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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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**

- **1900:-** 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
- 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
- To be effective, vaccination must be done between outbreaks rather than during an outbreak
- RVF is usually already well-established in animal populations by the time the first human cases are observed. Hence, control of RVF in livestock beforehand is very important
Control 3

- Control window very small
- Vaccination became a challenge for the vets
  - Need to know extent of disease spread
  - Vaccinate only healthy animals
  - Avoid spread of RVF and other infections during vaccination
  - Numbers to be vaccinated
  - Availability of vaccine
  - Operational funds
  - Lack of an approved human vaccine
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
- Not known to spread by 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

- 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

- 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
# Impact of 2006-2007 outbreak

## Financial losses/gains attributed to RVF outbreak for the sample

<table>
<thead>
<tr>
<th></th>
<th>Average loss/gain per unit business (Ksh)</th>
<th>Number of businesses</th>
<th>Total loss (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Positive impacts</strong></td>
<td>606,794.0</td>
<td>17</td>
<td>10,315,500.00</td>
</tr>
<tr>
<td><strong>Negative impacts</strong></td>
<td>1,104,468.4</td>
<td>74</td>
<td>81,730,659.00</td>
</tr>
</tbody>
</table>

## Monthly numbers of livestock sold before and during the outbreak by traders and corresponding unit prices

<table>
<thead>
<tr>
<th>Livestock species</th>
<th>Number sold per day before</th>
<th>Number sold per day during</th>
<th>Unit Price (Ksh) before</th>
<th>Unit Price (Ksh) during</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheep/goats</td>
<td>335</td>
<td>162</td>
<td>1350</td>
<td>983</td>
</tr>
<tr>
<td>cattle</td>
<td>111</td>
<td>14</td>
<td>19500</td>
<td>147000</td>
</tr>
</tbody>
</table>
Current 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 is used in Kenya-Provides good protection

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

- Long run is a drop in productivity and more abortion occurring.
- People have been always reluctant to use it—abortions
- Not always ideal to use a vaccine in the middle of an outbreak because it is a preventative measure
- Ready source of vaccine when needed
- Control window very small
- Accessibility of 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
- Vaccination in late 2008
Placement of the Sentinel herds

- Important in early warning systems
- Established in 1999
  - Garissa
  - Ijara
  - Taita Taveta
  - Nakuru
  - Machakos
  - Thika
  - Trans Nzoia
- Criteria for selection
  - RVF ecological zone
  - Enough animals
  - Good Record keeping

<table>
<thead>
<tr>
<th>Year</th>
<th>Vaccines doses issued</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>0</td>
</tr>
<tr>
<td>1998</td>
<td>183,300</td>
</tr>
<tr>
<td>1999</td>
<td>11,600</td>
</tr>
<tr>
<td>2000</td>
<td>500</td>
</tr>
<tr>
<td>2001</td>
<td>11,600</td>
</tr>
<tr>
<td>2002</td>
<td>59,000</td>
</tr>
<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>
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</table>
Public awareness in RVF control

RVF information Source

Proportion of Respondents

Radio
Television
Animal health service providers
Newspapers
Neighbour/Friend
Others
Ministry of Health
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 and to mass produce it
  - Impact of disease on human life
  - Impact on the meat industry
- Smallholder livestock owners need an affordable and 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
- Vaccination only effective 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
  - No political interference
REFERENCES

- Department of Veterinary Services-Kenya reports
Thank you