

ECONOMIC EVALUATION OF FMD MANAGEMENT OPTIONS

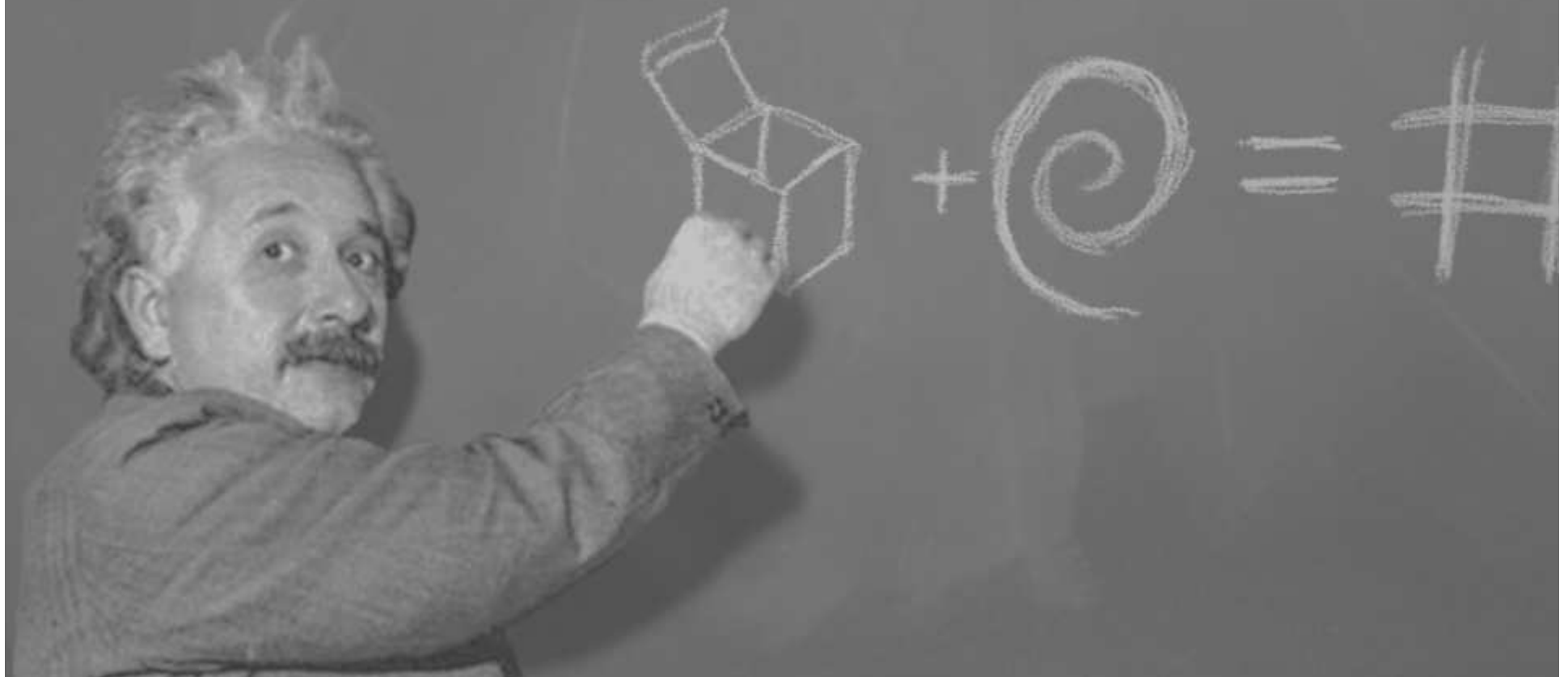
IMPLICATIONS FOR SCIENCE AND POLICY

Ron Bergevoet and Marcel van Asseldonk

Ron.Bergevoet@wur.nl



"The equation"



$$C_{av} = (1-p) * C_{\text{no outbreak}} + p * C_{\text{outbreak}}$$

C_{av} = average annual costs of FMD

p = probability of an outbreak

$C_{\text{no outbreak}}$ = $C_{\text{annual surveillance}}$

C_{outbreak} = $C_{\text{direct}} + C_{\text{control}} + C_{\text{trade}}$

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,

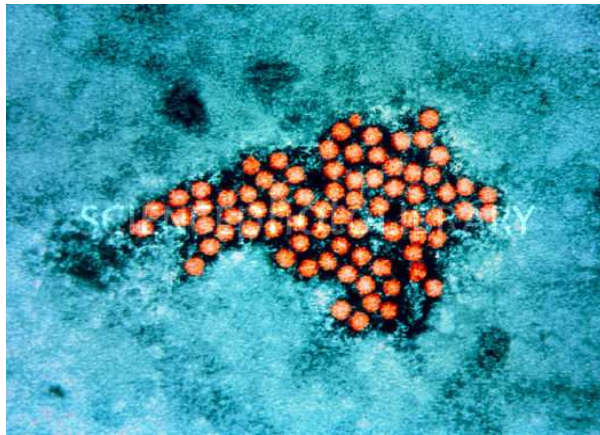
2. and the economic effects of

- a. the outbreak (the size and duration of the outbreak) and

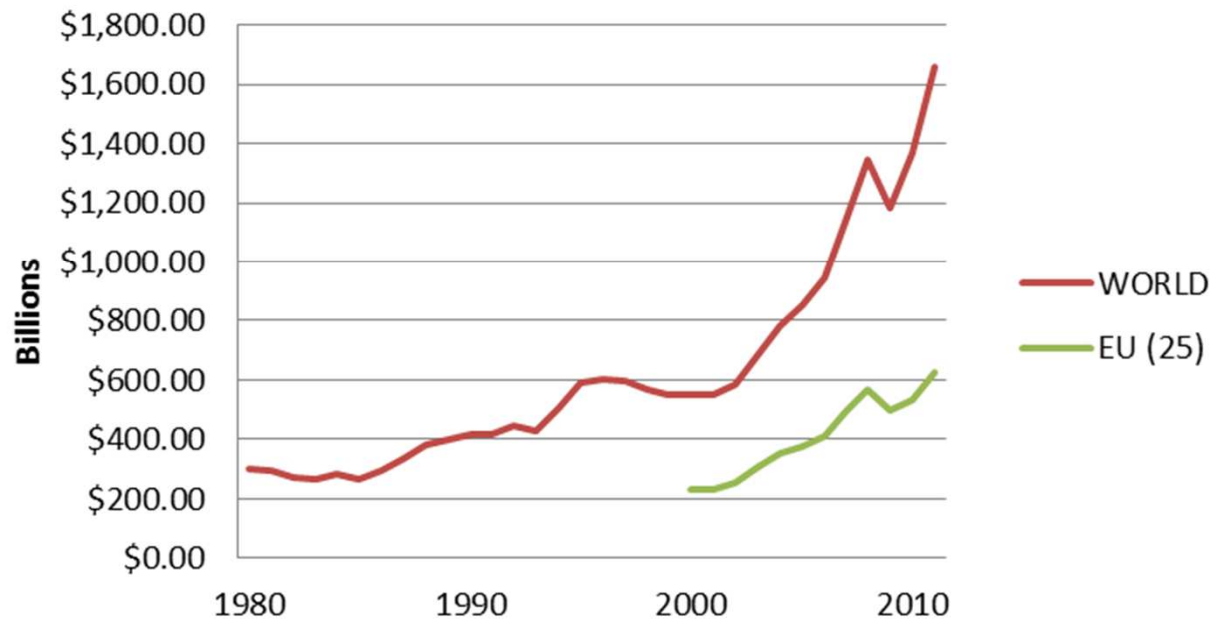
- b. the control measures taken by Competent Authorities and

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



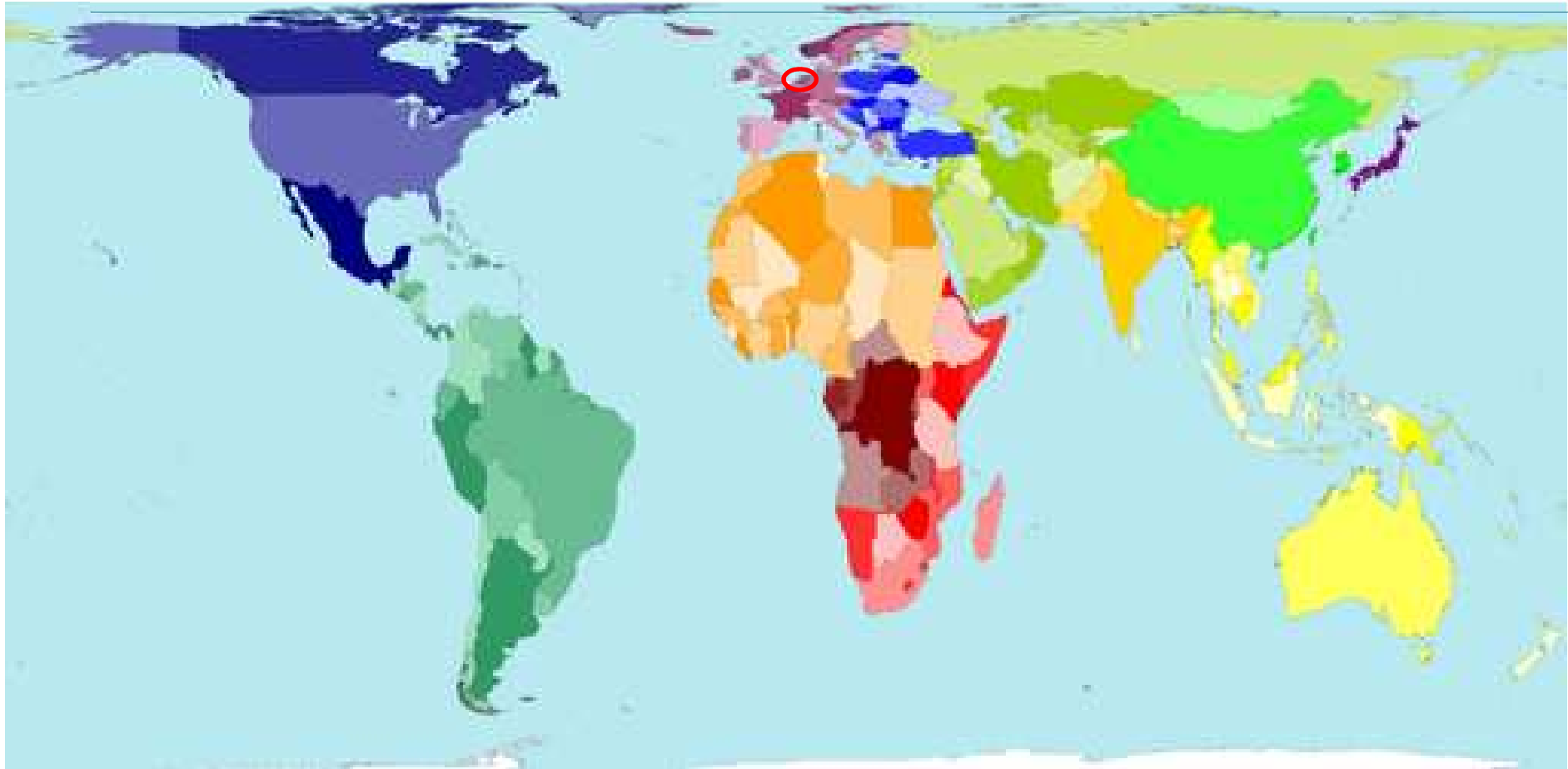
Source: WTO, international trade statistics (2012)
Current prices

Risky Trade

Infectious Disease
in the Era of
Global Trade

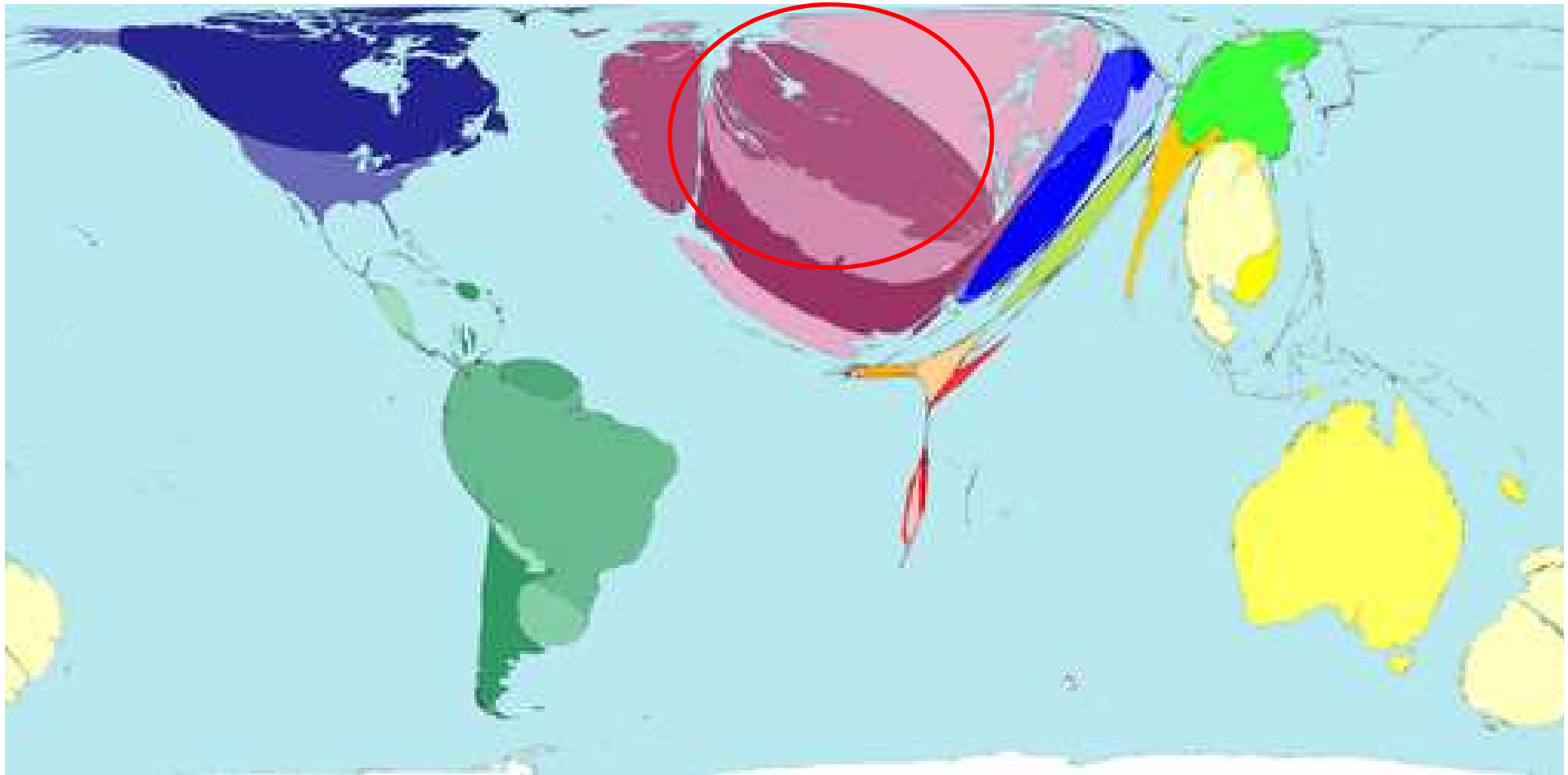
Ann Marie Kimball

The world



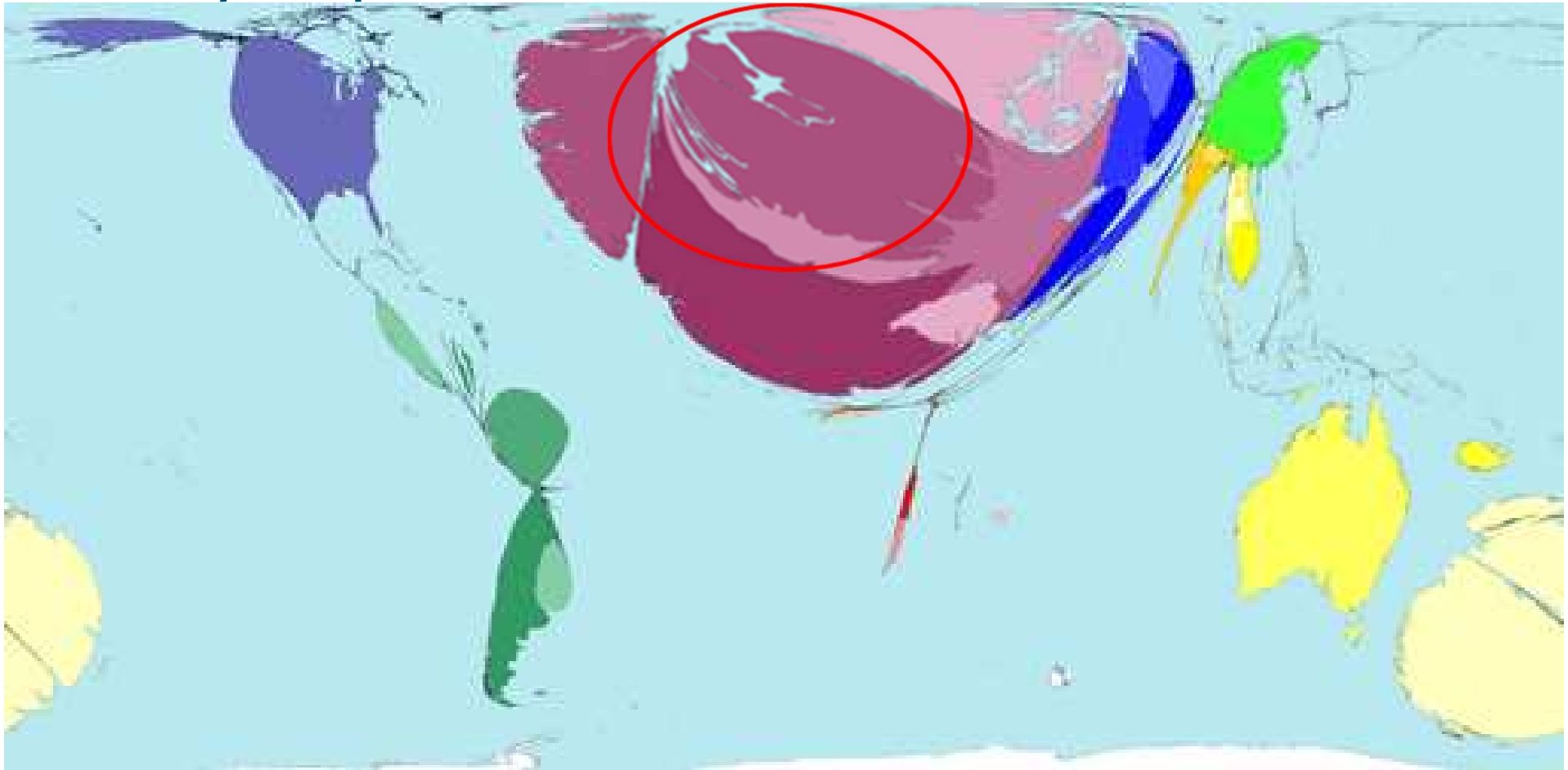
Worldmapper.org

Meat exports



Worldmapper.org

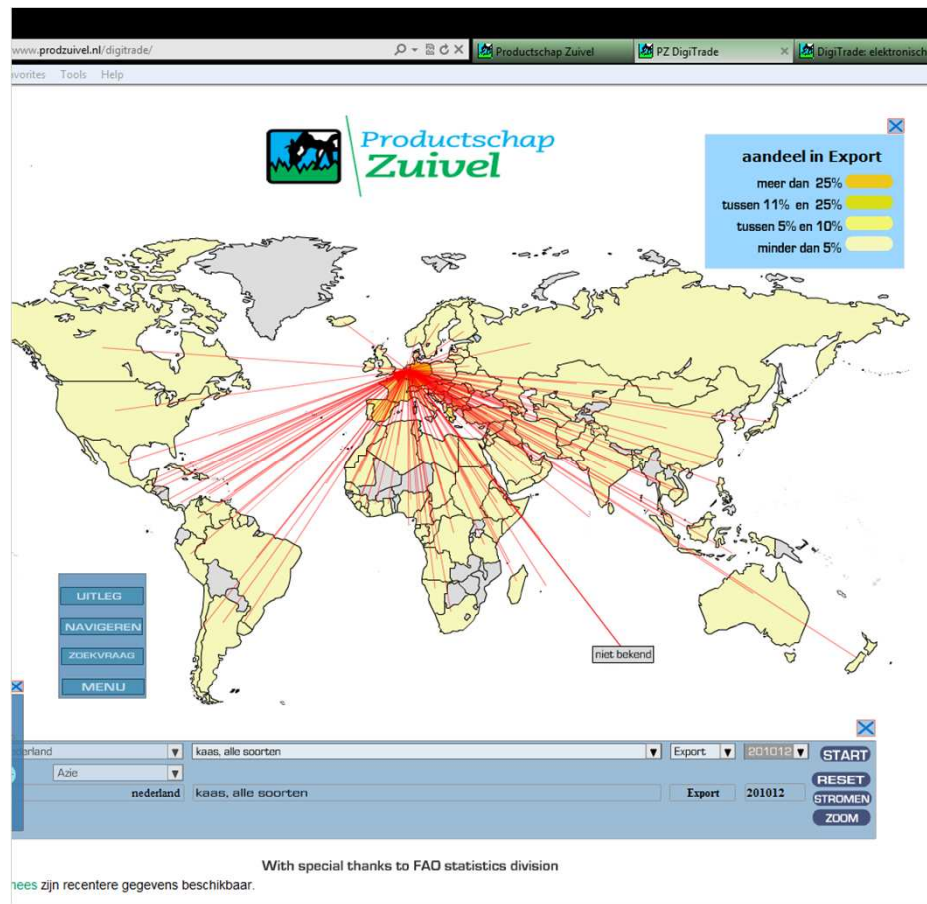
Dairy exports



Worldmapper.org

Export to countries outside the EU

Export of Cheese from the Netherlands



Export value pig meat (2006) Million€

	NL	DK	DE
total	1767	3333	2458
intra EU	1543	2115	2200
extra EU	224	1218	257
fraction extra EU	13%	37%	10%

The economic effects of the outbreak and the control measures taken by Competent Authorities



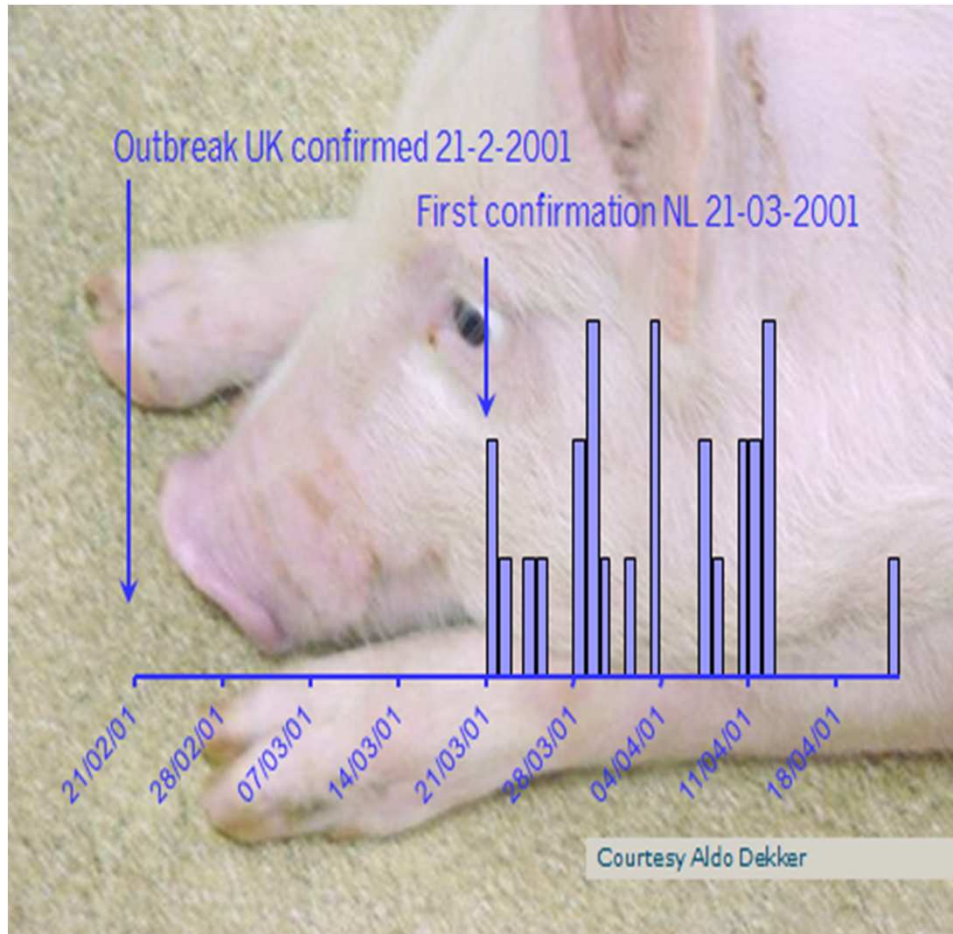
Control of FMD in the EU

- 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.

(Bouma, et. al., Prev Vet Med. 2003, 20; 57 (3) :155-66.)

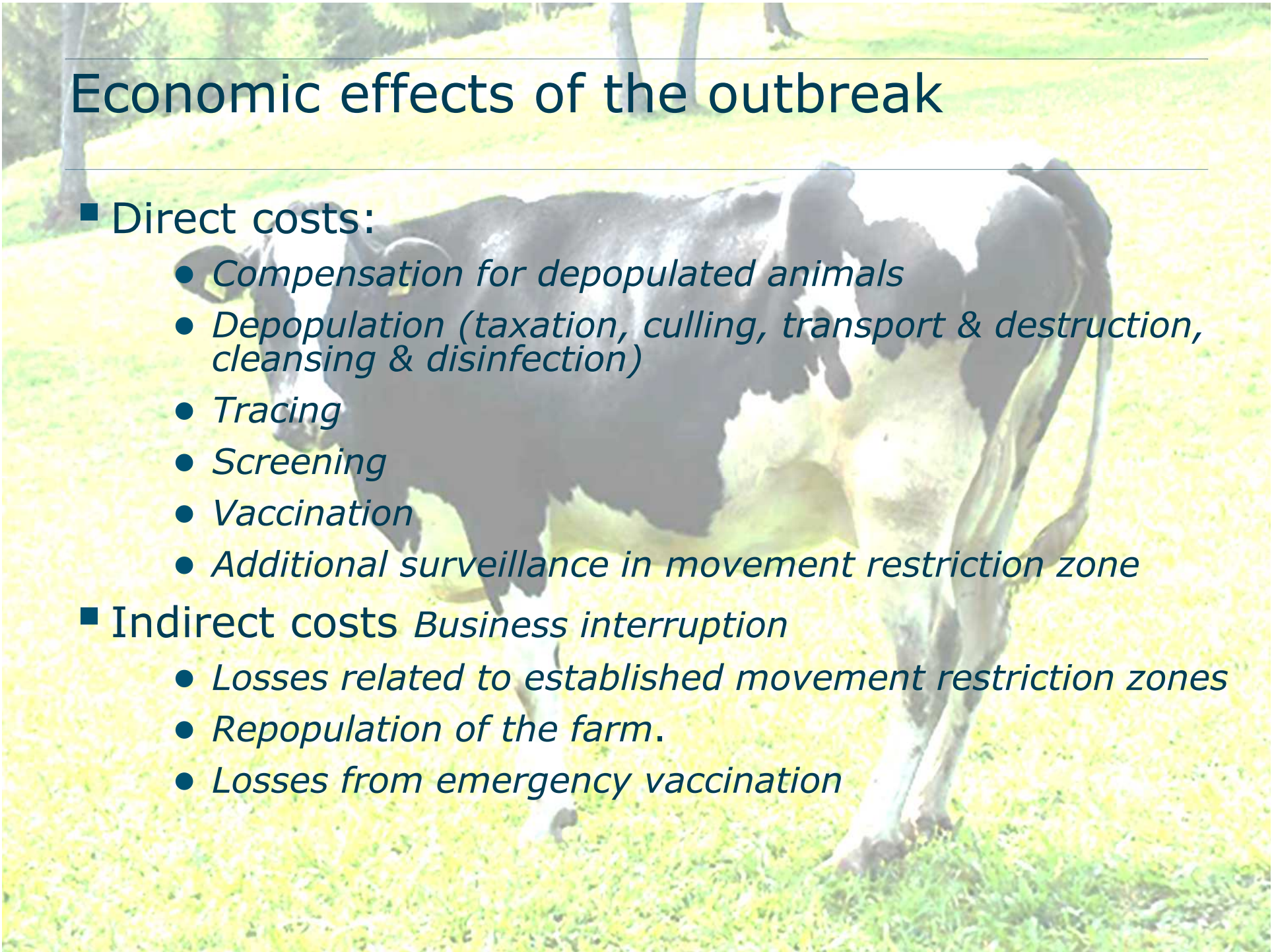
Economic effects of the outbreak

■ 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:

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

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

■ Indirect costs

Costs born by directly
affected farmers

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

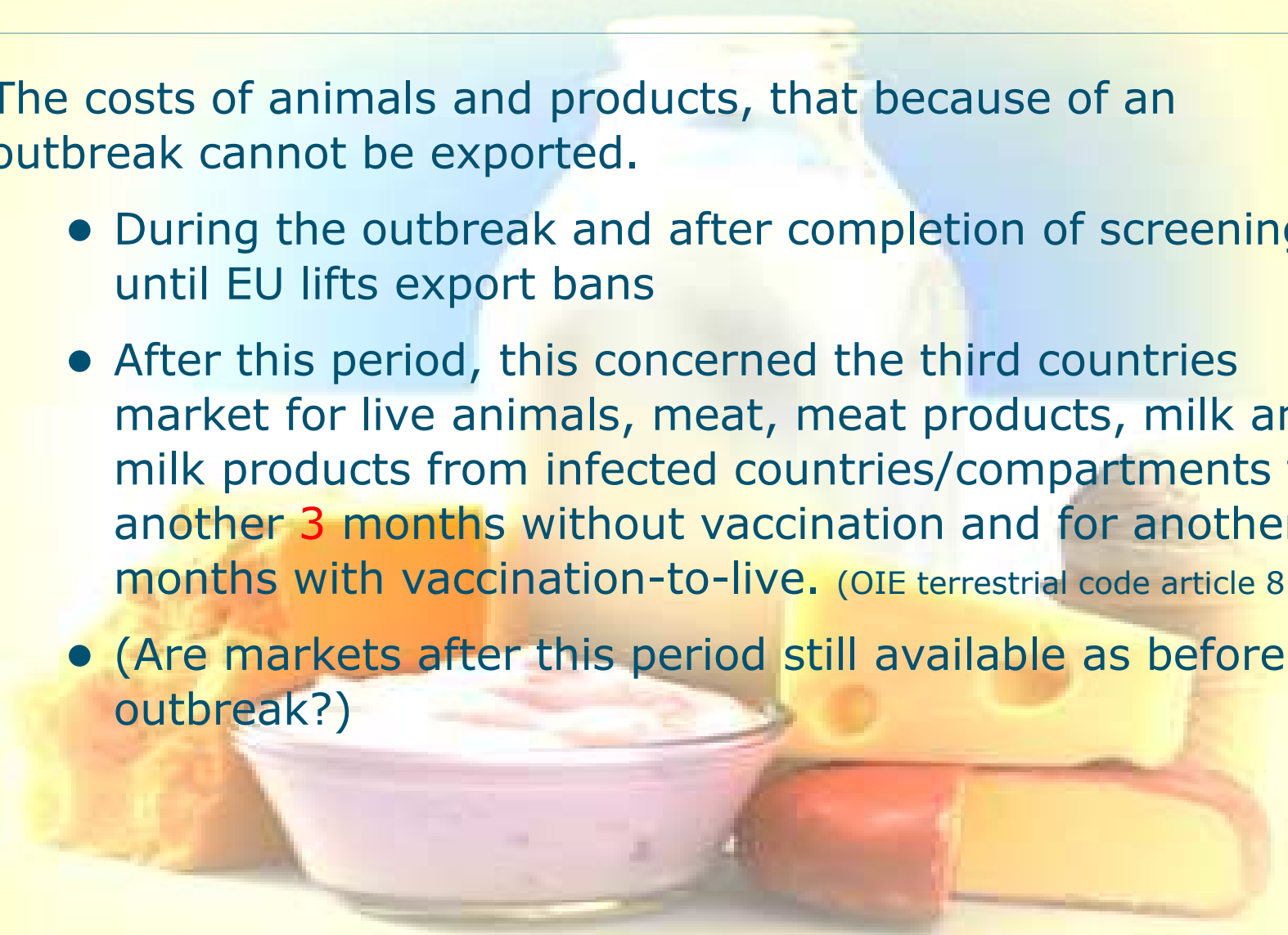
A close-up photograph of a pig's face, focusing on its snout. A prominent, red, raised, and inflamed lesion is visible on the snout, likely a sign of a disease such as African Swine Fever. The pig's eye is partially visible in the upper right, and its ear is on the left. The background is blurred, showing more of the pig's head and some green foliage.

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?)



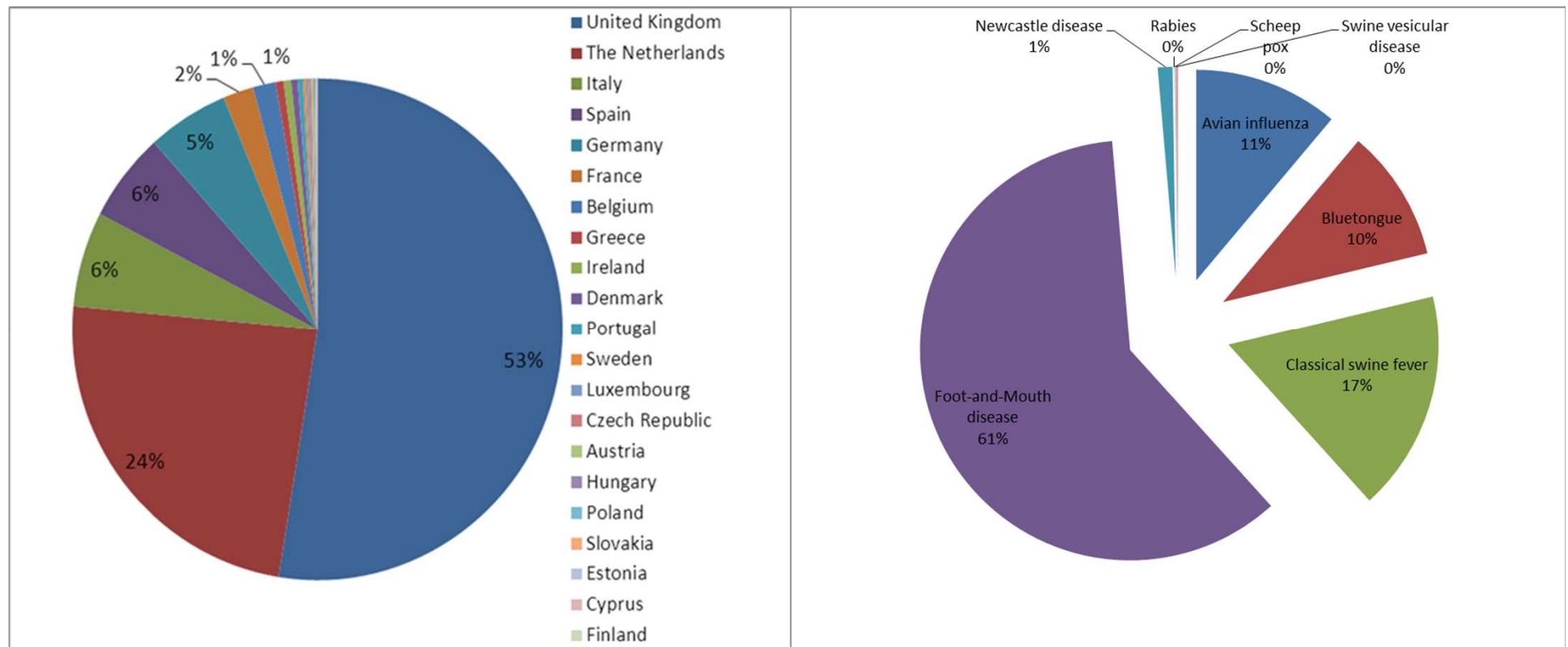
Costs of the 2001 FMD outbreak in NL

- 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 €

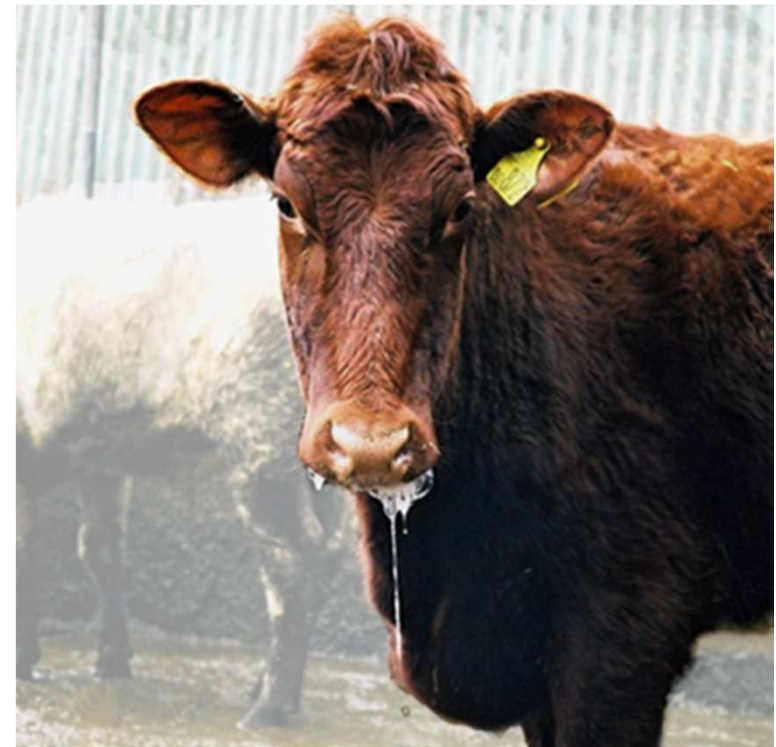




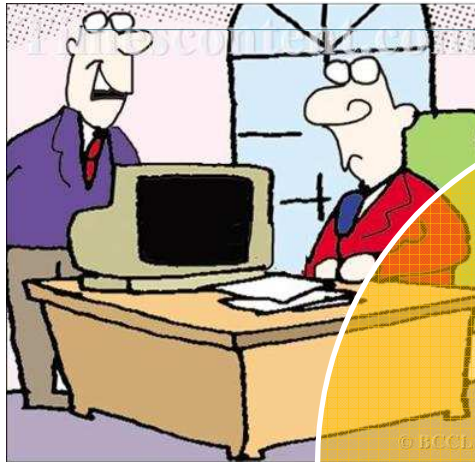


ECONOMICS OF THE ERADICATION OF FOOT-AND-MOUTH DISEASE EPIDEMICS WITH A VACCINATION TO LIVE STRATEGY

- 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



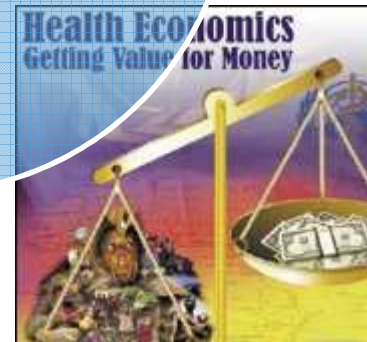
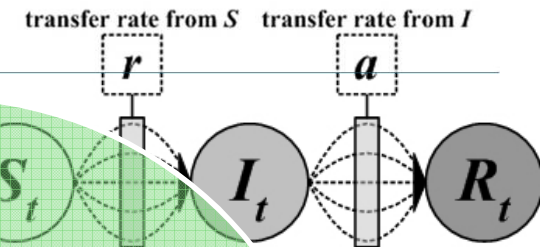
Approach



Policy makers

Epidemiological
modelling

Economic
evaluation

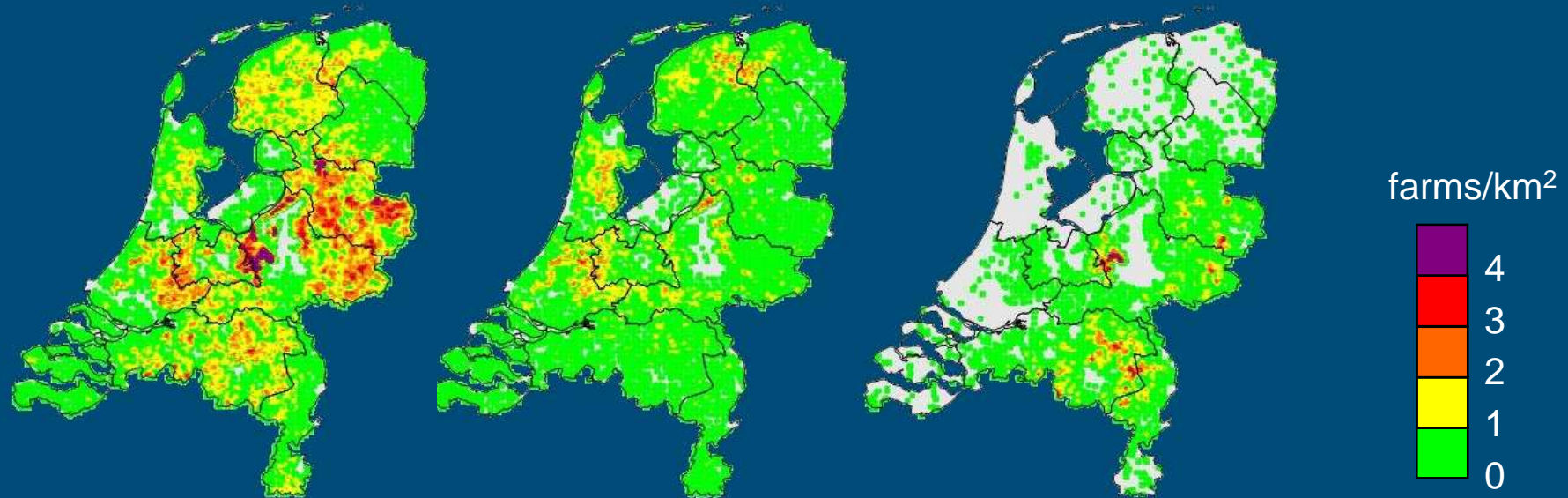


Methodology (1) Definition of investigated policy options / Control strategies:

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



DPLA

SPLA

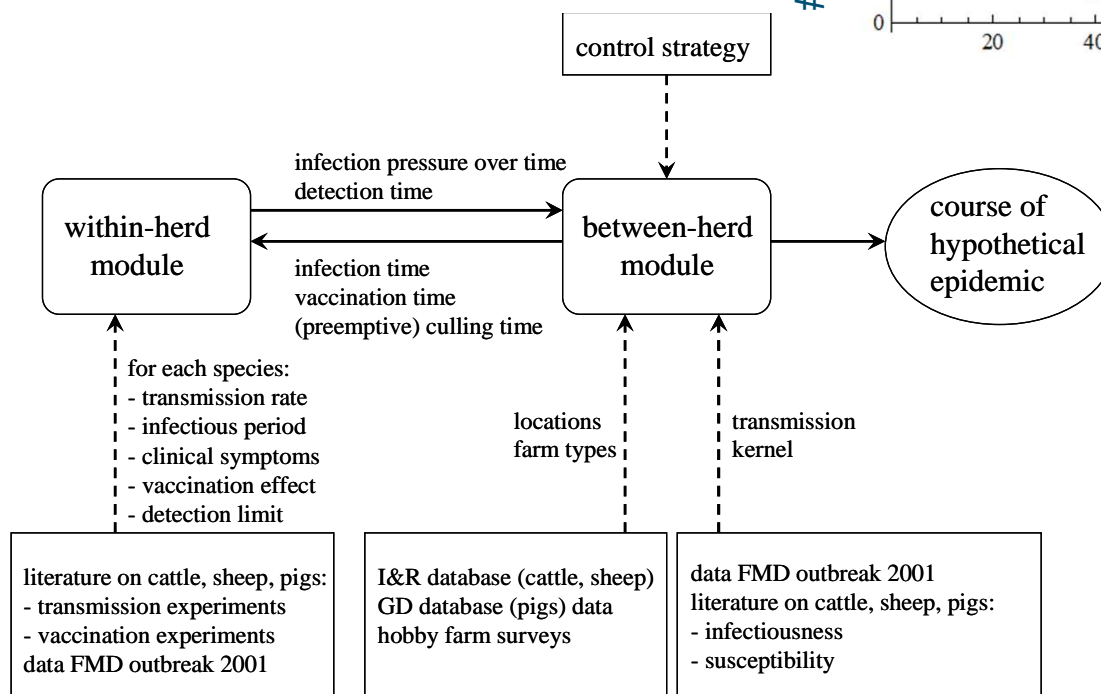
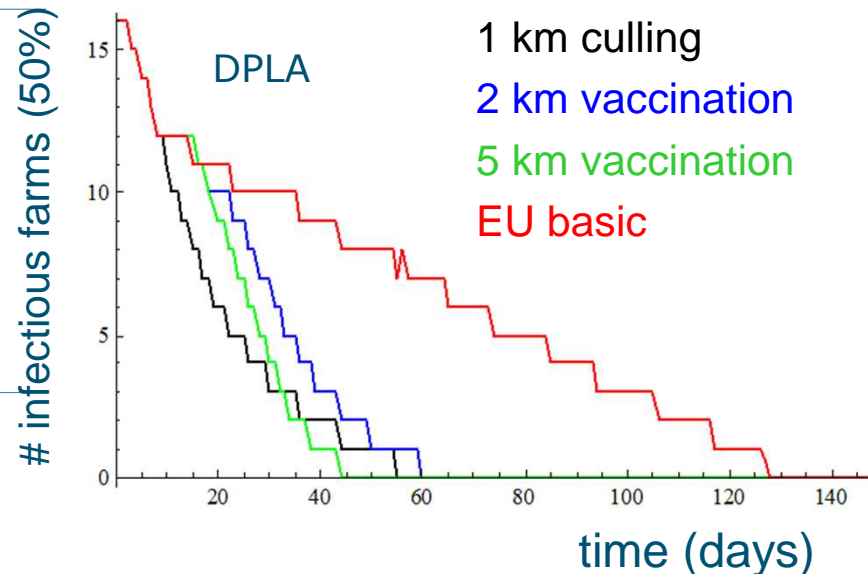
farms/km²



CENTRAL VETERINARY INSTITUTE
WAGENINGEN **UR**

Methodology (2)

Epidemiological modelling



Backer et al, 2008, EU FMD conference

The background of the slide is a close-up, slightly blurred image of several Euro banknotes. The notes are in various colors: a pink 50 Euro note, a grey 100 Euro note, a yellow 200 Euro note, and a green 500 Euro note. The word 'EURO' and the numbers '50', '100', '200', and '500' are visible on the notes. The text 'Methodology (3) Economic assessment' is overlaid in the center in a white, sans-serif font.

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).

Category	Value loss
Dairy cows	450 €/ animal
Young stock	5 €/ animal
Veal calves	550 €/ animal
Other cattle	26 €/ animal
Sows	260 €/ animal
Fattening pigs	50 €/ animal
Sheep	34 €/ animal

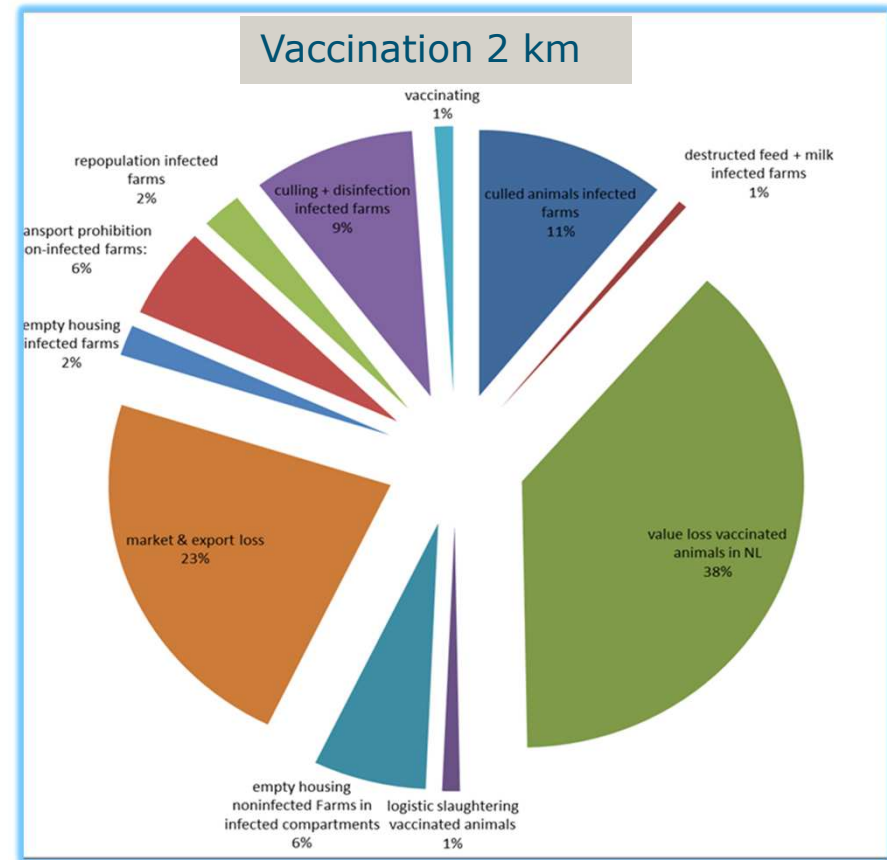
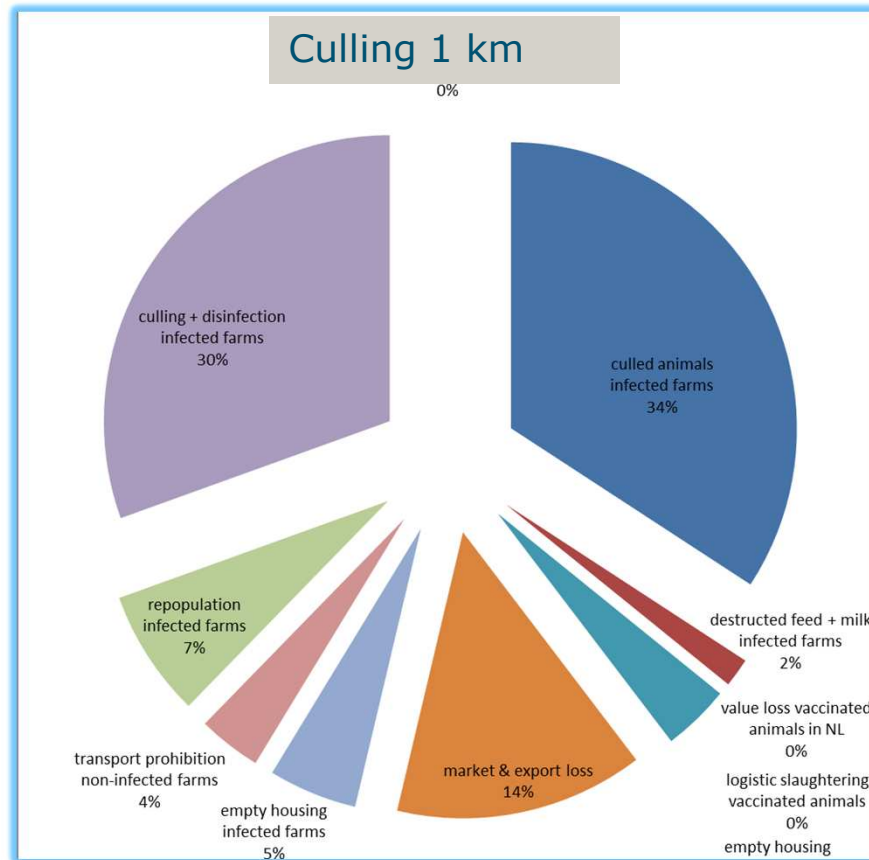
FMD SPLA (< 2 farms/km²) area Friesland:

	NUMBER OF CULLED FARMS			LAST WEEK OF DETECTION			TOTAL COSTS INCL COSTS OF OPERATION (in M€)		
	50%	5%	95%	50%	5%	95%	50%	5%	95%
EU	7	2	46	3	1	12	58	48	102
cul1	56	2	295	3	1	8	62	48	109
vac2	30	2	117	3	1	8	61	48	108
vac5	30	2	113	3	1	6	65	48	122

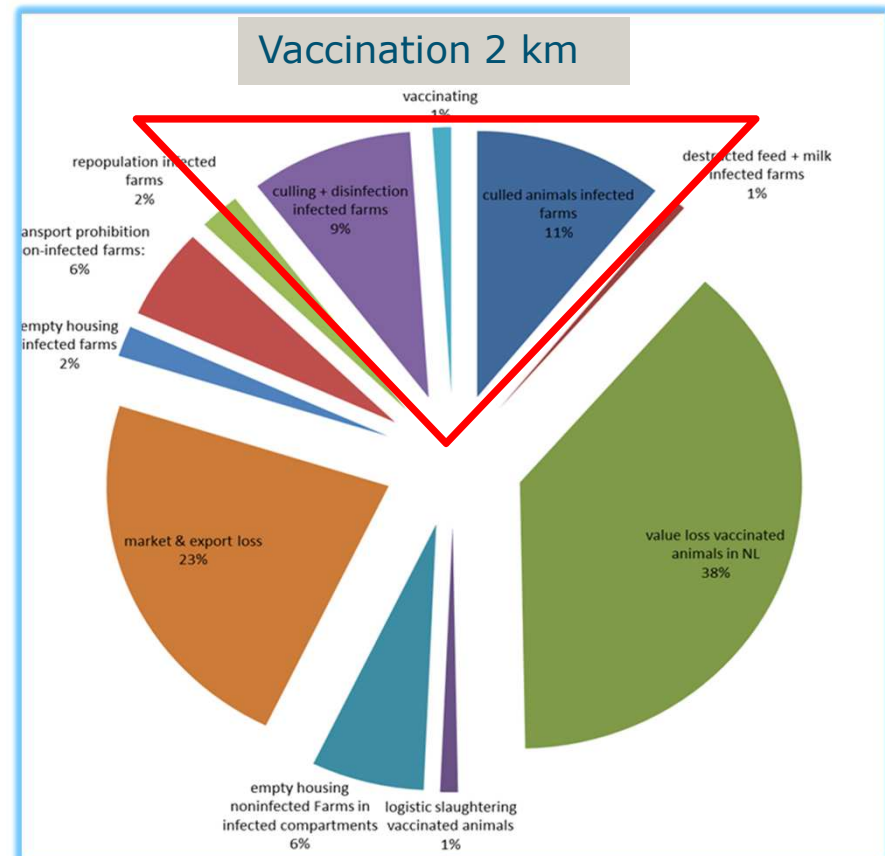
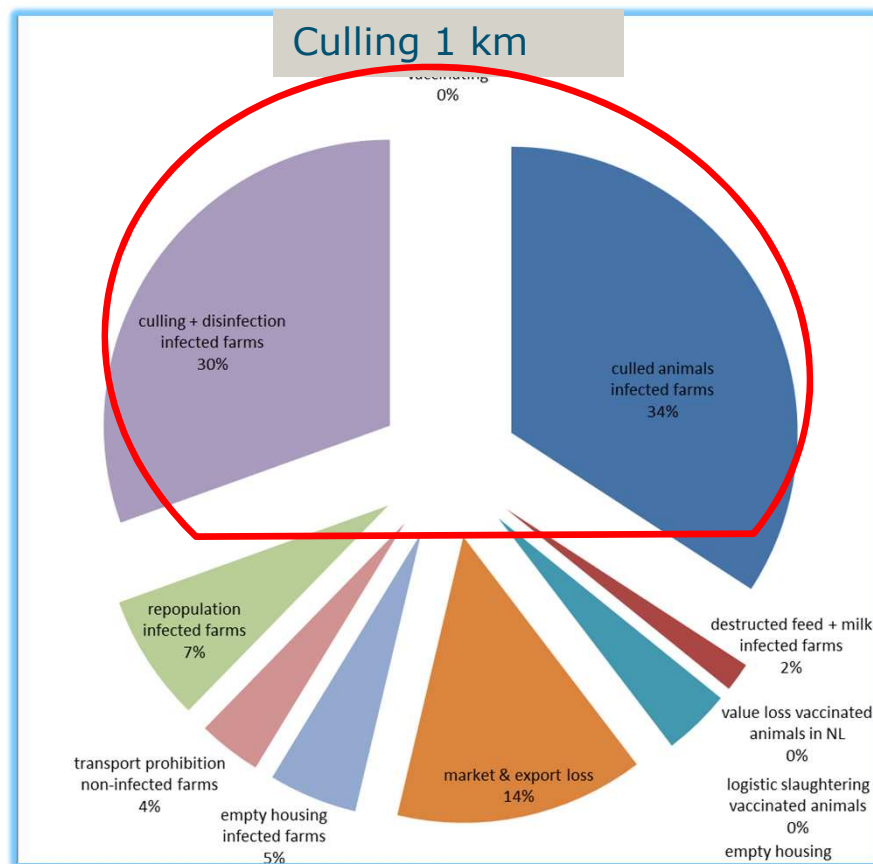
FMD PDLA (>4 farms/km²): Gelderse vallei

	NUMBER OF CULLED FARMS			LAST WEEK OF DETECTION			TOTAL COSTS INCL COSTS OF OPERATION (in M€)		
	50%	5%	95%	50%	5%	95%	50%	5%	95%
cul1	971	206	3217	9	4	15	236	94	615
vac2	260	70	707	10	5	17	227	99	526
vac5	230	68	571	6	4	11	228	106	504

Distribution of costs (median DPLA)



Distribution of costs



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

Conclusion

- Economic evaluation of different FMD management options:
 - should to 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.

Acknowledgements

- Jantien Backer, Thomas Hagenaars, Herman van Roermund, Aldo Deckers, Gonnie Nodelijk WUR-CVI
- Coen van Wagenberg, Nico Bondt, WUR- LEI
- The financial support of the Dutch Ministry of Economic Affairs, Agriculture and Innovation for enabling much of the underlying research is highly appreciated.
- FAO for the invitation

Thanks for you attention

