Food and Agriculture Organization of the United Nations

Animal Production and Health Division

# Rift Valley Fever in the Horn of Africa, East of Africa and the Middle East

## A historical overview (animal health)

**Bouna Diop**

*Regional Manager UN FAO ECTAD Eastern Africa*

**Rift Valley Fever: New options for trade, prevention and control Conference - Djibouti, 21 – 23 April 2015**

# Acknowledgment:


- OIE
- DVS from the region
- Emanuel Swai, DVS Tanzania
- Dan Tumusiime, NADDEC Uganda
- Samuel Mulat, DVS Ethiopia
- George N. Njoroge, DVS Kenya
- Eran Razman, AGAH
- Akiko Kamata, AGAH
- Claudia Pittiglio, AGAH
- Shaif Abdullah, FAO SS
- ECTAD EA team

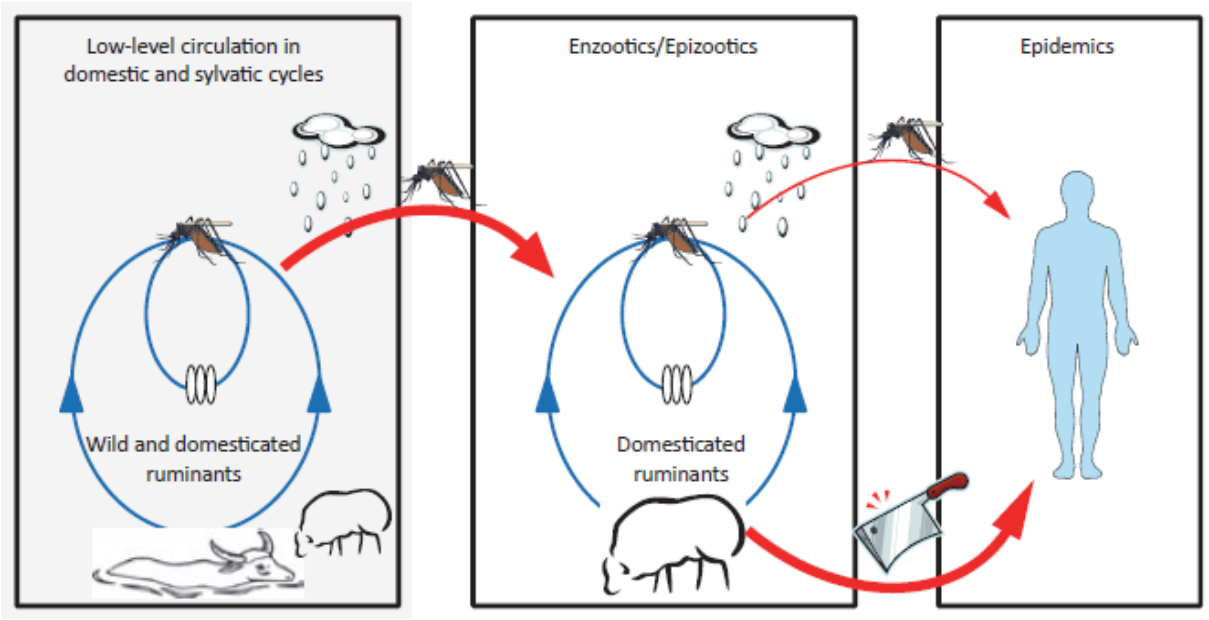

# Overview of the disease

- Rift Valley fever (RVF) is a Phlebovirus arthropod-borne zoonosis that primarily affects sheep, goats, cattle, camels, buffalos, several rodents, dromedaries, antelopes, wildebeest, and humans.
- Sheep are the most susceptible while goats and cattle are somewhat less susceptible.

# Overview of the disease

- 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, human can also be infected via infected mosquito bites.
- 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
- Outbreaks are usually associated with heavy rains and prolonged flooding (El Nino)

# RVF Transmission

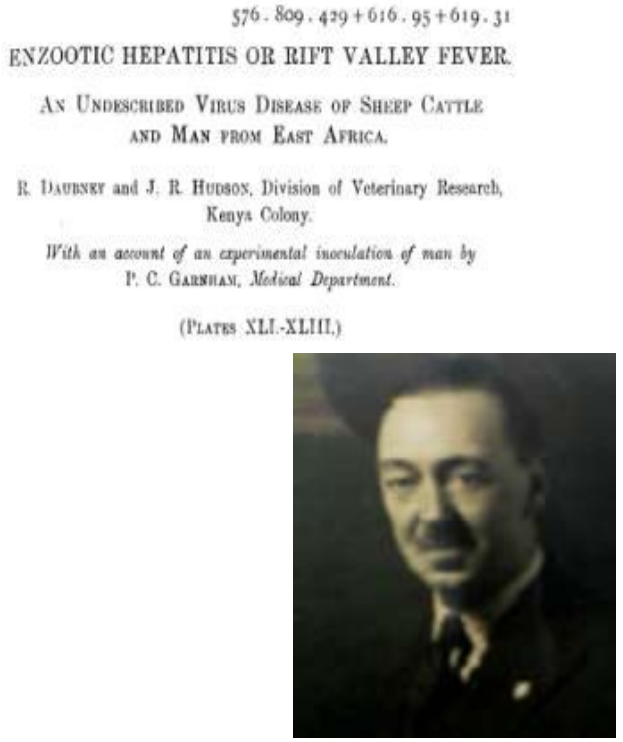



*FAO. 2015. The last hurdles towards Rift Valley Fever control*

- Enzootic areas: RVFV circulate between wild ruminants and mosquitoes; **disease is usually inapparent**
- Epizootic situation: Increased Aedes vectors transmit RVFV to susceptible domestic ruminants, principal host for amplification and transmission of RVFV
- Viremic cattle subsequently infect other species of mosquitoes which in turn infect an even broader range of vertebrates

# History – First occurrence

- RVF was first described in Nakuru District of Rift Valley province in Kenya in 1912 occurring as sporadic cases.
- The causal agent, however, was first isolated from Kenyan samples in 1931 (Daubney, Hudson and Garnham).



576 . 809 . 429 + 616 . 95 + 619 . 31

ENZOOTIC HEPATITIS OR RIFT VALLEY FEVER.

AN UNDESCRIBED VIRUS DISEASE OF SHEEP CATTLE AND MAN FROM EAST AFRICA.

R. DAUBNEY and J. R. HUDSON, Division of Veterinary Research, Kenya Colony.

*With an account of an experimental inoculation of man by* P. C. GARNHAM, *Medical Department.*

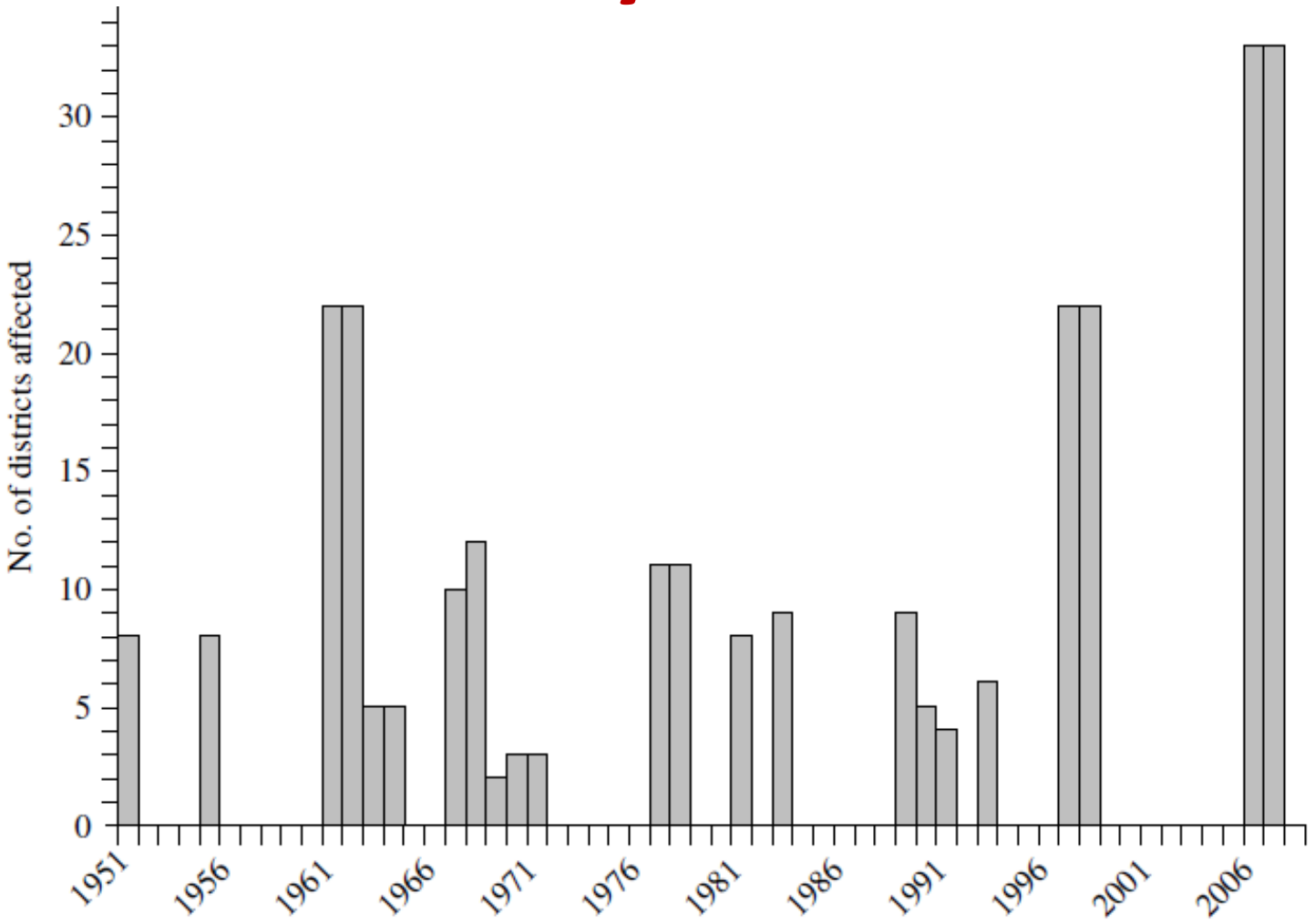
(PLATES XLI.-XLIII.)

Courtesy of ITAD, Plum Islands

# RVF in Kenya – Overview

- Between 1912 and 1936, RVF was confined to Nakuru District (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 had never been reported in the former Western and Nyanza provinces.

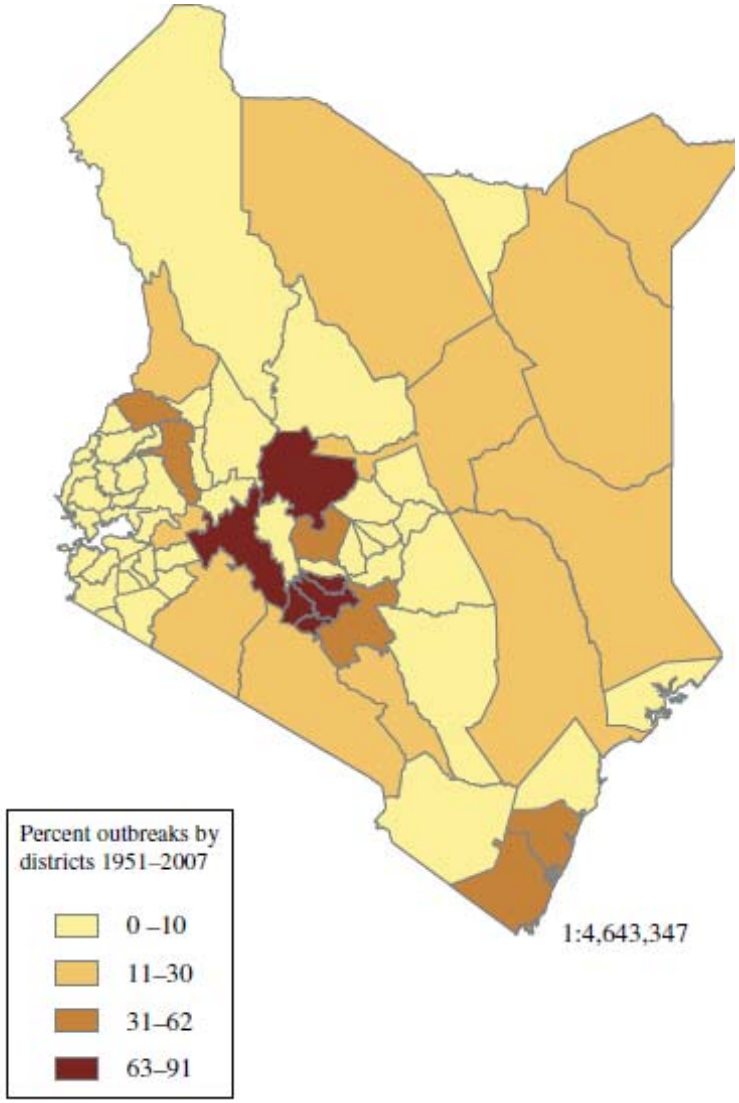
# RVF in Kenya – Overview




Courtesy of R. M. Murithi and others: National epizootics of RVF between 1951 and 2007

# RVF in Kenya – Overview

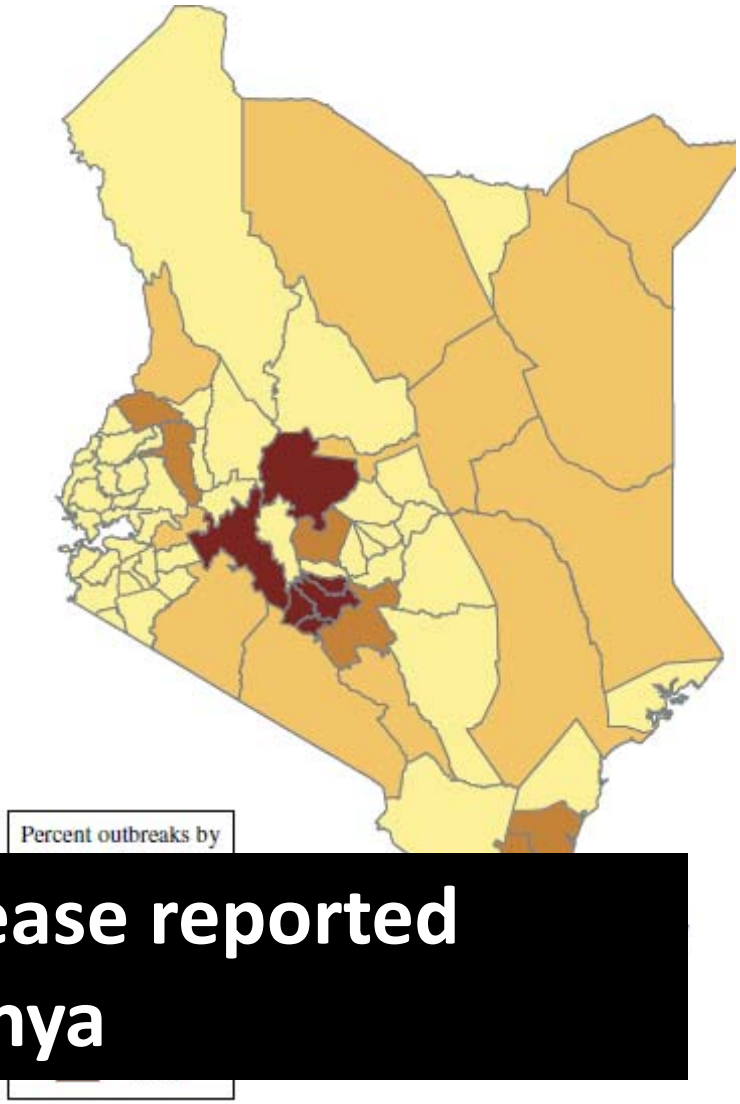
- During the 2006–07 outbreak:
  - 158 people died
  - Hundreds of thousands of animals (sheep, goats, cattle and camels) were affected
  - 33 of 69 former administrative districts across six of the eight provinces were infected




Courtesy of R. M. Murithi and others: Map showing districts that have been most vulnerable to RVF epizootics

# RVF in Kenya – Overview

- During the 2006–07 outbreak:
  - 158 people died
  - Hundreds of thousands of animals (sheep, goats, cattle and camels) were affected
  - 33 of 69 former administrative districts across six of the eight provinces were infected




**Since 2008, no clinical disease reported in animals in Kenya**

Courtesy of R. M. Murithi and others: Map showing districts that have been most vulnerable to RVF epizootics

# RVF related activities in Kenya

- RVF risk map produced and regularly updated
- Monitoring of Sentinel Herds in RVF hotspots
- RVF virus detection in periodically collected mosquitoes
- Vector/mosquito control
- RVF vaccination targeting high risk areas
- Public education
- Two RVF Contingency Plan developed by DVS (April 2010) and by MoH (2012) have been merged to come with one CP in line with the OH approach.


Courtesy of R. M. Murithi and others: Map showing Sentinel Herds in RVF hotspots

# RVF in Tanzania – Overview

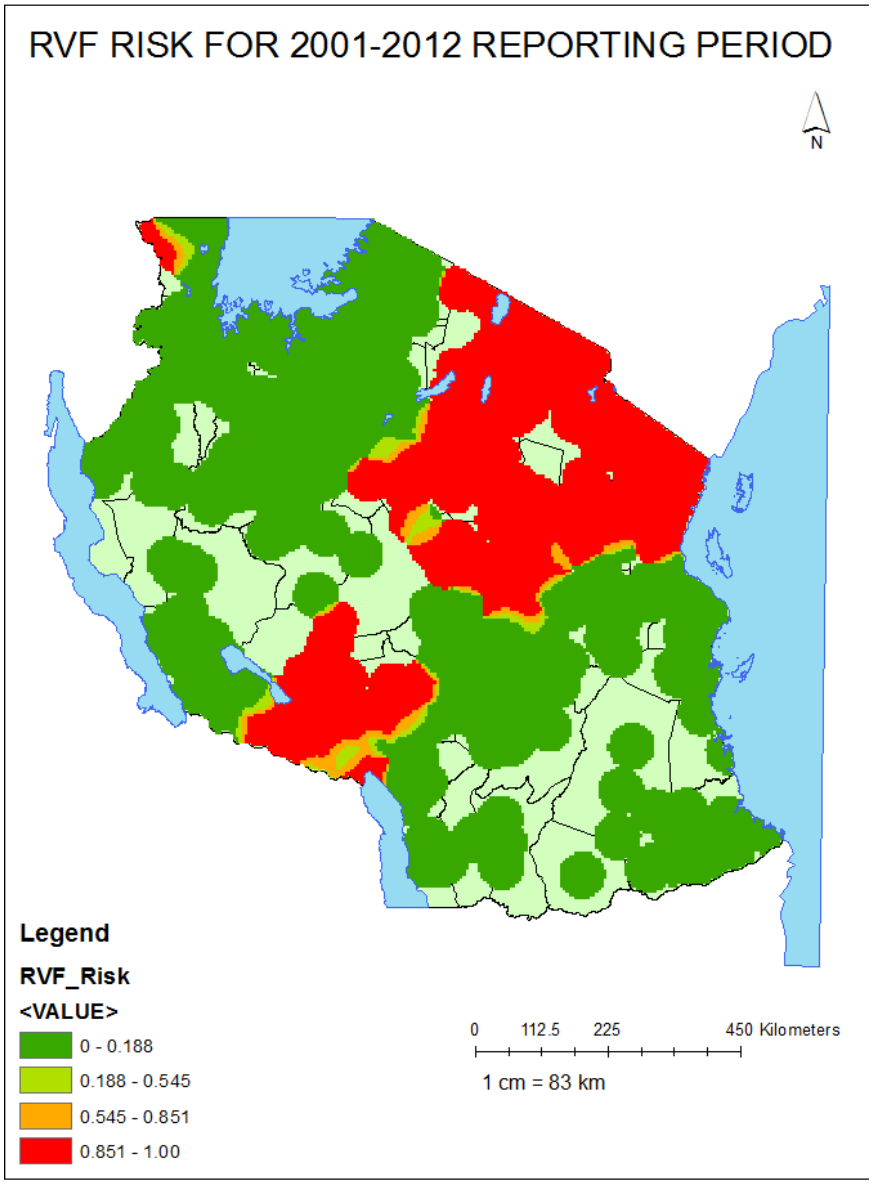
- First occurrence of the disease in 1930
- Other RVF outbreaks: occurred in the following periods:

| 1947 | 1957 | 1960 | 1963 | 1968 | 1977 | 1989 | 1997 | 2006 |
|---|---|---|---|---|---|---|---|---|

- 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
- The most notable epidemic occurred in 2006-2007:
  - Losses due to mortality for cattle and goats- sheep were respectively USD 4,243,250 and USD 2,202, 467. Gvt spent USD 4 Mil to control the outbreak

# RVF related activities in Tanzania

- Vaccination campaign:  956,000 animal vaccinated in 2010-2013
- Vector control
- Sentinel herd monitoring
- Use of impregnated bed nets in RVF prone region increased
- Ongoing researches on virus ecology, genome characterisation,  modelling, risk mapping, disease epidemiology in livestock/wildlife inter face.



# RVF in Somalia – Overview

- Somalia experienced the last two major RVF outbreaks in Eastern Africa.
- The first RVF outbreak occurred from July 1997 to June 1998
- Between December 2006 and February 2007, the disease was reported in many regions including: Gedo, Lower and Middle Juba, Lower and Middle Shabelle, and Hiran

- Surveillance and laboratory diagnosis is supported by Somali Animal Health Services Project (SAHSP)

# RVF related activities in Somalia

- Two sites for RVF sentinel surveillance:
  - Shabelle river basin between Jowhar and Balcad
  - Nugal valley in Puntland/Somaliland
- No RVF vaccination is not done in Somalia.
- Contingency plans for several trade-limiting animal diseases including RVF
- Limited vector control was attempted in the river basins in 2007

**Livestock export trade interrupted by bans during the two RVF outbreaks**

# RVF in Uganda – Overview

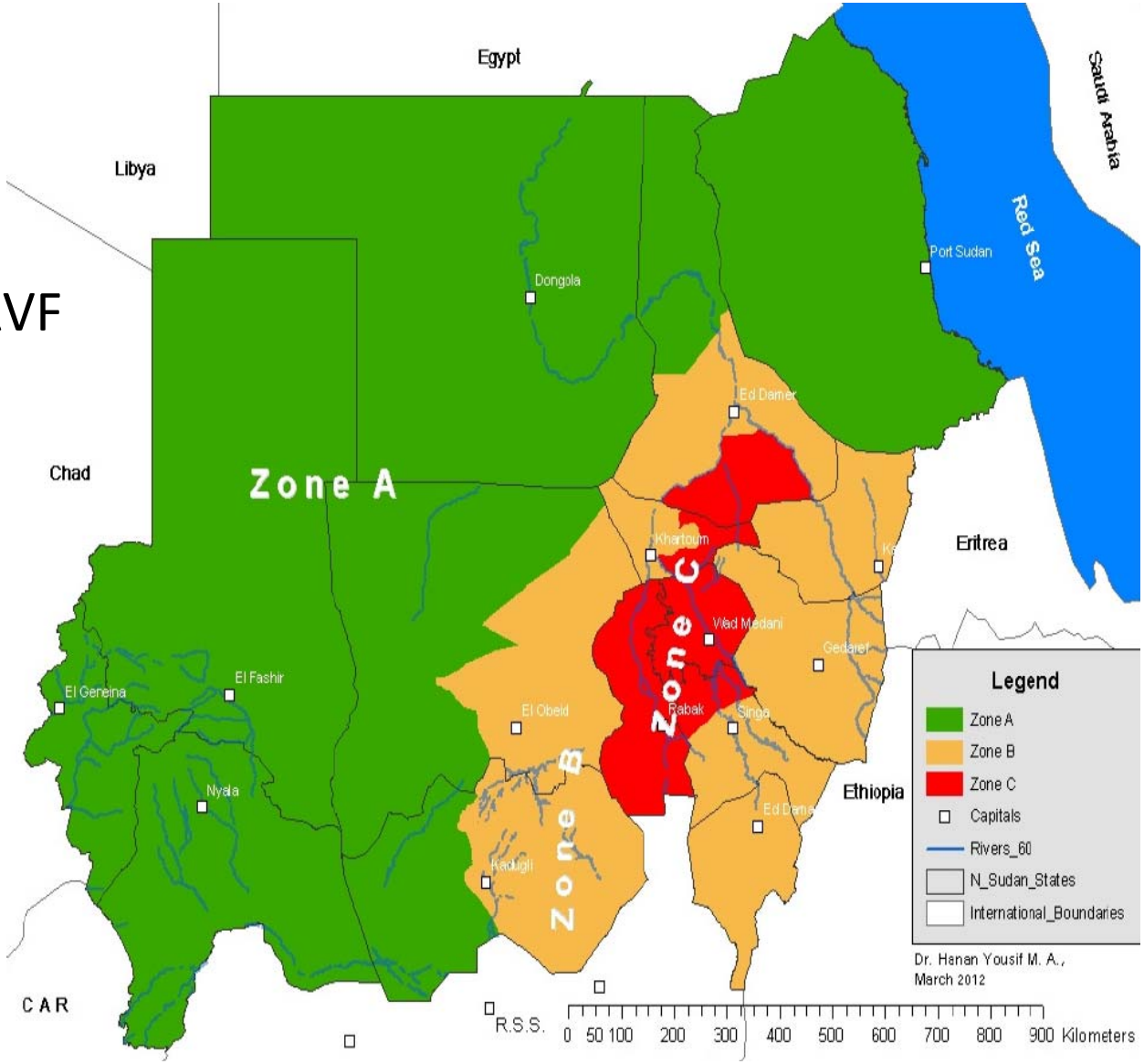
- RVF clinical disease has not been reported in animals
- Serological survey conducted in 4 districts revealed that RVFV was endemic in goats in these 4 districts, with seroprevalence rates ranging from 0 to 55% (Magona 2013).
- Surveillance have been ongoing to detect the disease/virus in animals, humans and mosquitoes by both MoH and MoA officials
- No contingency plan for RVF , however,guidelines for RVF surveillance exist

# RVF in Sudan – Overview

- 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 States
- RVF occurred in 1976, 1981 and 2007
- The last outbreak occurred in 2007 in several Sudanese states along the white and blue Nile

# RVF in Sudan – Overview

- RVF Risk map developed
- Action plan for the RVF control in place



# RVF in South Sudan – Overview

- RVF outbreaks have been reported from two States in 2007:
  - **Upper Nile State:** Renk, Mellut, Maban and Chemudi Counties
  - **Eastern Equatoria State** : Kapoeta East, Kapoeta North and Kapoeta South
- In October 2013, a workshop to evaluate risk map for RVF was facilitated by ILRI in Juba
- The exercise concluded that the following States have the highest risk of RVF
  - Upper Nile
  - East Equatoria
  - Jonglei
  - Unity

# RVF in Ethiopia – Overview

- RVF clinical disease has never been reported in Ethiopia
- In 1995, RVF was reported to OIE following positive serological tests but no clinical disease
- RVF Contingency and Preparedness Plan developed since June 2008
- Active RVF surveillance in place  in the risk areas bordering RVF infected countries such as Kenya, Somalia and Djibouti

The geographical localization of the country associated with large commercial ruminant trade and pastoralist movements makes Ethiopia at risk for RVF occurrence

# RVF in Djibouti – Overview

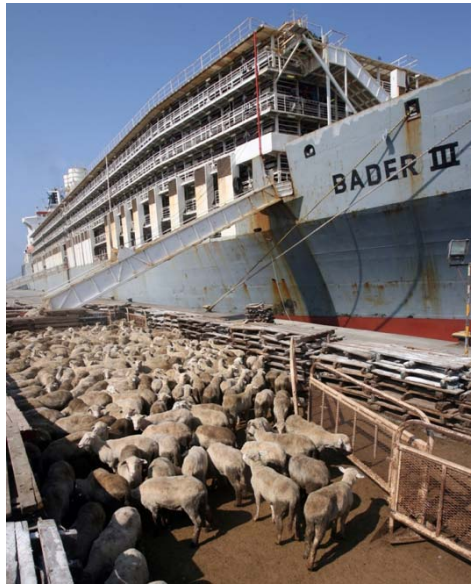
**RVF never reported**

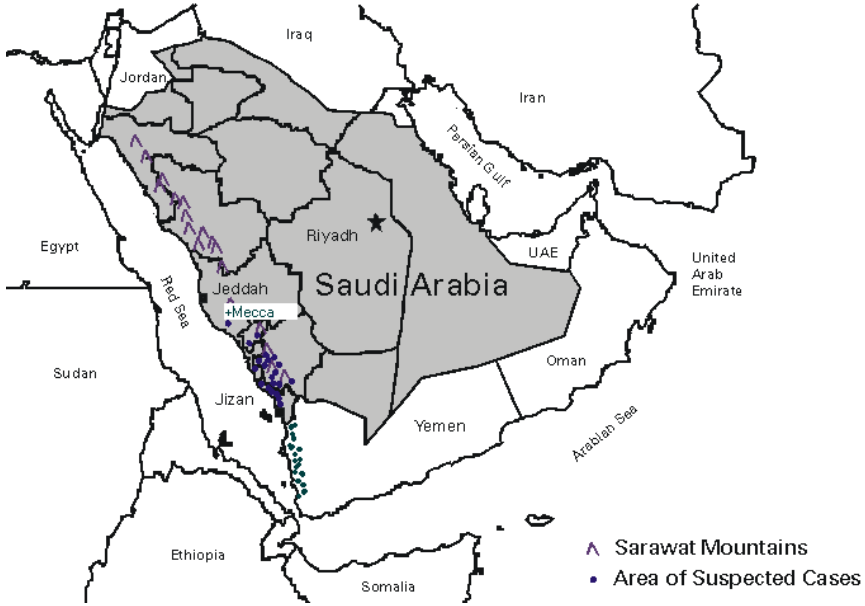
# RVF in Egypt – Overview

- RVF was restricted to sub-Saharan Africa until it was detected in Egypt in August 1977
- The first RVF outbreak occurred in Aswan Governorate followed by Sharqiya Governorate (70 km northeast of Cairo)
- A second outbreak occurred in 1993–1994
- In 1993, vaccination of livestock started
- Egypt has an ongoing vaccination program, vaccinating over 7 million animals per year.

# History: RVF spread out of Africa

- RVF was recognized for first time outside of the African continent in September 2000 with outbreaks reported in Saudi Arabia and Yemen

# RVF in Saudi Arabia – Overview

- RVF reported in September, 2000 in the livestock in southwest RSA following the confirmation of human cases
- RNA sequencing of the virus from KSA indicates that it is similar to the RVF viruses isolated from EA in 1998
- Main infected areas included Gazan, Aseer & Tohamet Mekkah
- Last reported positive case was in April 2001 at Gazan Region


Courtesy to Bayoumi, F. A. Director of Animal Health Branch Ministry of Agriculture, KSA

# RVF in Saudi Arabia – Overview

**Control measures during the 2000 outbreak:**

- Establishment of surveillance zone in Najran and Albaha Provinces
- Massive vaccination of all livestock in the infected areas
- Intensive screening and stamping out
- Massive campaign of vector control

# RVF in Saudi Arabia – Overview

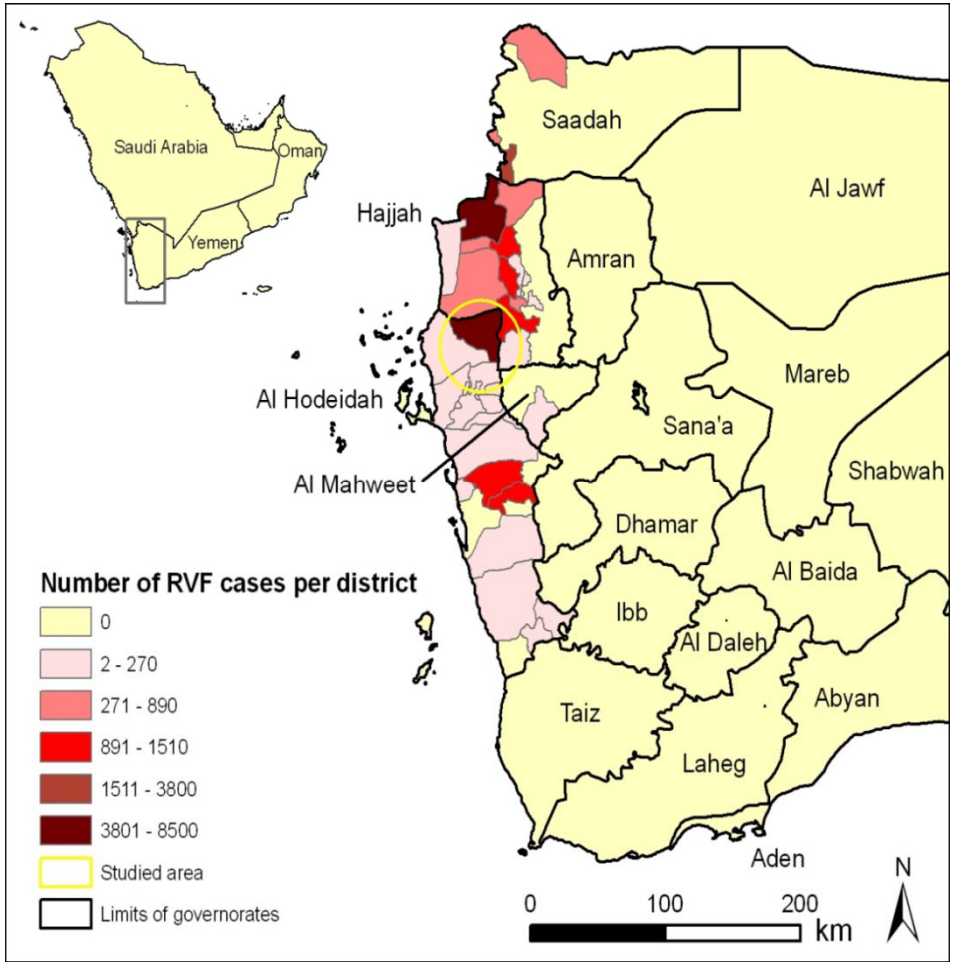
**Activities implemented after the 2000 Outbreak**

- Vaccination of newborn animals under 6 months
- Active disease surveillance among local herds
- Examination of smuggled animals at Al-Twal quarantine station (Yemen border)
- Sentinel herds distributed in different localities of the infected area
- RVF virus detection in periodically collected mosquitoes
- Draining and filling of water swamps to prevent mosquitoes from reproduce new generations
- Continuous vector control activities
- In 2004 RSA suspected RVF and vaccinated 760,000 susceptible animals

**Active surveillance results conducted from 2010 to 2012 revealed there was still positive cases (both IgG and IgM detected) but No clinical disease**

# RVF in Yemen – Overview

- First occurrence of RVF in July 2000 in the Tihama/Jizan regions : Sa'adah, Hajjah and Al Hodaidah governorates
- Infected areas were located in the irrigated zone or close to a water stream (valleys)




Courtesy to Shaif A. Salem; M. Al-Qadasi; K.Saeed

# RVF in Yemen – Overview

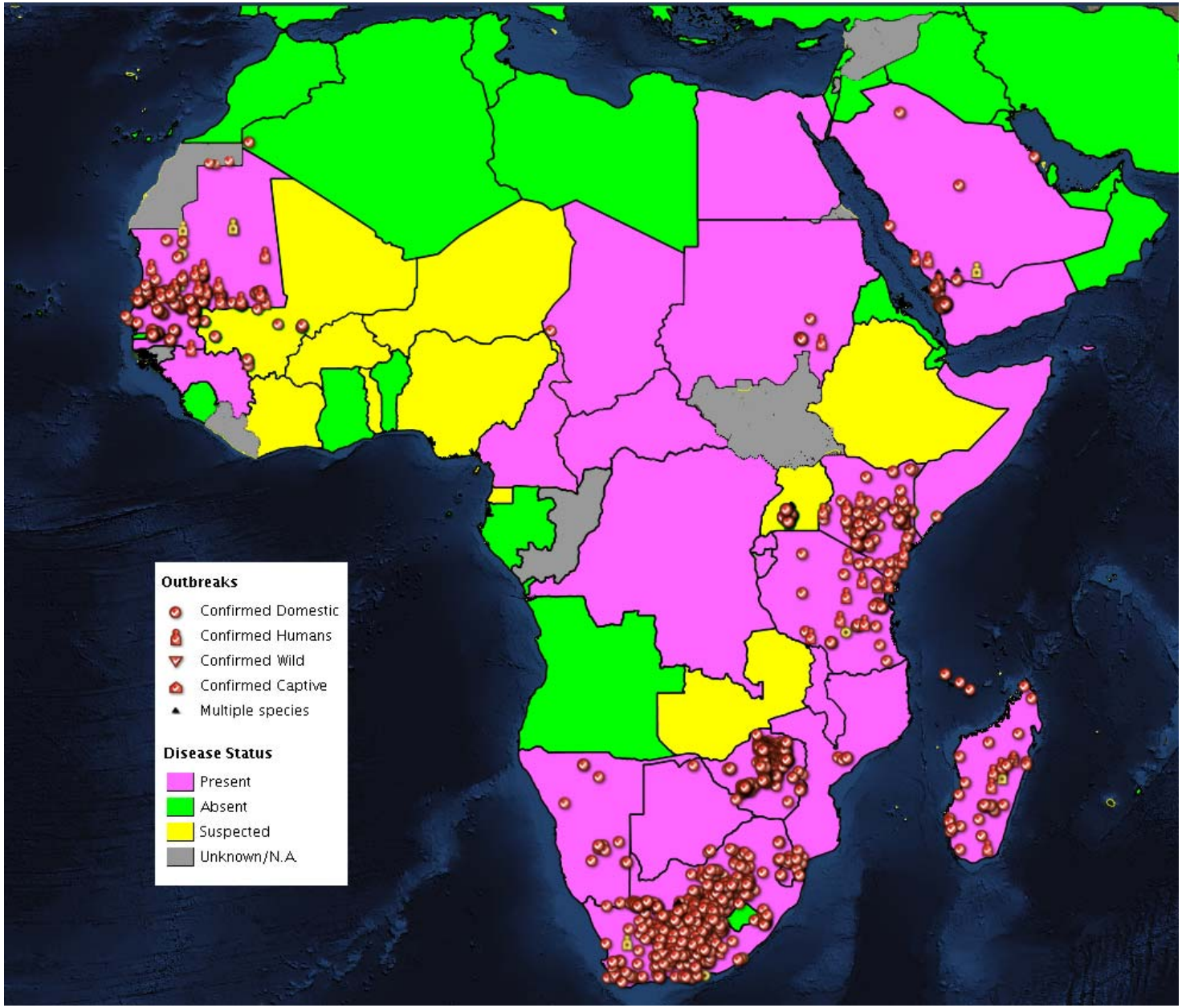
Sero-Surveillances of RVF results conducted from 2003 to 2011 mainly in Tihamah area and from the quarantine stations revealed:

- 7,181 samples (sheep, goat & cattle) tested between May 2005 and April 2009 – 12 RVF IgM positive.
- 1,011 samples tested between 2010 and 2011 revealed 18 RVF IgM positive

**Since 2003, confirmed RVF infection but no clinical disease**

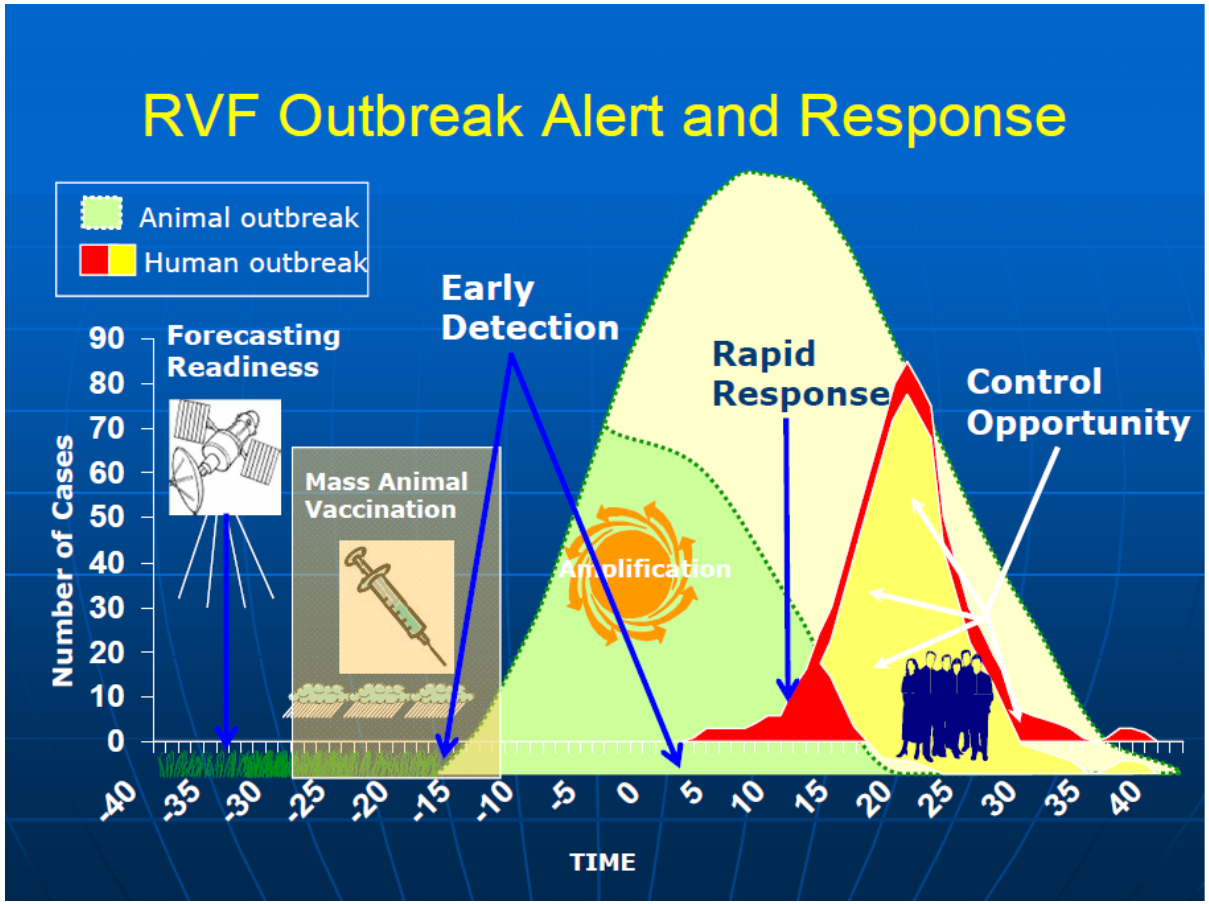
Courtesy to Shaif A. Salem; M. Al-Qadasi; K.Saeed

# Countries from which RVF virus has been reported in Africa and Middle East during the last 20 years



# RVF Control options

- Sentinel Surveillance
- Rainfall Remote Sensing and Survey Data
- Predictions
- Vaccination
- Vector Control
- Public Education and Awareness



# Challenges associated to RVF Control

- Outbreaks of RVF are hard to forecast accurately with respect to time or place. However new tools are being developed that will improve RVF predictions
- RVF surveillance  is generally inadequate and Sentinel herds are not always sustainable
- Vaccination can reduce the severity of RVF outbreaks but may not prevent the disease- timing and coverage levels remain a challenge
- Resources needed to implement National Contingency Plans ‘ provisions are not always allocated
- When RVF outbreaks occur after heavy rains, travel in the affected areas becomes especially difficult while other damages from floods compete with the disease for resources

# THANK YOU!