Costs and benefits of animal identification and recording for animal health

Cees de Haan
Overview

• Introduction
  – Why economic evaluation of animal health interventions; and
  – Short summary of history of animal health economics and current knowledge, with some examples of economics of disease control/eradication measures.

• Cost
  – Methods, cost structure, distribution;

• Benefits
  – Direct and indirect, methods; and

• Some tentative examples on C/B for AIR for animal health (theft);

• Drivers of adoption; and

• Influencing decision makers.
ECONOMICS OF DISEASE CONTROL/ERADICATION
Why economic evaluation of animal health investments

• Provide options to decision makers regarding:
  – Priority disease identification;
  – Disease management strategies:
    • Eradication vs control, regionalization, to AIR or not to AIR;
    • B/C of avoiding disease and the cost of doing nothing.

• But not only the highest return on investment is determining factor:
  – Equity and other distribution effects;
    • Value chain actors, poor vs. better-off producers and consumers.
History of economic evaluation of animal health interventions

• Seventies and eighties:
  – Focus on cost-benefits combined with herd dynamic models estimating direct benefits (VEERU/Massey);
• Eighties and nineties:
  – Greater variety of tools: decision trees, linear programming, disease simulations, willingness to pay (Davis);
  – Intensive production systems, risk analysis (Wageningen)
• More recent:
  – Decision making processes on control options (Brisbane); and
  – Tick borne diseases and food safety (ILRI).
• **Now full set of tools available, also for ex-ante. Issue is data availability**

Some examples of Benefit/Cost estimates

<table>
<thead>
<tr>
<th>Country/region</th>
<th>Benefit/Cost ratio (IRR)</th>
<th>Key driving factors</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rinderpest</td>
<td>1.1-3.9 (11%-118%)</td>
<td>Livestock density</td>
<td>Tambi et al (1999)</td>
</tr>
<tr>
<td>Tsetse</td>
<td>2.6-5.0</td>
<td>Extra carrying capacity</td>
<td>Putt and Shaw (1982)</td>
</tr>
<tr>
<td>FMD</td>
<td>1.6-12</td>
<td>Time to eradicate and export</td>
<td>Randolph et al (2002)</td>
</tr>
<tr>
<td>ECF (ITM)</td>
<td>9-17</td>
<td>Costs of stabilate and delivery</td>
<td>IFAD and others</td>
</tr>
</tbody>
</table>
Conclusions on B/C

• Highly variable outcomes depending on:
  – Delivery costs/livestock density and structure of the sector;
  – Estimation of the benefits;
    • Direct, indirect, assumptions on market behavior, time to achieve control/eradication;
  – Possible economies of scale.

• But generally a favorable return on investments.

• Why is this not better known??
Economics of AIR in disease control/eradication

Unchartered territory
Factors defining costs

• Purpose:
  – Why AIR and what are the risks is essential to define the scope of traceability
    • All species vs single species
    • Single eartag vs dual RFID tags
    • Basic unit (animal, herd, community, region, country)

• Phasing
  – Starting small;

• Physical infrastructure adjustments needed; and

• Economies of scale.
Benefits from AIR for Health Improvement

• Direct:
  – Reduction in control costs and mortality and morbidity from trans-boundary disease incidence;
  – Higher prices because of access to more remunerative markets;
    • But export no panacea
  – Safer food because of traceability.

• Indirect:
  – Employment generation in value chain
  – Reduced Greenhouse Gas Emission

• Methodology: sub-samples
Average emission intensities for cattle (kg CO2-e/kg protein) - including males fattened in humid zones -

Source: FAO/World Bank
Some very tentative projections

• Use on ECO-RUM model to estimate benefits and IRR at farm level
• Assumptions:
  – Traditional (pastoral herd)
  – Cost varying from US$ 1-US$ 4/head
  – All animals identified;
  – Simulations with different increases in off-take and one simulation with theft prevention;
• Question: Is it attractive to the producer
Impact of cost of AIR/head on IRR for health improvement and theft prevention at farm level (100 animal traditional pastoral herd)

<table>
<thead>
<tr>
<th>Cost of Identification/head</th>
<th>Assumed increase in offtake</th>
<th>5 year projections</th>
<th>20 year projections</th>
<th>With theft prevention (0.5 animal/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1</td>
<td>1%</td>
<td>-12%</td>
<td>21%</td>
<td>N/A</td>
</tr>
<tr>
<td>$4</td>
<td>2%</td>
<td>-53%</td>
<td>-2%</td>
<td>41%</td>
</tr>
<tr>
<td>$4</td>
<td>3%</td>
<td>-29%</td>
<td>12%</td>
<td>57%</td>
</tr>
<tr>
<td>$4</td>
<td>4%</td>
<td>-13%</td>
<td>21%</td>
<td>74%</td>
</tr>
</tbody>
</table>

Three comments: (a) importance of time frame; (b) significant increase in offtake needed; and (c) high returns of theft prevention
Distribution of costs along the chain

![Bar chart showing distribution of costs along the chain.](chart.png)

- EU Small
- EU large
- US Beef Bookend
- US beef full tracing
- Commercial beef operation Africa
## Adoption drivers

<table>
<thead>
<tr>
<th>Livestock systems</th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reduced incidence trans-boundary diseases</td>
<td>Fear of AIR used for other public purposes</td>
</tr>
<tr>
<td></td>
<td>Increase price</td>
<td>Other social constraints</td>
</tr>
<tr>
<td></td>
<td>Enhanced food safety</td>
<td></td>
</tr>
<tr>
<td>Small Nomadic</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>Large nomadic</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Export oriented beef cattle</td>
<td>+++</td>
<td>+</td>
</tr>
</tbody>
</table>

FAO/ICAR Symposium Pretoria 14-17 April
Addressing the drivers

- Define the nature of AIR services provided

<table>
<thead>
<tr>
<th>Public good</th>
<th>Private good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumption doesn’t reduce availability others</td>
<td>Owner can exclusively exercise property right and capture benefits</td>
</tr>
<tr>
<td>Nobody can be excluded</td>
<td></td>
</tr>
<tr>
<td>“Free riders”</td>
<td></td>
</tr>
<tr>
<td>Control trans-boundary diseases</td>
<td>Clinical services, Performance recording</td>
</tr>
<tr>
<td>Tracking for theft</td>
<td></td>
</tr>
</tbody>
</table>

- Control trans-boundary diseases generally considered (international) public good
Addressing the drivers (2)

• The equity issue:
  – Producer pays most, and in particular smallholder benefits less;
  – Need for cross-sectoral and cross wealth group transfers and subsidies.

• The social constraints:
  – Need for fully inclusive interaction with all stakeholders
Convincing sources of funding

- Governments
  - Cost/benefits levels compared to other investments;
  - Food safety, in particular in times of crisis
    - But fickle
- Donors
  - Reduction of international externalities
    - GHG, disease outbreaks in OECD countries, trade
  - Poverty reduction;
  - Sustainability; and
  - But time-bound.
- Commercial partners
  - Consumer power!!!
  - But charging back to producers?
Conclusions

• Cost are high, and benefit long term therefore:
  – Purpose should be well defined;
  – Integrated approach, but phased;
  – Ex ante Cost/benefit projections should be realistic, with major attention to what is in over the medium term for the producer.

• Permanent support is needed:
  – Need to convince public institutions on public good element;

• Need to come to equitable distribution of costs, related to benefits.
THANK YOU AND GOOD LUCK