ECONOMIC EVALUATION OF FMD MANAGEMENT OPTIONS

IMPLICATIONS FOR SCIENCE AND POLICY

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Socio-economic effects of FMD and its control

• are determined by:

1. the probability of occurrence of an outbreak in one or more MS’s,

2. and the economic effects of
   a. the outbreak (the size and duration of the outbreak) and
   b. the control measures taken by Competent Authorities and

3. the reaction of stakeholders/public and trade partners.
The probability of occurrence of an outbreak in one or more MS’s
Export of Agricultural products

$0.00
$200.00
$400.00
$600.00
$800.00
$1,000.00
$1,200.00
$1,400.00
$1,600.00
$1,800.00

Billions

1980 1990 2000 2010

Source: WTO, international trade statistics (2012)
Current prices
The economic effects of the outbreak and the control measures taken by Competent Authorities
Control of FMD in the EU

- Prophylactic vaccination in EU has been banned in the EU since 1992 (Directive 90/423/EEC)
- EU minimal measures:
  - culling of infected herds,
  - pre-emptive slaughter of contact herds,
  - establishment of control and surveillance zones
- Additional measures:
  - Ring culling and/or
  - Emergency vaccination
    - Delayed culling
    - Vaccination to live
2001 FMD outbreak in NL

- EU minimal measures:
  - culling of infected herds,
  - pre-emptive slaughter of contact herds,
  - establishment of control and surveillance zones

- Additional measures:
  - Ring culling and/or
  - Emergency vaccination
    - Delayed culling
    - Vaccination to live
2001 FMD outbreak in NL

- 26 outbreaks were detected.
- All susceptible animals on approximately 1800 farms were vaccinated. All farms subsequently were depopulated.
- In total, approximately 260,000 animals were killed.

Economic effects of the outbreak

• Direct costs:
  – Compensation for depopulated animals
  – Depopulation (taxation, culling, transport & destruction, cleansing & disinfection)
  – Tracing
  – Screening
  – Vaccination
  – Additional surveillance in movement restriction zone

• Indirect costs Business interruption
  – Losses related to established movement restriction zones
  – Repopulation of the farm.
  – Losses from emergency vaccination
Economic effects of an outbreak

- **Direct costs:**
  - Compensation for depopulated animals
  - Depopulation (taxation, culling, transport & destruction, cleansing & disinfection)
  - Tracing
  - Screening
  - Vaccination
  - (Additional surveillance in movement restriction zone)

- **Indirect costs**
  - Business interruption
  - Losses related to established movement restriction zones
  - Repopulation of the farm.
  - Losses from emergency vaccination

*Costs born by government (or PPP) & 60% by EU*

*Costs born by directly affected farmers*
Consequential losses

- Export market losses
- Ripple effects.
  - upstream and downstream along the livestock value chain
- Spill-over effects.
  - During outbreaks e.g. tourism and other services
Export market losses

- The costs of animals and products, that because of an outbreak cannot be exported.
  - During the outbreak and after completion of screening until EU lifts export bans
  - After this period, this concerned the third countries market for live animals, meat, meat products, milk and milk products from infected countries/compartments for another 3 months without vaccination and for another 6 months with vaccination-to-live. (OIE terrestrial code article 8.5.8)
  - (Are markets after this period still available as before the outbreak?)
The world

Source: worldmapper.org
Meat exports

Source: worldmapper.org
Dairy exports

Source: worldmapper.org
Export to countries outside the EU

<table>
<thead>
<tr>
<th>Export value pig meat (2006) Million€</th>
<th>NL</th>
<th>DK</th>
<th>DE</th>
</tr>
</thead>
<tbody>
<tr>
<td>total</td>
<td>1767</td>
<td>3333</td>
<td>2458</td>
</tr>
<tr>
<td>intra EU</td>
<td>1543</td>
<td>2115</td>
<td>2200</td>
</tr>
<tr>
<td>extra EU</td>
<td>224</td>
<td>1218</td>
<td>257</td>
</tr>
<tr>
<td>fraction extra EU</td>
<td>13%</td>
<td>37%</td>
<td>10%</td>
</tr>
</tbody>
</table>

De Winter et al, LEI 2010
Social concern-The reaction of stakeholders/public and trade partners
Costs of the 2001 FMD outbreak in NL

- Total for Dutch society: €900 million or 0.3% GNP
  - Direct costs: €90 million
e.g. enforcement costs, compensation of culled animals, screening etc. (had to be borne by the government)
  - Farmers (Indirect and export market losses): €320 million
  - Other parts of the livestock chain: €215 million
  - Tourism and recreation sector: €275 million

Source (CPB 2001 cited by Huirne et al., 2002)
Payments by the EU Emergency Fund (1997-2009)

• Total payments by Emergency fund in this period:
  – 1,109 million €
ECONOMICS OF THE ERADICATION OF FOOT-AND-MOUTH DISEASE EPIDEMICS WITH A VACCINATION TO LIVE STRATEGY

• What has changed in the NL?
  – No more images of large scale culling of animals
  – Society is closely monitoring what is happening
  – No welfare slaughter with destruction but welfare slaughter with animals and products made available for consumption
  – Vaccination to live strategy
Approach

Policy makers

Economic evaluation

Epidemiological modelling

transfer rate from S
transfer rate from I

S_t
I_t
R_t
Methodology (1) Definition of investigated policy options / Control strategies:

The following strategies were evaluated:

1. EU basic strategy: EU minimal measures
2. EU basic strategy + Culling in 1 km around infected farms
3. EU basic strategy + Vaccination with radius of 2 or 5 km around infected farms (culling 1st week)
Farm densities 2006

Cattle
37,000 farms
3.7 mln animals

Sheep
18,000 farms
1.5 mln animals

Pigs
9,000 farms
11 mln animals
Start of the outbreak
Methodology (2)

Epidemiological modelling

Backer et al, 2008, EU FMD conference
Methodology (3) Economic assessment
When vaccination-to-live strategy is applied

- Products of vaccinated animals produced *during* the outbreak: no difference with other animals in control and surveillance zones
- Products of vaccinated animals still present *after* the end of the outbreak until declared officially free:
  - Logistic processing and sub-optimal value
  - Market acceptance: products restricted to Dutch market
Estimated Average value loss due to lower revenues and logistic processing of vaccinated animals (in € per vaccinated animal).

<table>
<thead>
<tr>
<th>Category</th>
<th>Value loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy cows</td>
<td>450 €/animal</td>
</tr>
<tr>
<td>Young stock</td>
<td>5 €/animal</td>
</tr>
<tr>
<td>Veal calves</td>
<td>550 €/animal</td>
</tr>
<tr>
<td>Other cattle</td>
<td>26 €/animal</td>
</tr>
<tr>
<td>Sows</td>
<td>260 €/animal</td>
</tr>
<tr>
<td>Fattening pigs</td>
<td>50 €/animal</td>
</tr>
<tr>
<td>Sheep</td>
<td>34 €/animal</td>
</tr>
</tbody>
</table>
FMD PDLA (>4 farms/km²): Gelderse vallei

<table>
<thead>
<tr>
<th></th>
<th>NUMBER OF CULLED FARMS</th>
<th>LAST WEEK OF DETECTION</th>
<th>TOTAL COSTS INCL COSTS OF OPERATION (in M€)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>cul1</td>
<td>971 (206-3217)</td>
<td>9 (4-15)</td>
<td>236 (94-615)</td>
</tr>
<tr>
<td>vac2</td>
<td>260 (70-707)</td>
<td>10 (5-17)</td>
<td>227 (99-526)</td>
</tr>
<tr>
<td>vac5</td>
<td>230 (68-571)</td>
<td>6 (4-11)</td>
<td>228 (106-504)</td>
</tr>
</tbody>
</table>
Distribution of costs (median DPLA)

Culling 1 km
- culling + disinfection infected farms: 30%
- culled animals infected farms: 34%
- repopulation infected farms: 7%
- transport prohibition non-infected farms: 4%
- empty housing infected farms: 5%
- market & export loss: 14%

Vaccination 2 km
- market & export loss: 23%
- value loss vaccinated animals in NL: 34%
- empty housing non-infected farms in infected compartments: 6%
- logistic slaughtering vaccinated animals: 1%
- destroyed feed + milk infected farms: 1%
- culling + disinfection infected farms: 9%
- culled animals infected farms: 11%
- empty housing infected farms: 2%
- re-population infected farms: 2%
- transport prohibition on-infected farms: 0%
- logistic slaughtering vaccinated animals: 0%
Distribution of costs

Culling 1 km

- Culling + disinfection infected farms: 31.0%
- Culled animals infected farms: 34%
- Repopulation infected farms: 7%
- Transport prohibition non-infected farms: 4%
- Empty housing infected farms: 5%
- Market & export loss: 14%
- Destructed feed + milk infected farms: 2%
- Value loss vaccinated animals in NL: 0%
- Logistic slaughtering vaccinated animals: 0%
- Empty housing

Vaccination 2 km

- Culled animals infected farms: 13%
- Destructed feed + milk infected farms: 1%
- Value loss vaccinated animals in NL: 58%
- Empty housing non-infected farms in infected compartments: 6%
- Logistic slaughtering vaccinated animals: 1%
- Repopulation infected farms: 2%
- Transport prohibition on-infected farms: 6%
- Empty housing infected farms: 2%
- Market & export loss: 23%
Implications for policy and research

1. Reduce the probability of occurrence of an outbreak in one or more MS’s,
   1. → preventive measures
   2. → public Private Partnerships
Share responsibility and costs between public and private sector (the PPP)

- All farmers pay a levy to the compensation scheme.
- Sharing responsibility between government and stakeholders has to be established before decisions on cost sharing can be defined.
  - Provides incentives for farmers to stimulate behavioural changes.
  - Should impose biosecurity standards/quality assurance.
  - Determining an appropriate base for cost sharing is a highly complex matter (no “one size fits all” solution).
  - Should adequately consider national and regional differences
  - Should be based on a EU set of basic requirements (and preferably recognized by the EU).
  - Example is Dutch Animal Health Fund
Animal health fund

- Covenant of the Ministry of LNV with the Commodity Boards Cattle, Pigs, Poultry, Sheep and Goats
- Covenant for financing outbreaks of animal disease
  - Covers payments of the costs of outbreaks of contagious animal diseases designated by the Dutch government.
  - The expenses for legal control of contagious animal diseases.
  - Maximal contribution of different livestock sectors in 5 year period
Implications for policy and research (2)

- Research indicates that vaccination-to-live is alternative for large scale culling
- Support with epi- and eco-models to continuous update during an outbreak
- Harmonisation of regulation vaccination-to-live with culling or vaccination as delayed culling
- Challenge is to put experiences from the past into perspective of the 21st century
Conclusions

- Economic evaluation of different FMD management options:
  - should be based on universal principles,
  - need to be tailored to local circumstances in discussion with stakeholders,
  - is likely to result in different solutions for different countries e.g. due to difference in livestock population density, trade patterns or acceptance of product originating from vaccinated animals, and
  - should be supported by epidemiological and economic models
  - SHOULD BE PART OF THE DECISION MAKING PROCESS.
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