Experience with vaccinating livestock in an endemic setting

Rift Valley Fever Workshop
An Integrated Approach to Controlling Rift Valley Fever in Africa and the Middle East
January 27-29 2009, Cairo, EGYPT

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INTRODUCTION

- Rift Valley Fever (RVF) is a viral haemorrhagic disease primarily of cattle, sheep, goats, camels, wildlife and humans
- Spread: - Aedes mosquitoes, other blood-sucking insects and through skin abrasions
- Virus persistence between outbreaks remains unclear
One of the most significant zoonotic disease problems in Africa

The haemorrhagic human disease syndrome generates a high degree of panic among the human populations at risk
Background

- 1900s: RVF first recognized as a disease in sheep in Rift Valley province, Kenya
- 1930: Virus isolated
- Intermittent outbreaks in Kenya
- 1950-51: A major epizootic
  - 500,000 sheep abortions
  - 100,000 sheep deaths
- 1997-98: Kenya, Africa
  - Largest outbreak reported
  - 89,000 humans cases - 478 deaths
Number of RVF outbreaks in Kenya from 1912-2002 (5-15 year cycles)
Control 1

- Vaccination
- Livestock movement controls – quarantines
- Stopping slaughter
- Vector control
- Livestock owners moving to high grounds with their animals
  - avoid areas with stagnant flood water that may host the vectors
Control 2

- First control measure that comes to mind in an outbreak—Vaccination
- Effective vaccination—before an outbreak
- RVF is usually already well-established in animal populations by the time the first human cases are observed. Control of RVF in livestock beforehand is key to control
Control 3

- Control window very small or none
- Vaccination became a challenge for the vets
  - Need to know extent of disease spread
  - Vaccinate only healthy animals
  - Avoid spread of RVF during vaccination
  - Numbers to be vaccinated
  - Availability of vaccine
  - Operational funds
  - Lack of an approved human vaccine
  - Personnel to carry out vaccination
2006-2007 outbreak in Kenya

- First detected in human in Garissa district in early December 2006
- Late December RVF was confirmed in Livestock in this district
- Appeared to spread by flare ups of endemic foci
- It occurred in several districts
- Local spread from initial outbreak – limited
  - Movement of infected animals- Reduction in transportation time has made this mode possible
Adjacent districts to known endemic foci areas - based on previous infections, areas ecologically conducive for vector habitation.
Vaccination during the outbreak

- Vaccinations were carried out in goats, sheep, cattle and camels
  - Started in January 2007 in the North Eastern Province
  - Later focus shifted to known endemic districts
  - A total of 2,550,300 doses of RVF vaccine were used in control efforts
  - Type of vaccine: Smithburn live attenuated vaccine
Vaccination during the outbreak

- Vaccination arrived too late for controlling the disease
- Aggravate the situation-
  - The repeated use of needles and other equipment during vaccination campaigns could actually help to spread the disease from infected to healthy animal
- Factors that contributed to vaccination in an outbreak situation—Political, public trust
1912-2002

FEBRUARY 2007

2/9/2009
2008 alert

- Vaccination for RVF was carried out alongside PPR vaccination
- Targeted areas where previous outbreaks had been confirmed
- A total of 1,078,414 sheep and goats vaccinated
Task for Kenya

- Enormous work in the control of RVF in Kenya
  - A few districts on the Western side, RVF not reported
  - Quantity of vaccines to be used in control quite big
  - Source of funding especially when there is no disease
  - Political goodwill
Challenges in vaccination

- Smithburn live attenuated vaccine used in Kenya-Provides good protection

- Challenges
  - causes abortion in a number of animals in early pregnancy- reluctant to use it
  - usually difficult, especially in the rural community, to determine when an animal is pregnant especially in early pregnancy
Challenges in vaccination

- Long run is a drop in productivity
- Personnel to carry out the vaccination
- Ready source of vaccine when needed
- Vaccination done only during outbreaks
- Control window very small
- Accessibility to the areas affected
Follow up after the 2006-2007 outbreak

- Technical Committee comprising stakeholders jointly chaired by DVS and DOPHS – meetings weekly initially, bimonthly later
- Weekly weather reports
- Draft contingency plan in place - need to be operationalised
- Surveillance alongside PPR surveillance
- Review of sentinel herds and locations
Placement of the Sentinel herds

- Important in early warning systems
  - Garissa
  - Ijara
  - Taita
  - Taveta
  - Nakuru
  - Machakos
  - Thika
  - Trans Nzoia

<table>
<thead>
<tr>
<th>Year</th>
<th>Vaccines doses issued</th>
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<tbody>
<tr>
<td>1997</td>
<td>0</td>
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<tr>
<td>1998</td>
<td>183,300</td>
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<tr>
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<td>11,600</td>
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<td>500</td>
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<td>2001</td>
<td>11,600</td>
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<td>2002</td>
<td>59,000</td>
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<tr>
<td>2003</td>
<td>8,900</td>
</tr>
<tr>
<td>2004</td>
<td>0</td>
</tr>
<tr>
<td>2005</td>
<td>20,000</td>
</tr>
<tr>
<td>2006</td>
<td>0</td>
</tr>
</tbody>
</table>
## Impact of 2006-2007 outbreak

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value (KSh)</th>
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<tbody>
<tr>
<td>Total herd meat loss due to RVF (20,237,829 kg)</td>
<td>1,251,909,117</td>
</tr>
<tr>
<td>Total milk loss due to RVF (21,134,520 litres)</td>
<td>221,912,460</td>
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<tr>
<td>Net losses to business actors</td>
<td>2,320,000,000</td>
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<td>Government expenditure in control measures</td>
<td>200,000,000</td>
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<tr>
<td><strong>TOTAL COST OF OUTBREAK</strong> (excluding value of human lives lost)</td>
<td><strong>3,993,821,577</strong></td>
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*Sources: Socioeconomic studies by VEEU and ILRI*
Public awareness in RVF control

![Bar chart showing sources of RVF information]

- Radio: 90% of respondents
- Television: 60% of respondents
- Animal health service providers: 50% of respondents
- Newspapers: 40% of respondents
- Neighbour/Friend: 30% of respondents
- Others: 20% of respondents
- Ministry of Health: 10% of respondents

RVF information Source

2/9/2009
Estimates of sequence of events after above normal rains

- The prediction of RVF provides a lead period of 2 months through which the following are expected:
  - 33 days from the start of rains vectors will have multiplied greatly and swarmed
  - 52 days from the start of rains the first livestock cases will be reported
  - 73 days from the start of rains, the first human cases will be reported
Vaccination only way out?

- Need to develop a
  - safer vaccine
  - Efficacious vaccine
  - Mass production
- smallholder livestock owners need
  - an affordable
  - accessible vaccine
    - Finances, cost effective vaccine
Vaccination only way out?

- Vaccine developers/manufacturers - let's look at the benefits of development of a better vaccine and not only the profits made
- Rapid pen-side test to test animals before vaccinating
- Vaccinate only before an outbreak
Conclusion

- Experts need to work together – work on RVF need to be harmonised
  - Research work
  - Vaccine development

- Lobbying for governments support on RVF activities during the inter-epidemic period
  - Funding
  - Emergency funds
  - Personnel
  - No political interference
REFERENCES

- Department of Veterinary Services-Kenya reports
Thank you