 19 11 73 577
y.gedimekdi@yahoo.com
gedionyilma245@gmail.com

JORDAN

Dr Majed Al Hawaasha
Head of Animal Health Division
Ministry of Agriculture
P.O.Box 17110
Madaba
☎ +962 64 12 07 13
☎ +962 777 32 52 41
☎ +962 799 03 85 54
majed_rq@yahoo.com

KENYA

Dr Kisa Juma Ngeiywa
Director of Veterinary Services
State Department of Livestock
Ministry of Agriculture, Livestock and
Fisheries
Kabete
P.O.Box 23355
00625 Nairobi
☎ +254 722 37 62 37
kisajuma@yahoo.com

Dr Kasiiti Lichoti
Assistant Director of Veterinary Services
State Department of Livestock
Ministry of Agriculture, Livestock and
Fisheries
Central Veterinary Laboratories,
Kabete,
P.O.Box 23355
00625 Nairobi
☎ +254 733 70 76 85
kasiiti.orengo@gmail.com

Mr Khaled Almutawaa
Head of Veterinary Laboratory
Public Authority of Agriculture and Fisheries
Kuwait City
☎ +965 55 03 32 22
khaledalmutawaa@gmail.com

Dr Saad Jasim Al Anzi
Head of Veterinary Quarantine
Public Authority of Agriculture and Fisheries
Kuwait City
☎ +965 66 700 918
m.n.e.a7777@gmail.com

LEBANON

Dr Mohamad Sokarie
Veterinary Officer
Animal Health Department
Ministry of Agriculture
Bir Hassan - Jnah
Beirut
☎ +961 3 87 17 20
msoukarie@agriculture.gov.lb

OMAN

Dr Sultan Al Ismaili
Veterinary Epidemiologist
Director General of Animal Wealth
Ministry of Agriculture and Fisheries
P.O.Box 2298 PC112
Muscat
☎ +968 99 38 03 16
sultan.ismaili@gmail.com

Dr Anwar Nasser Al Saadi
Directorate of Animal Wealth
Ministry of Agriculture and Fisheries
20413 Ibra
☎ +968 99 38 17 79
anwar99381779@yahoo.com

QATAR

Dr Farhoud Al-Hajri
Head of Animal Resources Department
Ministry of Environment
P.O.Box 23211
Doha
☎ +974 44 56 04 00
☎ +974 44 66 31 63
☎ +974 66 67 66 99
m6066@moe.gov.qa

SOUTH SUDAN

Mr Saleh Al-Marri
Head of Veterinary Services Section
Animal Resources Department
Ministry of Environment
P.O.Box 23211
Doha
☎ +974 44 56 05 55
☎ +974 44 65 43 90
☎ +974 55 85 95 80
simarri@moe.gov.qa

SAUDI ARABIA

Dr Alarabi Mehidi Alomim
Animal Health Department
Ministry of Agriculture
Riyadh
☎ +966 50 48 81 477
arabo2000@hotmail.com

Dr Abdelhamid El-Fadil
KSA / Consultant Epidemiologist
Sudan University of Science and Technology
Khartoum
☎ +249 915 689 630
aaelfadil@yahoo.com

SOMALIA

Dr Habiba Hamud
Ministry of Livestock, Forestry and Range
Mogadishu
☎ +252 615 178 424
habibahamud@yahoo.com

Dr Ahmed Abdi GEDI
Chief Veterinary Officer
Ministry of Livestock, Forestry and Range
Mogadishu
☎ +252 615 914 495
ahmedgedi6@gmail.com
ahmedgedi5@yahoo.com

SOMALIA (SOMALILAND)

Mr Warsame Haibeh
Animal Health Director
Ministry of Livestock
Hargesia
☎ +252 63 44 46 174
ahmedhaybe2014@gmail.com
molhealth1@gmail.com

Dr Mabior Yuot
Inspector of Veterinary Services
Directorate of Veterinary Services
Ministry of Livestock and Fisheries Industry
P.O.Box 126
Juba
☎ +211 95 55 44 437
deawar03@gmail.com
m_mabil@yahoo.com

SUDAN

Dr Kamal Tagelsir Elsheikh Elfaki
Chief Veterinary Officer
Undersecretary
Ministry of Livestock
P.O.Box 1111
Khartoum
☎ +249 91 23 38 522
kemojahiz@gmail.com
ktagelsir11@yahoo.com

SYRIA

Dr Mohammed Riad Dayoub
Head of Vaccine Production
Vaccine Production Department
Ministry of Agriculture and Agrarian Reform
Bab Sharki – Airport Square, Al Hejaz
Damascus
☎ +963 11 54 22 472
☎ +963 11 54 24 761
☎ +963 93 37 46 913
doah@mail.sy

TANZANIA

Dr Makungu Luka Selemani
National Epidemiologist
Directorate of Veterinary Services
Ministry of Livestock and Fisheries
Development
131, Nelson Mandela Road
P.O.Box 9152
15487 Dar Es Salaam
☎ +255 75 44 32 113
☎ +255 68 55 12 765
makungu57@yahoo.com
makungu57@gmail.com

Dr Mwananyanzala Dotto Maziku
PVO Veterinary Public Health
Directorate of Veterinary Services
Ministry of Livestock and Fisheries
Development
131, Nelson Mandela Road
P.O.Box 9152
15487 Dar Es Salaam
☎ +255 22 28 62 592
☎ +255 76 44 95 881
dotto52matthew@gmail.com
dottomd@yahoo.com

UGANDA

Dr Dan Tumusiime
Senior Veterinary Officer
Livestock Health Department
Ministry of Agriculture, Animal Industry and
Fisheries
Lugard Avenue
P.O.Box 513
Kampala
☎ +256 77 23 40 032
drdantumusiime@gmail.com

Dr Noelina Nantima
Principal Veterinary Officer
Livestock Health Department
Ministry of Agriculture, Animal Industry and
Fisheries
P.O.Box 513
Kampala
☎ +259 77 25 15 962
noelinanantima@yahoo.com

SPEAKERS (except FAO and OIE)

Dr Assaf Anyamba
Research Scientist
GESTAR/USRA & Biospheric Sciences
Laboratory
NASA Goddard Space Flight Center
Code 618
20771 Greenbelt, MD
UNITED STATES OF AMERICA
☎ +1 30 16 14 66 01
☎ +1 30 16 14 66 95
assaf.anyamba@nasa.gov

Dr Bernard Bett
Scientist
Food Safety and Zoonosis
ILRI
P.O.Box 30709
00100 Nairobi
KENYA
☎ +254 20 422 34 53
☎ +254 20 422 30 01
☎ +254 722 84 19 38
b.bett@cgiar.org

Dr Austine Bitek
Veterinary Epidemiologist
Ministry of Agriculture, Livestock and
Fisheries
Zoonotic Disease Unit
P.O.Box 20811
00202 Nairobi
KENYA
☎ +254 721 606 743
abitek@zdukenya.org

Dr Charles Bodjo
Senior Diagnostics Officer
Pan-African Veterinary Vaccines Centre
AFRICAN UNION
P.O.Box 1746
Debre – Zeit
ETHIOPIA
☎ +251 913 48 90 79
bodjoc@africa-union.org;
charlesbodjo@gmail.com

Dr Mehdi El-Harrak
Director R & D
MCI Santé Animale
Lot 157 ZI Sud Ouest,
BP 278
28810 Mohammadia
Rabat
MOROCCO
☎ +212 52 33 03 132
☎ +212 52 33 02 130
☎ +212 66 28 83 378
elharrak_m@hotmail.com;
m.elharrak@mci-santeanimale.com

Prof. Ahmed El-Sawalhy
Director
Inter-African Bureau for Animal Resources
AU
Kenindia Business Park Building
Museum Hill, Westlands Road
P.O.Box 30 786
00100 Nairobi
KENYA
☎ +254 20 367 40 00
☎ +254 20 367 43 41
☎ +254 710 888 810
ahmed.elsawalhy@au-ibar.org

Dr Pierre Formenty
Emerging and Dangerous Pathogens Team
Alert and Response Operations Office
Department of Communicable Diseases,
Surveillance and Response (CDS/CSR)
WHO
20 avenue Appia,
1211 Geneva (27)
SWITZERLAND
☎ +41 22 79 12 550
☎ +41 22 79 14 198
☎ +41 79 46 55 571
formentyp@who.int

Dr Danny Goovaerts
Consultant
Research Department
GALVmed
Langenberg 3,
2460 Lichtaart
BELGIUM
☎ +32 4 87 65 79 86
dannygoovaerts@skynet.be

Dr Baratang Alison Lubisi
Head of Virology Department
ARC-OVI
Onderstepoort Veterinary Institute (ARC-OVI)
Old Soutpan Road, Onderstepoort
P/bag X05
Pretoria
0110 SOUTH AFRICA
☎ +27 12 529 92 33/
☎ +27 12 529 9418
☎ +27 79 52 44 895
lubisia@arc.agric.za
baratanglubisi@yahoo.com

Dr Louis Maartens
Research Veterinarian
Research & Development
Deltamune
Jean Avenue 248,
P.O.Box 14167
0140 Lyttelton
SOUTH AFRICA
☎ +27 12 664 5730
☎ +27 12 664 5149
☎ +27 82 899 8056
louism@deltamune.co.za
louism@gmail.com

Mrs Moabi Rachel Maluleke
Researcher
Virology Department
Agricultural Research Council
Onderstepoort Veterinary Institute (ARC-OVI)
Old Soutpan Road, Onderstepoort
P/bag X05
0110 Pretoria
SOUTH AFRICA
☎ +27 12 529 92 86
☎ +27 12 52 99 249
☎ +27 82 400 4557
malulekeR@arc.agri.za
malulekerachel@yahoo.com

Mr. Mohamed Moussa Mohamed
Director
Agriculture and Environment Division
IGAD Secretariat
B.P. 2653
Djibouti
DJIBOUTI
☎ +253 21 31 27 40
☎ +253 21 35 69 94
☎ +253 77 81 45 27
mohamed.moussa@igad.int

Dr Kariuki Njenga
Head of One Health Programme
Kenya Medical Research Institute (KEMRI)
P.O.Box 54840
00200 Nairobi
KENYA
☎ +254 72 22 08 925
knjenga@kemri.org

Dr Mulalo Bethuel Nthangeni
Chief Scientific Officer
Research and Development Department
Onderstepoort Biological Products (OBP)
Old Soutpan Road, Onderstepoort
P/Bag X07
0110 Pretoria
SOUTH AFRICA
☎ +27 12 522 1549
☎ +27 12 522 1591
☎ +27 82 885 7260
bethuel@obpvaccines.co.za

Dr Chip Stem
CEO
Livestock Trade Services
P.O.Box 2997
00100 Nairobi
KENYA
☎ +254 72 22 05 703
cstem1@gmail.com;
cstem@livestocktradeservices.com

Dr Zelalem Tadesse
Coordinator STSD Project
Inter-African Bureau for Animal Resources
AU
Kenindia Business Park Building
Museum Hill, Westlands Road
P.O.Box 30 786
00100 Nairobi
KENYA
☎ +254 20 367 43 52
☎ +254 71 88 65 692
zelalem.tadesse@au-ibar.org
tadessez@africa-union.org

Prof. James Wabacha
Coordinator SMP-AH Project
Inter-African Bureau for Animal Resources
AU
Kenindia Business Park Building
Museum Hill, Westlands Road
P.O.Box 30 786
00100 Nairobi
KENYA
☎ +254 20 36 74 00
📠 +254 20 36 74 341
📱 +254 72 28 74 870
james.wabacha@au-ibar.org

Dr Ameha Sebsibe Woldemariam
Head, Livestock Programme
ICPALD
P.O.Box 47824
00100 Nairobi
KENYA
📱 +254 721 23 30 45
ameha.sebsibe@igad.int

OBSERVERS

Dr Thomas Albrecht
Veterinarian
US Army
Camp Lemonier
BP 09363
DJIBOUTI
☎ +253 77 174 719

Dr Jodi Collins
Veterinarian
US Army
Camp Lemonier
BP 09363
DJIBOUTI
☎ +253 77 174 719
hoaveterinaryteam@gmail.com

Dr Ahmed Issa Dawud
Laboratory Manager
Technical Department
PRIMA International Company
DJIBOUTI
☎ +253 77 11 75 66
☎ +251 91 14 08 989
ahmedissa73@hotmail.com

Dr Jeroen Kortekaas
Virologist / Project Leader
Central Veterinary Institute
Wageningen University
Edelhertweg 15,
P.O.Box 65
8219 PH Lelystad
THE NETHERLANDS
☎ +31 320 23 81 98
☎ +31 6 209 19 110
jeroen.kortekaas@wur.nl

Ms Boitumelo Moetlhoa
Research Assistant
Research and Development Department
Onderstepoort Veterinary Institute (ARC-OVI)
10 Old Soutpan Road, Onderstepoort
P/bag X05
0110 Pretoria
SOUTH AFRICA
☎ +27 12 522 15 52
☎ +27 73 37 89 592
boitumelo@obpvaccines.co.za;
moetlhoab@gmail.com

Dr Momtaz Shahein
Deputy Director
Animal Health Research Institute
PRIMA International Company
Nadi El Said St.
Dokki – Giza
EGYPT
☎ +20 10 07 321 765
Momtaz.shahein@yahoo.com

Dr Shebta Shebta
Virology Department
Animal Health Research Institute
PRIMA International Company
Mansoura
EGYPT
☎ +20 10 919 79 167
☎ +20 11 134 79 437
shebta357@yahoo.com

Dr Khalid Omari Tadlaoui
Director General
MCI Santé Animale
Lot 157 ZI Sud Ouest,
BP 278
28810 Mohammadia
Rabat
MOROCCO
☎ +212 52 33 03 132
☎ +212 52 33 02 130
☎ +212 66 11 41 860
k.tadlaoui@mci-santeanimale.com
k.tadlaoui@menara.ma

(OTHER) REGIONAL AND INTERNATIONAL ORGANISATIONS

AU-IBAR / IGAD

Dr Samuel Wakhusama
VET-GOV Coordinator for the IGAD Region
IGAD - ICPALD
1st floor, Jadala Place
Ngong Lane, off Ngong Road
P.O.Box 47824
00100 Nairobi
KENYA
☎ +254 72 52 54 600
☎ +254 73 36 25 866
samuel.wakhusama@igad.int;
swakhusama@gmail.com

ILRI

Ms Edna Nduku Mutua
Graduate Fellow
Food Safety and Zoonoses Department
ILRI
ILRI Campus Kabete
P.O.Box 30709
00100 Nairobi
☎ +254 20 422 3029
☎ +254 722 97 5578
enmutua@cgiar.org
ednamutua@gmail.com

CDC

Dr Peninah Munyua
Public Health Scientist
Division of Global Health Protection
CDC - Kenya
Village Market
P.O.Box 606
00621 Nairobi
KENYA
☎ +254 202 713 008
☎ +254 710 602 787
ikg2@cdc.gov
munyuap@gmail.com

Dr Emmanuelle Guerne-Bleich
Resident Representative
FAO
Lottissement du Héron
Immeuble Moussa Bouraleh, Lot No. 16
BP 2588
DJIBOUTI
Emmanuelle.guernebleich@fao.org
fao-dj@fao.org

Dr Markos Tibbo
Regional Representative
Regional Office for the Near East and North Africa
FAO
11 Aleslah El Zerai St.
P.O.Box 2223
Cairo
EGYPT
☎ +20 23 33 16 143 / 6000 (ext. 2803)
☎ +20 23 74 95 981
markos.tibbo@fao.org

Dr Daniel Beltrán Alcrudo
Animal Health Officer
AGAH
FAO
Viale delle Terme di Caracalla
00153 Rome
ITALY
☎ +39 (0) 6 570 53 823
☎ +39 (0) 6 570 53 057
daniel.beltranalcrudo@fao.org

Dr Bouna Diop
Regional Manager
ECTAD Eastern Africa
Food and Agriculture Organization of the United Nations
Block P Level 3
United Nations Complex,
UN Avenue, Gigiri
P.O.Box 30470
00100 Nairobi
KENYA
☎ +254 20 76 25 926
☎ +254 73 69 99 180
bouna.diop@fao.org
bounaa.diop@gmail.com

WORLD ORGANISATION FOR ANIMAL HEALTH (OIE)

HEADQUARTERS (PARIS)

12, rue de Prony

75017 Paris

FRANCE

☎ +33 1 44 15 18 88

☎ +33 1 42 67 09 87

Dr Susanne Munstermann

Programme Officer

Scientific and Technical Department

s.munstermann@oie.int

Dr Gregorio Torres

Programme Officer

Scientific and Technical Department

g.torres@oie.int

REGIONAL REPRESENTATION FOR
THE MIDDLE EAST

1st Floor, Ministry of Agriculture bldg

Furn El Chebak

Beirut

LEBANON

Dr Ghazi Yehia

Regional Representative for the Middle East

g.yehia@oie.int

Dr Xavier Pacholek

Programme Officer

x.pacholek@oie.int

Ms Rita Rizk

Secretary

r.rizk@oie.int

SUB-REGIONAL REPRESENTATION FOR
EASTERN AFRICA

4th Floor, Taj Towers,

Upper Hill Road, Upper Hill

P.O.Box 19687

00202 Nairobi

KENYA

☎ +254 20 271 3461

Dr Patrick Bastiaensen

Programme Officer

p.bastiaensen@oie.int

Ms Grace Omwega

Administrative and Financial Assistant

g.omwega@oie.int

Ms Loise Ndungu

Secretary

l.ndungu@oie.int

SUB-REGIONAL REPRESENTATION FOR
NORTH AFRICA

Sub-Regional Representation for North Africa

17 Av d'afrique, El Menzah 5,

BP 17

Tunis

TUNISIA

Dr Alessandro Ripani

Programme Officer

a.ripani@oie.int

SUB-REGIONAL REPRESENTATION
IN BRUSSELS

Bd du jardin Botanique, 55

1000 Brussels

BELGIUM

Dr Stéphane de La Rocque

Programme Officer

☎ +41 14 41 15 19 73

☎ +41 6 76 57 90 99

s.delarocque@oie.int

USEFUL WEBSITES

www.arc.agric.za/arc-ovi/Pages/ARC-OVI-Homepage.aspx
www.ars.usda.gov/Business/Docs.htm?docid=23464
www.au-ibar.org
www.cdc.gov/vhf/rvf/
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CHAPTER 8.13. INFECTION WITH RIFT VALLEY FEVER VIRUS

Article 8.13.1.

General provisions

The aim of this chapter is to mitigate the animal and public health risks posed by *Rift Valley fever* (RVF) and to prevent its international spread. Humans and many animal species are susceptible to infection. For the purpose of the Terrestrial Code, RVF is defined as an infection of ruminants with *Rift Valley fever virus* (RVFV).

The following defines the occurrence of RVFV infection:

- RVFV, excluding vaccine strains, has been isolated and identified as such from a sample from a ruminant; or
- antigen or ribonucleic acid specific to RVFV, excluding vaccine strains, has been identified in a sample from a ruminant epidemiologically linked to a confirmed or suspected case of RVF, or giving cause for suspicion of association or contact with RVFV; or
- antibodies to RVFV antigens which are not the consequence of vaccination, have been identified in a sample from a ruminant with either epidemiological links to a confirmed or suspected case of RVF, or giving cause for suspicion of association or contact with RVFV.

For the purposes of the Terrestrial Code, the infective period for RVF shall be 14 days.

In areas where RVFV is present, epizootics of RVF may occur following favourable climatic, environmental conditions and availability of susceptible host and competent vector populations. Epizootics are separated by inter-epizootic periods.

For the purposes of this chapter:

- 'area' means a part of a country that experiences epizootics and inter-epizootic periods, but which does not correspond to the definition of zone;
- 'epizootic of RVF' means the occurrence of outbreaks at an incidence substantially exceeding that during an inter-epizootic period;
- 'inter-epizootic period' means the period of variable, often long, duration, with intermittent low level virus activity, which is often not detected;
- 'ruminants' include dromedary camels.

The historical distribution of RVF has been parts of the African continent, Madagascar, some other Indian Ocean Islands and the south western Arabian Peninsula. However, vectors, environmental and climatic factors, land-use dynamics, and animal movements may modify the temporal and spatial distribution of the infection.

When authorising import or transit of the commodities covered in the chapter, with the exception of those listed in Article 8.13.2., Veterinary Authorities should require the conditions prescribed in this chapter relevant to the RVF status of the ruminant population of the exporting country. Standards for diagnostic tests and vaccines are described in the Terrestrial Manual.

Article 8.13.2.

Safe commodities

When authorising import or transit of the following commodities and any products made from them, Veterinary Authorities should not require any RVF related conditions, regardless of the RVF status of the ruminant population of the exporting country:

- hides and skins;
- wool and fibre.

Article 8.13.3.

Country or zone free from RVFV infection

A country or a zone may be considered free from RVFV infection when the disease is notifiable in the whole country and either:

- it meets the requirements for historical freedom in point 1 of Article 1.4.6.; or
- met the following conditions:
 - an on-going pathogen-specific surveillance programme in accordance with Chapter 1.4. has demonstrated no evidence of RVFV infection in ruminants in the country or zone for a minimum of ten years; and
 - no indigenous human cases have occurred in the country or zone.

A country or zone free from infection with RVFV will not lose its free status through the importation of ruminants that are seropositive, so long as they are either permanently identified as such or destined for immediate slaughter.

Article 8.13.4.

Country or zone infected with RVFV during the inter-epizootic period

A country or zone infected with RVFV, during the inter-epizootic period, is one in which virus activity is present at a low level but the factors predisposing to an epizootic are absent.

Article 8.13.5.

Country or zone infected with RVFV during an epizootic

A country or zone infected with RVFV, during an epizootic, is one in which outbreaks of RVF are occurring at an incidence substantially exceeding that of the inter-epizootic period.

Article 8.13.6.

Strategies to protect from vector attacks during transport

Strategies to protect animals from vector attacks during transport should take into account the local ecology of the vectors and potential risk management measures include:

- treating animals with insect repellents prior to and during transportation;
- loading, transporting and unloading animals at times of low vector activity;
- ensuring vehicles do not stop *en route* during dawn or dusk, or overnight, unless the animals are held behind insect-proof netting;
- using historical and current information to identify low risk ports and transport routes.

Article 8.13.7.

Recommendations for importation from countries or zones free from RVFV infection

For ruminants

Veterinary Authorities should require the presentation of an international veterinary certificate attesting that the animals:

- were kept in a country or zone free from RVFV infection since birth or for at least 14 days prior to shipment;
- AND
- either:
 - were vaccinated at least 14 days prior to leaving the free country or zone; or
 - did not transit through an area experiencing an epizootic during transportation to the place of shipment; or
 - were protected from vector attacks when transiting through an area experiencing an epizootic.

Article 8.13.8.

Recommendations for importation from countries or zones infected with RVFV during the inter-epizootic period

For ruminants

Veterinary Authorities should require the presentation of an international veterinary certificate attesting that the animals:

- showed no sign of RVF on the day of shipment;
 - met one of the following conditions:
 - were vaccinated against RVF at least 14 days prior to shipment with a modified live virus vaccine; or
 - were held for at least 14 days prior to shipment in a mosquito-proof quarantine station which is located in an area of demonstrated low vector activity. During this period the animals showed no clinical sign of RVFV infection;
- AND
- either:
 - did not transit through an area experiencing an epizootic during transportation to the place of shipment; or
 - were protected from vector attacks when transiting through an area experiencing an epizootic.

Article 8.13.9.

Recommendations for importation from countries or zones infected with RVFV during an epizootic

For ruminants

Veterinary Authorities should require the presentation of an international veterinary certificate attesting that the animals:

- showed no sign of RVF on the day of shipment;
- did not originate in the area of the epizootic;
- were vaccinated against RVF at least 14 days prior to shipment;
- were held for at least 14 days prior to shipment in a quarantine station, which is located in an area of demonstrated low vector activity outside the area of the epizootic. During this period the animals showed no sign of RVF;
- either:
 - did not transit through an area experiencing an epizootic during transportation to the place of shipment; or
 - were protected from vector attacks when transiting through an area experiencing an epizootic.

Article 8.13.10.

Recommendations for importation from countries or zones not free from infection with RVFV

For semen and in vivo derived embryos of ruminants

Veterinary Authorities should require the presentation of an international veterinary certificate attesting that the donor animals:

- showed no sign of RVF within the period from 14 days prior to and 14 days following collection of the semen or embryos;
- AND
- either:
 - were vaccinated against RVF at least 14 days prior to collection; or
 - were demonstrated to be seropositive on the day of collection; or
 - testing of paired samples has demonstrated that seroconversion did not occur between semen or embryo collection and 14 days after.

Article 8.13.11.

Recommendations for importation of fresh meat and meat products from ruminants from countries or zones not free from infection with RVFV

Veterinary Authorities should require the presentation of an international veterinary certificate attesting that the entire consignment of meat comes from:

- ruminants which showed no clinical sign of RVF within 24 hours before slaughter;
- ruminants which were slaughtered in an approved slaughterhouse/abattoir and were subjected to ante- and post-mortem inspections with favourable results;
- carcasses which were submitted to maturation at a temperature above 2°C for a minimum period of 24 hours following slaughter.

Article 8.13.12.

Recommendations for importation from countries or zones not free from infection with RVFV

For milk and milk products

Veterinary Authorities of importing countries should require the presentation of an international veterinary certificate attesting that the consignment:

- was subjected to pasteurisation; or
- was subjected to a combination of control measures with equivalent performance as described in the *Codex Alimentarius Code of Hygienic Practice for Milk and Milk Products*.

Article 8.13.13.

Surveillance

Surveillance should be carried out in accordance with Chapter 1.4.

- During an epizootic, surveillance should be conducted to define the extent of the affected area.
- During the inter-epizootic period, surveillance and monitoring of climatic factors predisposing an epizootic should be carried out in countries or zones infected with RVFV.
- Countries or zones adjacent to a country or zone in which epizootics have been reported should determine their RVFV status through an on-going surveillance programme.

To determine areas of low vector activity (see Articles 8.13.8. and 8.13.9.) surveillance for arthropod vectors should be carried out in accordance with Chapter 1.5.

Examination of vectors for the presence of RVFV is an insensitive surveillance method and is therefore not recommended.

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12, rue de Prony, 75017 Paris, FRANCE
Email: oiie@oiie.int | <http://www.oiie.int>



Viale de terme di Caracalla, 00153 Rome, ITALY
Email: fao_hq@fao.org | <http://www.fao.org>