Outbreaks of Rift Valley Fever in Uganda 2016-2018: Epidemiological and Laboratory Findings

• First RVF outbreak in Kabale Uganda after 50yrs
• 3 human cases PCR confirmed in March -June 2016
• All male, associated with contact with Livestock
• Had fever, vomiting, diarrhea, headache, hemorrhagic symptoms
• One RVF PCR-positive goat from village of confirmed case
• CFR=0%
RVF Sero-survey Follow-up Study: Objectives

1. To provide an estimate of the seroprevalence of RVF in animals and humans in Kabale district

2. To assess the risk factors for RVF seroprevalence

3. To assess the knowledge, attitudes, and practices regarding RVF
Methods-One Health Approach

• Sampled both humans and their animals (Cattle, Sheep and Goat)
  • Abattoirs/Slaughterhouse animals and workers
  • Farms
  • Villages in Kabale district and surrounding districts

• Collected blood from animals and humans
  • Animal: Anti-RVF IgG by ELISA
  • Human: Anti-RVF IgG and IgM by ELISA

• District staff conducted standardized interviews regarding knowledge, attitudes, and practice of RVF
Human and Livestock sampling
Human and Animal Serology Results

- **Humans**
  - 88/659 (13%) RVF seropositive
    - 3 (0.5%) IgM positive
    - 78 (12%) IgG positive
    - 7 (1%) IgM/IgG positive
  - All IgM positive cases were from outbreak villages

- **Animals**
  - 133/1051 (13%) RVF IgG positive over all (all sampled species)
    - 11 (16%) of 67 animals sampled at the abattoir were IgG positive
# Human Demographic Risk Factors

<table>
<thead>
<tr>
<th>Variable</th>
<th>RVF Seropositive</th>
<th>OR</th>
<th>P-value</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age Group</strong></td>
<td></td>
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</tr>
<tr>
<td>Age 7-19</td>
<td>0</td>
<td></td>
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</tr>
<tr>
<td>Age 20-49</td>
<td>66 (17%)</td>
<td>Ref</td>
<td>0.09</td>
<td>0.38-1.1</td>
</tr>
<tr>
<td>Age ≥50</td>
<td>22 (11%)</td>
<td>0.64</td>
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<tr>
<td><strong>Sex</strong></td>
<td></td>
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<tr>
<td>Female*</td>
<td>15 (7%)</td>
<td>Ref</td>
<td>0.2</td>
<td>0.81-2.9</td>
</tr>
<tr>
<td>Male*</td>
<td>71 (17%)</td>
<td>1.5</td>
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<tr>
<td><strong>Occupation</strong></td>
<td></td>
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</tr>
<tr>
<td>Other occupation**</td>
<td>20 (8%)</td>
<td>Ref</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Butcher**</td>
<td>40 (35%)</td>
<td>4.7</td>
<td>&lt;0.01</td>
<td>2.5-8.6</td>
</tr>
<tr>
<td>Farmer/Herdsm**</td>
<td>88 (13%)</td>
<td>0.94</td>
<td>0.8</td>
<td>0.51-1.7</td>
</tr>
</tbody>
</table>

*adjusting for occupation  **adjusting for gender
## Human Behavioral Risk Factors

<table>
<thead>
<tr>
<th>Activity</th>
<th>RVF Seropositive (%)</th>
<th>Unadjusted OR</th>
<th>P-value</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal Contact</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Milking</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Grazing</td>
<td>8 (11%)</td>
<td>0.74</td>
<td>0.5</td>
<td>0.3-1.6</td>
</tr>
<tr>
<td>Grooming</td>
<td>33 (9%)</td>
<td>0.32</td>
<td>&lt;0.01</td>
<td>0.2-0.5</td>
</tr>
<tr>
<td>Caring for sick</td>
<td>14 (11%)</td>
<td>0.68</td>
<td>0.22</td>
<td>0.4-1</td>
</tr>
<tr>
<td>Birth/fetus disposal</td>
<td>16 (14%)</td>
<td>1.03</td>
<td>0.9</td>
<td>0.6-2</td>
</tr>
<tr>
<td></td>
<td>30 (14%)</td>
<td>1.1</td>
<td>0.6</td>
<td>0.7-2</td>
</tr>
<tr>
<td>Meat Preparation</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Slaughtering/butchering</td>
<td>53 (22%)</td>
<td>3.5</td>
<td>&lt;0.01</td>
<td>2-6</td>
</tr>
<tr>
<td>Handling raw meat</td>
<td>71 (16%)</td>
<td>4.7</td>
<td>&lt;0.01</td>
<td>2-12</td>
</tr>
<tr>
<td>Raw milk consumption</td>
<td>4 (11%)</td>
<td>0.8</td>
<td>0.67</td>
<td>0.27-2.3</td>
</tr>
<tr>
<td>Raw meat consumption</td>
<td>5 (17%)</td>
<td>1.3</td>
<td>0.6</td>
<td>0.48-3.5</td>
</tr>
</tbody>
</table>
## Animal Serology Results

<table>
<thead>
<tr>
<th></th>
<th>Seropositive</th>
<th>Adjusted OR</th>
<th>P-Value</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Species</strong></td>
<td></td>
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<td></td>
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<tr>
<td>Sheep</td>
<td>7 (4%)</td>
<td>Ref</td>
<td>0.1</td>
<td>0.9-5</td>
</tr>
<tr>
<td>Goat</td>
<td>40 (7%)</td>
<td>1.6</td>
<td>&lt;0.01</td>
<td>0.5-2</td>
</tr>
<tr>
<td>Cattle</td>
<td>86 (27%)</td>
<td>5.2</td>
<td>&lt;0.01</td>
<td>0.9-5</td>
</tr>
<tr>
<td><strong>Age Group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infant</td>
<td>13 (6%)</td>
<td>Ref</td>
<td>0.9</td>
<td>0.5-2</td>
</tr>
<tr>
<td>Middle</td>
<td>14 (7%)</td>
<td>1.1</td>
<td>&lt;0.01</td>
<td>2-6</td>
</tr>
<tr>
<td>Adult</td>
<td>106 (17%)</td>
<td>3.0</td>
<td>&lt;0.01</td>
<td>2-6</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>10 (5%)</td>
<td>Ref</td>
<td>0.9</td>
<td>0.5-2</td>
</tr>
<tr>
<td>Female</td>
<td>121 (14%)</td>
<td>2.9</td>
<td>&lt;0.01</td>
<td>1-4</td>
</tr>
<tr>
<td><strong>Breed</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local Breed</td>
<td>86 (10%)</td>
<td>Ref</td>
<td>0.8</td>
<td>0.7-2</td>
</tr>
<tr>
<td>Other</td>
<td>47 (21%)</td>
<td>1.1</td>
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</tr>
</tbody>
</table>
Phylogenetic Analysis
Educational Campaign posters Designed
RVF Human case detections in 2017-Uganda

- Total human case count = 7
- Four (4) districts affected all from the cattle corridor of Uganda
- Between months of November –December 2017
- 86% (6/7) were Herdsmen by occupation, one forester
- All male, aged between 11-51 age, Median age 26
- CFR=43% (3/7)
RVF Human case detections in 2018-Uganda

- Total human cases = 26
- Thirteen (13) districts affected, 11/14 from the cattle corridor
- Reported in months of June –November 2018
- 70% (18/26) had contact with livestock, majority cattle keepers
- All male apart from one, aged between 15-63 age, Median age 34
- CFR = 50% (13/26)
Over all Incident RVF Human cases 2016-2018 Uganda

- Total human cases = 36
- Seventeen (17) districts affected, 13/17 from the cattle corridor
- 67% (24/36) detected in month June-July
- 75% (27/36) had contact with livestock
- 97% (35/36) are Male, aged between 11-63, median 34
- CFR=44% (16/36)
RVF Incident Cases by Month and Year of On-set (2016-2018)
Incident Human RVF Cases by Month

No. of Cases

Month

Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec
---|---|---|---|---|---|---|---|---|---|---|---
1  | 2  | 1  | 0  | 0  | 8  | 12 | 4  | 0  | 1  | 6  | 1  |
Uganda RVF Livestock Sero-survey 2017
Conclusions and Future Research

- Human cases of RVF are on increase in Uganda
- Contact with livestock is main mode of transmission to humans
- Role of mosquitoes in human infection needs to be investigated
- RVF prospective study on going
- RVF risk factor and emergence modeling started
- Health Education is key in the Control and Prevention of RVF in Uganda
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THANK YOU FOR LISTENING