A cost-benefit analysis of tsetse eradication in the Niayes area of Senegal

F. Bouyer, A. Dicko, M.T. Seck, B. Sall, M. Lo, M. Vreysen, J. Bouyer, E. Chia, A. Wane
AAT context in the Niayes area

- AAT = main constraint to innovation and increased productivity in cattle rearing systems (cattle breeds)
- Good climatic conditions for production / important consumption basin/ human resources (private and public)
- Tsetse eradication in the Niayes area = intervention of the government to create a suitable sanitary context for innovation
Costs of the eradication project

- Costs evaluated to ~ 5.7 Millions euros until 2016

- As recommended by A. Shaw (2013), this cost include the following items:
  - Preliminary surveys (feasibility study)
  - Field operational costs (equipment and monitoring)
  - Administrative costs and overheads (human resources and management).
Ex ante evaluation of the benefits

702 farms georeferenced by the vet services (~50% of the existing farms in the study area)

277 farms (39%) surveyed by the vet services in 2010 using a socio-economic questionnaire including herd compositions, sales and main diseases and treatments
Sociological, economic and technical data concerning the farms

- Household: sociological organization in relation with the farming activity
- Structure and equipment of the farm
- Composition of the herd by species with a special focus on cattle (composition by breed, sex, age, reproductive performances)
- Commercial sales by species (last year)
- Sanitary constraints and expenses by disease
Analysis of benefits

- Comparison of herd dynamics and sales in relation to AAT risk (case-control study) with two simple hypothesis:
  - One single cattle rearing system in the study area
  - No innovation after the eradication project
# Milk production

<table>
<thead>
<tr>
<th></th>
<th>Nb farms</th>
<th>Price of milk (€ per L)</th>
<th>Annual milk production (L)</th>
<th>Sales per farm(€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without AAT risk</td>
<td>176</td>
<td>0.72</td>
<td>5419</td>
<td>3924</td>
</tr>
<tr>
<td>With AAT risk</td>
<td>80</td>
<td>0.66</td>
<td>3646</td>
<td>2423</td>
</tr>
</tbody>
</table>

-38%
## Meat production

<table>
<thead>
<tr>
<th></th>
<th>Nb farms</th>
<th>Nb animals sold</th>
<th>Average weight</th>
<th>Average price per animal</th>
<th>Sales per farm (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without AAT risk</td>
<td>176</td>
<td>7</td>
<td>188</td>
<td>451</td>
<td>3267</td>
</tr>
<tr>
<td>With AAT risk</td>
<td>80</td>
<td>4</td>
<td>147</td>
<td>268</td>
<td>1165</td>
</tr>
</tbody>
</table>

-64%
Total benefits

Benefits of 1.3 Millions euros yearly
Payback period of 8 years
Internal rate of return of 16%
33% increase of the herders 'income
Heterogenous distribution of breeds and farming systems

Distribution of cattle breeds in relation with the risk status of the area
Perspectives to improve the cost-benefit study

- Characterization of the breeding systems
- Case studies of ~10 farms to understand farmer perceptions & innovation trajectories
- Ex post questionnaire study to quantify variations in sales and herd dynamics
Multifactorial analysis:
- Size of the herd
- Proportion of breeds (djakoré / gobra / exotic or cross-bred)
- Nomadic grazing
- Daily animal care (by the owner or his family/employees)
- Surface area of crops

Typology of the cattle breeding systems

Cluster Dendrogram

- Businessmen farmers (16%)
- Traditional breeders of Gobras (20%)
- Traditional breeders of Djakorés (64%)
Which innovation trajectories?

- Case study: essential qualitative step to increase the relevance and reliability of the collected data for studying the dynamics and the determining factors of evolution/innovation

Tsetse eradication

- Traditional Djakoré
- Traditional Gobra

Innovation scenario

- Modern
Preliminary results

Perception of the eradication project

- Farmers already perceived a reduction of AAT incidence (notation matrixes) but did not attribute it to the project

Impact of the control project: monitoring of AAT incidence (source: R. Lancelot)
Preliminary results / Herd composition

- Integration of the sanitary risk in the choice of cattle breeds: global approach integrating benefits/ drawback
- Strong adaptation hability to new constraints (plastic bags, roberies...)
- Oppositions between traditionnal rules / productivity requirements

2010

2013

Exemple of the dynamys of a Thiossan herd (gobras)
Conclusion

• Benefits of the campaign already huge without any innovation
• Change in sanitary context already perceived -> strong innovation anticipated
• Diversity and dynamics of production systems: use of sociological methods necessary
• Necessity to characterize the full socio-technical networks and not the production systems only : innovation is not an individual process (ex: problems of land insecurity, markets, ...)
Thanks!