THE ROLE OF LIVESTOCK IN THE EPIDEMIOLOGY OF SLEEPING SICKNESS IN TANZANIA

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HAT Risk areas in Tanzania

• Western: along the Ugalla ecosystem (Ugalla, Moyowosi, Katavi)

• Northern: along the Serengeti ecosystem (Serengeti, Maswa game reserves, Ngorongoro), Manyara and Tarangire

• Southern TZ (is a silent foci, no HAT cases recorded to date)

• NB: Recently reported case from Mkomazi NP
Transmission of HAT

- *T. b. rhodesiense* is zoonosis can be transmitted from vertebrates animals to humans

- Wild animals are reservoirs of the diseases

- It has been demonstrated in Uganda that Livestock play an important role in the epidemiology of HAT, - as reservoirs of human infective trypanosomes.

- Tsetse infestations in areas with wild animals make them prone to infection with human infective trypanosomes.
Factors for HAT in Tanzania

1. Extensive protected areas in Tanzania
   - Tsetse flies have mainly remained in National Parks and reserve areas + wild animals
   - Grazing of livestock in buffer zones & encroachment in the protected areas during dry season increases the risks of Trypanosomiasis (for both animals and human beings).
Factors for HAT in Tanzania

2. Climate change and changing landscapes
   • **Increased wildlife – livestock – human interactions due to:**
     • Movement and encroachment of animals in tsetse infested areas especially during dry season
   • Changes in land use plans
OBJECTIVE

• To assess the role of livestock in Tanzania in the transmission of HAT

NB: zoonotic diseases are better controlled in the animal reservoirs

Study sites

• Western zone: Ugalla ecosystem
• Northern zone: Serengeti ecosystem
• Southern zone: Rufiji (recipient of livestock from the north and western zones)
MATERIAL & METHODOLOGY

• Animals were bled and examined for trypanosomes in blood films and PCV determined
  – Microscopic/buffy coat, thick and thin blood smears

• Blood of positive animals was collected on FTA cards and DNA eluted (Boid et al, 1999) and analysed by ITS PCR (Adams et al, 2006)
  – animals with Packed cell Volume (PCV) less than 23 were also subjected to ITS PCR

• Screening during the onset of dry season 2009 to 2012

• Confirmatory test of human infectivity – SRA LAMP as described by Njiru et al., 2008
<table>
<thead>
<tr>
<th>Year</th>
<th>ZONE</th>
<th>ANIMALS</th>
<th>NO: SCREENED</th>
<th>+ve PARASITOL</th>
<th>ITS PCR T. brucei</th>
<th>OTHER TRYPS</th>
<th>SRA LAMP</th>
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</thead>
<tbody>
<tr>
<td>2009</td>
<td>SNP NORTH</td>
<td>Cattle</td>
<td>518</td>
<td>5</td>
<td>28</td>
<td>0</td>
<td>6/28</td>
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<tr>
<td>2010</td>
<td>SNP NORTH</td>
<td>Cattle</td>
<td>150</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0/3</td>
</tr>
<tr>
<td>2010</td>
<td>West</td>
<td>Cattle</td>
<td>574</td>
<td>34</td>
<td>66</td>
<td>52 (Tv), 6 (Tc)</td>
<td>30/66</td>
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<tr>
<td>2010</td>
<td>SNP NORTH</td>
<td>Cattle</td>
<td>150</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>5/5</td>
</tr>
<tr>
<td>2011</td>
<td>West</td>
<td>Cattle</td>
<td>190</td>
<td>7</td>
<td>51</td>
<td>1 (Tv)</td>
<td>0/51</td>
</tr>
<tr>
<td>2011</td>
<td>Southern</td>
<td>Cattle</td>
<td>202</td>
<td>4</td>
<td>33</td>
<td>0</td>
<td>0/33</td>
</tr>
<tr>
<td>2012</td>
<td>West</td>
<td>Cattle</td>
<td>101</td>
<td>6</td>
<td>17</td>
<td>1 (Tc)</td>
<td>0/17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1885</td>
<td>60 (3.2%)</td>
<td>203 (10.8%)</td>
<td>53 Tv (2.8%)</td>
<td>41 (2.2%)</td>
</tr>
</tbody>
</table>
PCR products in relation to trypanosome types

Gel picture showing various DNA bands of trypanosomes by ITS – PCR from some of the samples analysed. Numbers 4,5,14,17 are *T. congolense* savannah ~700 bp; 3,7,8,9,10,13,16 are *T. simiae* ~ 400bp; 10 and 19 are *T. savannah Tsavo* ~ 370 bp and 18 is *T. vivax* ~ 250 bp. No. 2 is positive control of *T. congolense* savannah control and 1 is negative control. M = 1 kb DNA ladder
SUMMARY: Prevalence of *T. brucei* types in cattle

<table>
<thead>
<tr>
<th>ZONE</th>
<th>TBR +ve (%)</th>
<th>SRA +ve (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NORTH</td>
<td>36/818 (40.9)</td>
<td>11/36 (30.6)</td>
</tr>
<tr>
<td>WEST</td>
<td>134/865 (15.5)</td>
<td>30/134 (22.4)</td>
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<tr>
<td>SOUTH</td>
<td>33/202 (16.3)</td>
<td>0/33(0%)</td>
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</table>
## Results: Other animals

<table>
<thead>
<tr>
<th>YEAR</th>
<th>ZONE</th>
<th>ANIMALS</th>
<th>NO. SCREENED</th>
<th>+ve PARASITOLOGICAL</th>
<th>+ve ITS PCR BRUCEI</th>
<th>SRA LAMP</th>
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<tbody>
<tr>
<td>2010</td>
<td>Western (UGALLA)</td>
<td>Goats</td>
<td>108</td>
<td>2/108</td>
<td>16/108</td>
<td>0/16</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dogs</td>
<td>21</td>
<td>1/21</td>
<td>4/11</td>
<td>0/4</td>
</tr>
<tr>
<td>2011</td>
<td>Southern</td>
<td>Goats</td>
<td>102</td>
<td>0</td>
<td>1/10*</td>
<td>0/10</td>
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<tr>
<td></td>
<td></td>
<td>Dogs</td>
<td>10</td>
<td>0</td>
<td>1/10*</td>
<td>0/10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sheep</td>
<td>85</td>
<td>0</td>
<td>2/6*</td>
<td>0/6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Donkeys</td>
<td>5</td>
<td>0</td>
<td>1/5*</td>
<td>0/5</td>
</tr>
</tbody>
</table>

* PCR analysed on animals showing clinical symptoms for trypanosomes
Positive SRA LAMP samples
Confirmation of SRA LAMP by electrophoresis
Summary of results & Discussions

• Only cattle were found to have the human infective trypanosomes:- from North and western zone, NONE from Southern Zone

• The positive results by SRA LAMP test (serum resistance associated genes) confirms the presence of infective trypanosomes that cause the *T. b. rhodesiense* form

• Northern and Western are still active for HAT transmission as confirmed with human infective trypanosomes in cattle
• Southern zone considered a silent foci however the threat of HAT can’t be ignored due to high prevalence of *T. brucei* in cattle, continual influx of animals from the northern regions. 

  Cattle could act as a vehicle of HAT to non HAT areas

• Control of the vector (tsetse), treatment of animals confirmed to have trypanosomiasis is important to curb the spread of HAT

• Collaboration of Multidisciplinary teams to curb zoonotic diseases in reservoir animals is important
Way forward

• More research on the role of small ruminants in the epidemiology of HAT in Tanzania
ACKNOWLEDGMENT

ISTRC

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WHO/TDR

Government of SUDAN
THANK YOU!