



Rijksinstituut voor Volksgezondheid
en Milieu
*Ministerie van Volksgezondheid,
Welzijn en Sport*

Effect of testing and production system on the human risk of *Trichinella* ascribed to pig meat

Frits Franssen, Katsuhisa Takumi,
Joke van der Giessen & Arno Swart

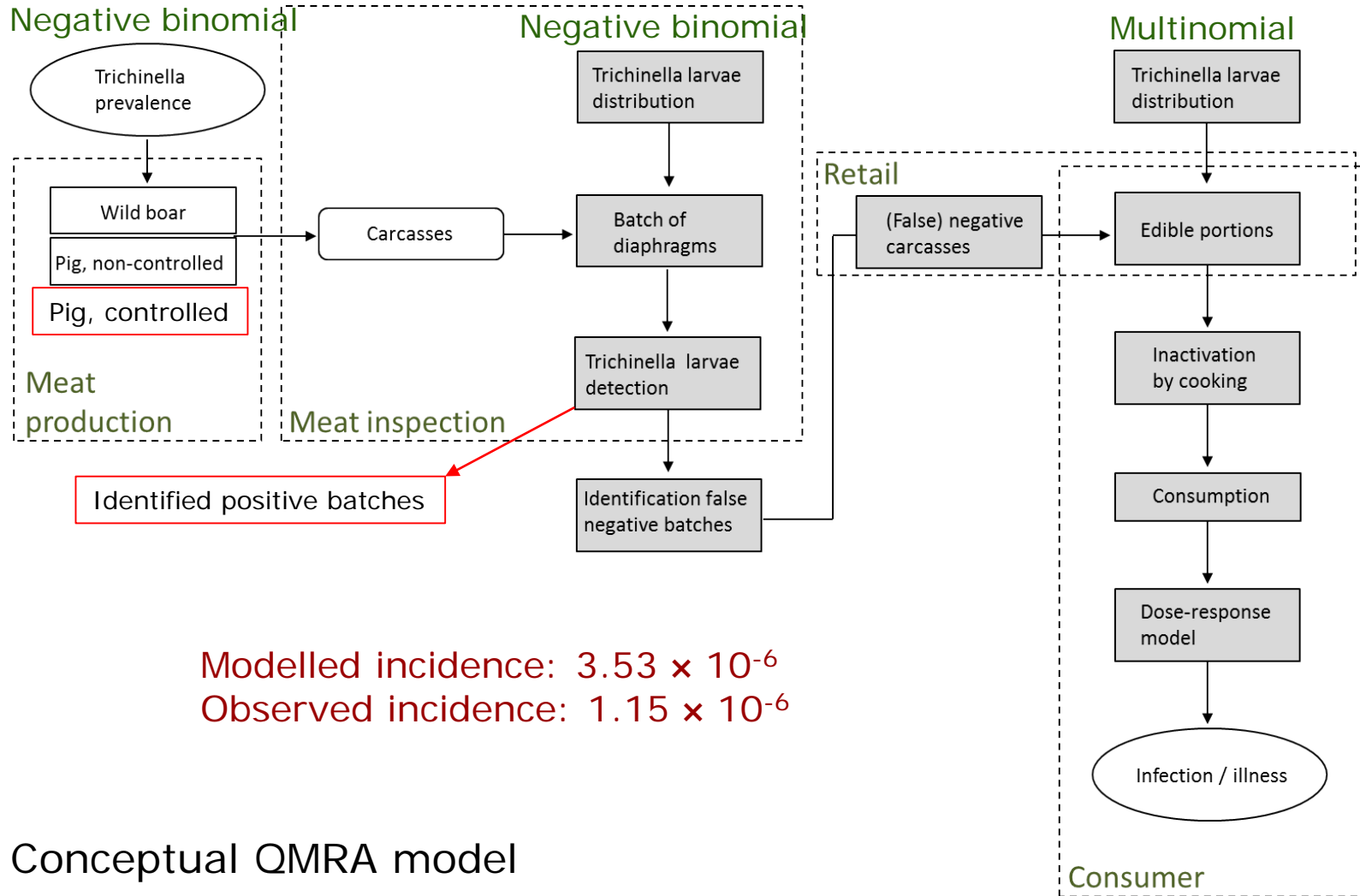
National Institute for Public Health &
the Environment, the Netherlands



Individual carcass control of pigs at meat inspection:
In pigs from controlled housing no positives & Expensive

EU regulation, OIE and Codex guidelines:
Risk-based control to prevent human trichinellosis and to facilitate international trade.

QMRA for *Trichinella* to support risk-based control



Conceptual QMRA model



The aim of this study:

- Quantify and compare human trichinellosis risk from different housing systems
- Quantify and compare human trichinellosis risk with- and without *Trichinella* testing in EU



Run scenarios using the QMRA model to:

- Compare human trichinellosis risk from different housing systems
- Compare human trichinellosis risk with- and without *Trichinella* testing in EU



Table 1. Test parameters for QMRA modelling of human trichinellosis cases for non-controlled and controlled housing with- and without *Trichinella* testing at meat inspection.

Variable parameter	Pig, non-controlled	Pig, controlled	Unit
Observed prevalence	5.26×10^{-6}	$< 4.17 \times 10^{-10}$	-
m	6.87×10^{-3}	5.30×10^{-7}	-
k	5.83×10^{-7}	4.51×10^{-11}	-
abundance	0.3 – 211	???	LPG
<i>Trichinella</i> relative test sensitivity ¹	0.6 – 1 and 0	1 and 0	-
Number of swine	80	120	Million/year
swine/pool	100		pigs
diaphragm weight tested	1		gram
Iterations # escaped Swine	1000		
Iterations # larvae in diaphragm	1000		-
portions/person ²	94	147	100g
population EU ³	504		Million
Number of loops per model run	1000		-

¹ Test sensitivity relative to the sensitivity of *Trichinella* testing using the artificial digestion test. A relative test sensitivity of 1 means testing according to the EU Reference method, 0 means no testing at all.

² Average consumption of portions of shoulder, loin and belly per person per year calculated for EU, proportional to housing condition of origin.

³ Population size EU 2015; average EU population 2007 - 2016: 503.5 ± 3.2 M (Table 4).

Method



Scenario

No pos. pigs in 20 years
at 120 M tested/year

Upper prevalence limit
 4.17×10^{-10}

Increasing *Trichinella*
larval abundance limit
10 – 5000 LPG

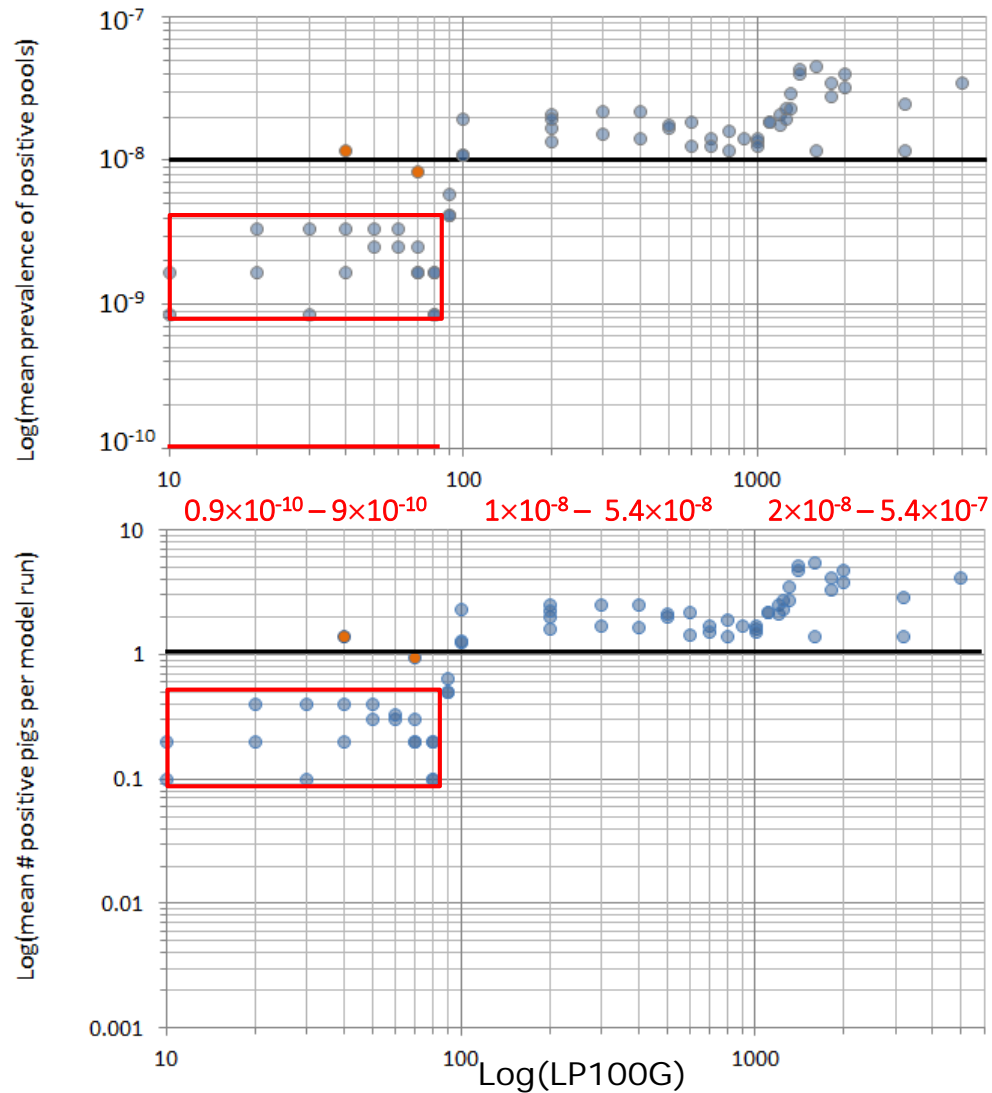




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k	5.83×10^{-7}	4.51×10^{-11}	-
abundance	0.3 – 211	0.1 – 0.8	LPG
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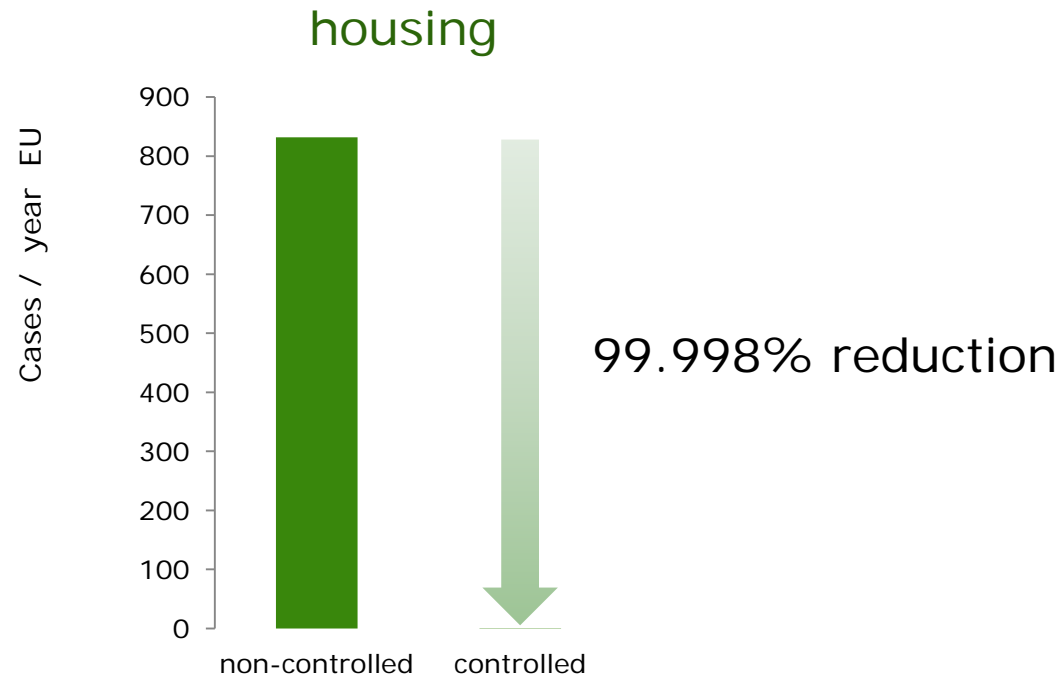
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Results housing



Scenario: slaughter volume of 80 M pigs per year from non-controlled housing and 120M from controlled housing, whole EU, with testing





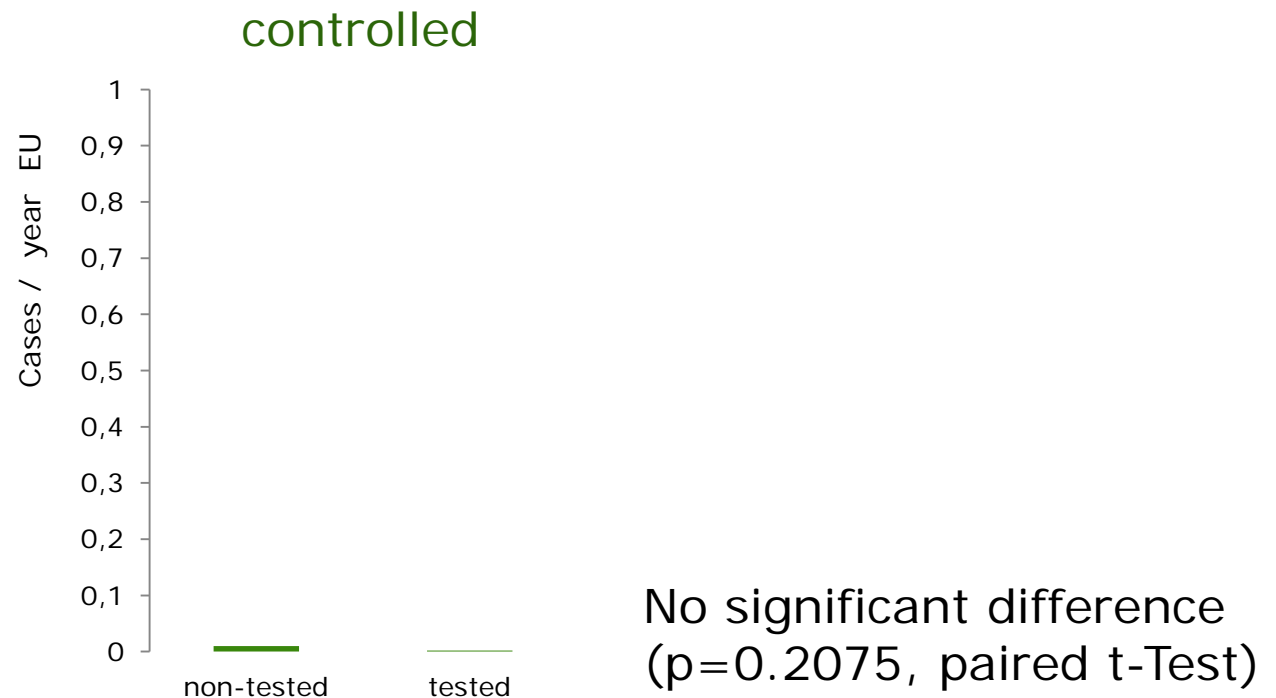
Run scenarios using the QMRA model to:

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Results testing

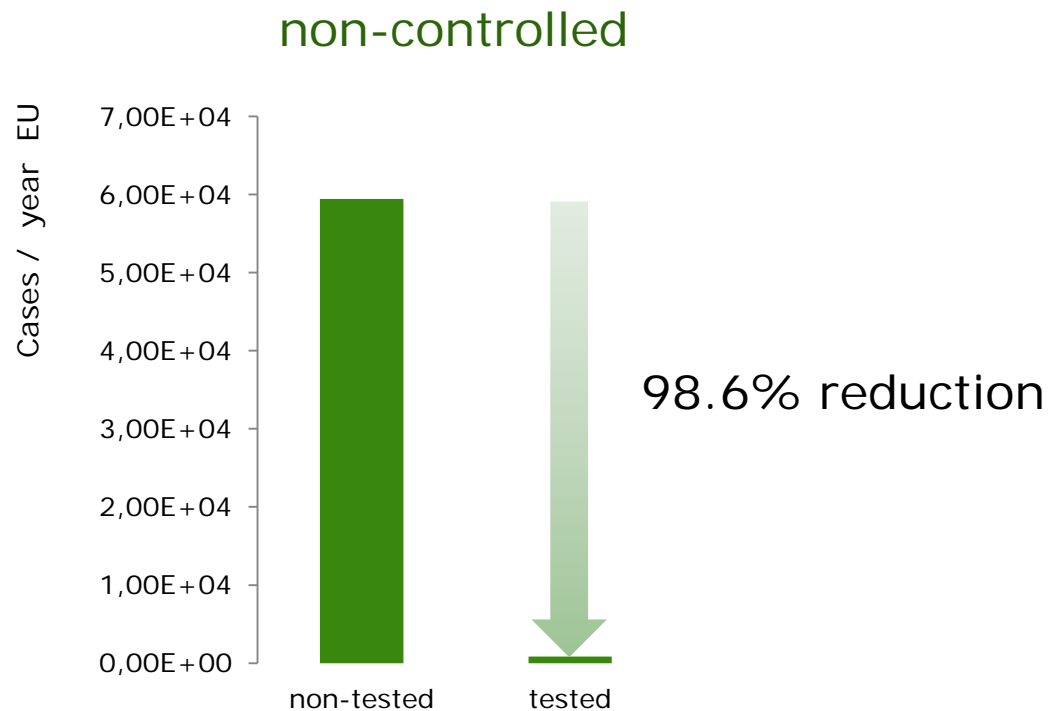


Scenario: slaughter volume of 120 M pigs per year, whole EU





Scenario: slaughter volume of 80 M pigs per year, whole EU





Using the QMRA for *Trichinella* we show that:

Controlled housing:
effective to prevent 100% human trichinellosis cases compared to non-controlled housing.

Testing pigs from controlled housing does not contribute to public health.

In low endemic countries:
non-controlled compartment + sows + boars as sentinel to monitor infection pressure from the environment.

Non-controlled housing:
Trichinella testing of these pigs (and wild life) prevents 98.6% of human trichinellosis cases.



Food and Waterborne Parasitology

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