

# Risk associated with trade of deboned beef

Is it risk-free regardless of circumstances?  
If not, can risks be mitigated by means other  
than zonal FMDV eradication?

David Paton, Marna Sinclair, Ricardo Rodriguez

OIE/FAO Global Conference on FMD, 24-26 June 2009, Paraguay

# Importance of meat trade for developing countries

- Global demand for meat outstrips supply
- $\geq 60\%$  of beef produced in developing countries (2008, USDA)
- Low or negligible tariff barriers
- Perceived risk of FMD is a significant barrier and globally, FMD occurrence mirrors economic development

# Brooksby, 1961

Report of the 20<sup>th</sup> Conference of the FMD Commission of OIE  
On the subject of "International trade in meat and the dissemination of foot-and-mouth disease."

“Consideration of the facts relating to virus survival in meat inevitably leads to the conclusion that **an absolute prohibition should be placed on the importation of meat from areas where the exotic types of virus occur** whether the animals in the area are at the time visibly infected or not”

# Thomson, Leyland & Donaldson, 2009

Transboundary and Emerging Diseases, 56, 9-17

“De-boned beef from which lymph nodes and risk material associated with BSE have been removed, is **a product which can be produced for safe international trade irrespective of whether the locality of production is recognized free from so-called transboundary diseases or not**”

# FMD Risk Associated with Animal Products

1. Likelihood of an infected animal being presented at an export abattoir
2. Likelihood of virus being eliminated from the commodity during the slaughter and preparation process
3. Likelihood of an infected commodity causing disease if traded

# Mitigation Measures

- Vaccination
- Pre-slaughter quarantine of cattle
- Serology
  
- Ante mortem inspection
- Abattoir procedures
- Post mortem inspection
- Maturation
- pH criteria
- Removal of bones and other organs
- Quality Assurance Systems -including HACCP & Traceability
- Veterinary Service Inspection
  
- Controls on swill feeding in importing countries

# OIE Code, 2008

Article 8.5.23 on importation from FMD infected countries or zones, where an official control programme exists, involving compulsory systematic vaccination of cattle

- Fresh meat of cattle and buffalo (excluding feet, head and viscera) must come from animals which:
  - originate in a zone with an official vaccine-based control programme
  - have been vaccinated twice
  - have been in same place for 30 days not close to outbreaks (10km)
  - were slaughtered in an approved abattoir with correct inspection
- Must come from deboned carcasses:
  - from which major lymph nodes removed
  - have been matured at a temperature above 2°C for at least 24 hours
  - pH value of both *longissimus dorsi* muscles below 6.0

# Procedure to be adopted by this review

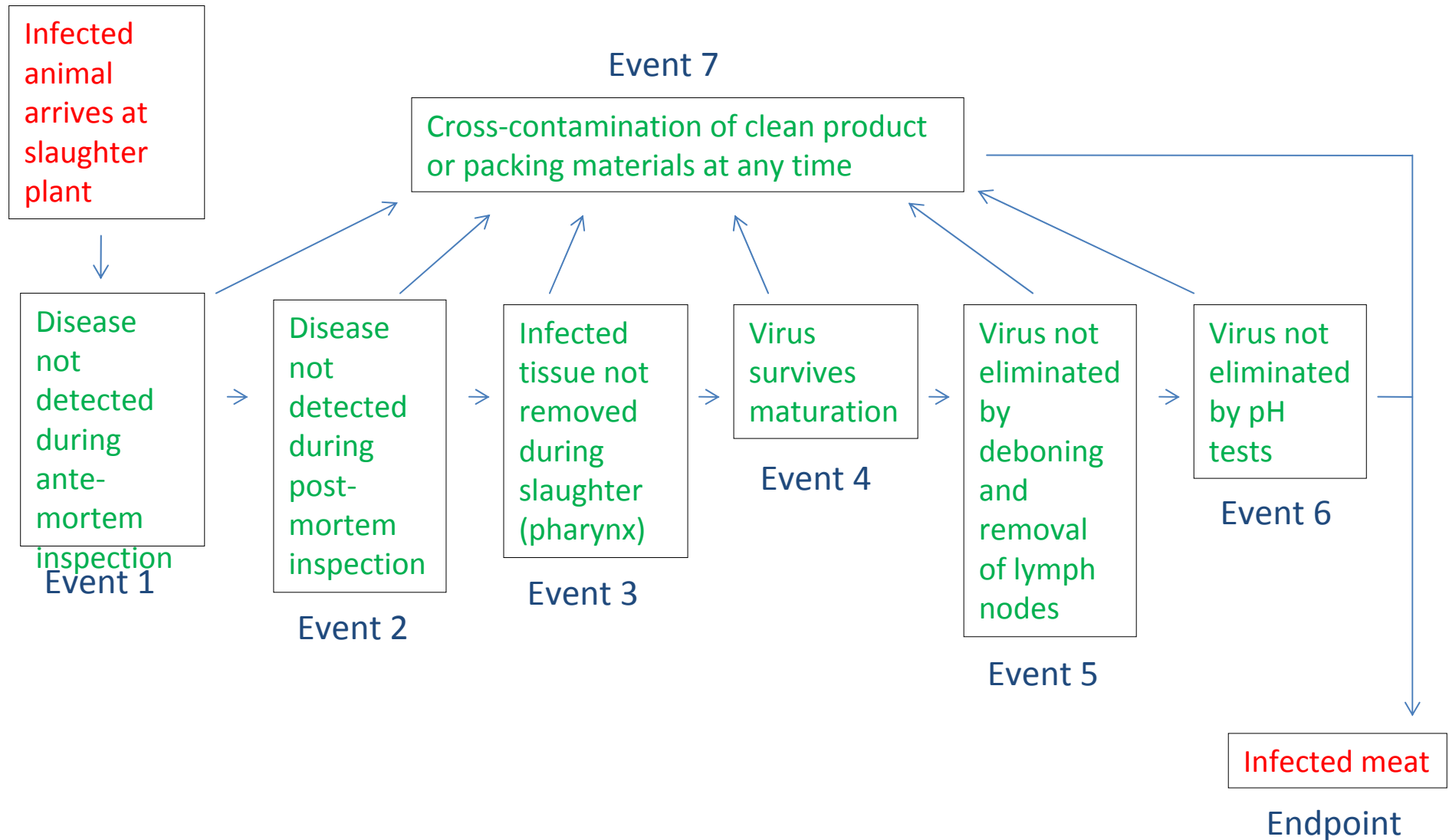
- Focus on likelihood of virus being eliminated from the commodity during the slaughter and preparation process
  - Describe slaughter and preparation process in detail
  - Review evidence and opinions from literature
  - Qualitative risk assessment
- Comment on other mitigation measures
- Review evidence for safety of trade
- Consider fresh ovine and porcine meat



# Scenario Tree

for likelihood of virus being eliminated from the commodity during the slaughter and preparation process

## Initial Hazard



# Event 1: Disease not detected during ante-mortem inspection

- Procedure of ante-mortem inspection
- Ease of missing lesions
- Influence of stage of infection:
  - preclinical phase
  - clinical/subclinical phase
  - convalescence
  - carrier state

# Ascribe risk with reference to literature as proof

- Fact
  - During a study by Cottral, Cox & Baldwin (1960), high virus titres were found in lymph nodes, 24 hrs post-inoculation, and before any clinical signs were observed
- Opinion
  - In clinically sick cattle, the likelihood of missing lesions is low (Astudillo et al., 1997) but infected animals in the incubation period present a high risk (Sutmoller, 2001)

# Is deboned, matured and pH tested beef safe regardless of further mitigations?

- FMDV can survive in bones, lymph nodes and large blood clots
- Limited evidence of FMDV survival in muscle itself
- Uncertain how much bone and lymph node present in de-boned meat
- Possibility of abattoir derived carcass contamination
- Uncertain threshold for an acceptable level of FMDV survival
  
- Mitigations require procedural guarantees

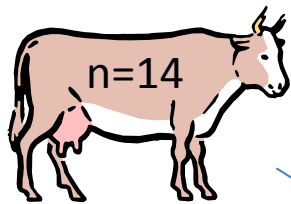
# Further mitigation measures

- Vaccination
- Pre-slaughter quarantine of cattle
- Serology
  
- Ante mortem inspection
- Abattoir procedures
- Post mortem inspection
- Maturation
- pH criteria
- Removal of bones and other organs
- Quality Assurance Systems -including HACCP & Traceability
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- Controls on swill feeding in importing countries

# Vaccination

Can be very effective at reducing virus load (Argentine-US Report, 1966)

Vaccinated



Challenged with FMDV and slaughtered 32 hrs later

Fresh lymph node

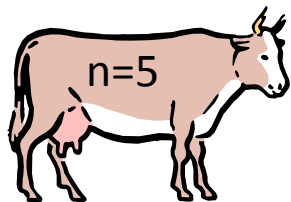
Ripened lymph node

Cured lymph node

Tested for FMDV in:

- cattle
- mice
- tissue culture
- pigs

Unvaccinated



Experiment done x3 for serotypes O, A, C

Reliant on vaccine strain suitability, quality and correct administration

# Quarantine / Serology

- Incubation period of FMD is short
- Recovered animals unlikely to initiate new infections (carriers?)
- Value of serology
- Reassurance highly dependent on procedural guarantees

# Trade Risk

UK 1954-1967: 54% of primary FMD outbreaks attributed to imported meat, bones and meat wrappers

Origins of Recent European Outbreaks of FMD, Valarcher et al., 2008:

Year	Sero-type	Topotype	Place and country	No. outbreaks	Origin
1991	O	ME-SA	Bulgaria	1	unknown
1993	O	ME-SA	Italy	57	Cattle imported with forged certificate
	O	ME-SA	Bulgaria	1	unknown
1994	A	ASIA	Spasskoe, Vladimir, Russia	1	Laboratory escape
	O	ME-SA	Greece	95	Illegal import of Sheep
1995	O	ME-SA	Kirkloreli, Turkish Thrace	1	Illegal Movement of Cattle
	O	Cathay	Moscow, Russia	1	Import of pork meat
1996	A	ASIA	Albania		Import of meat on bone
	A	ASIA	FYRO Macedonia	130	
	A	nk	FR Yugoslavia		
	O	ME-SA	Turkish Thrace	2	illegal movement of cattle
	O	ME-SA	Greece	39	illegal immigrants
	O	ME-SA	Bulgaria	1	Unknown
	Asia 1		Greece	14	Unknown
2001	O	ME-SA	UK	2060	Illegal introduction of animal product and swill feeding
	O	ME-SA	UK (Northern Ireland)	?	spread from UK mainland
	O	ME-SA	Eire	1	spread from Northern Ireland?
	O	ME-SA	France	2	spread from UK
	O	ME-SA	The Netherlands	26	spread from France?
2006	A	ASIA	Turkish Thrace	?	from Anatolia
2007	O	EURO-SA	United Kingdom	8	Laboratory escape

But need figures on levels of traded meat



# Completion of the review process

- Opinion on risk and options for further research
- Detailed report and recommendations to be submitted to OIE Scientific Commission (31<sup>st</sup> July 2009)
- Review by Ad Hoc Epidemiology Group (next meeting in October 2009)
- Recommendations to be presented to General Assembly in May 2010
- Peer-reviewed publication of review

# Acknowledgements

- OIE/DfID
- Gideon Bruckner
- Keith Hamilton
- Tim Leyland