Modulagem de contaminação cruzada: teoria e aplicação

Møller, Cleide Oliveira de Almeida

Publication date:
2014

Citation (APA):
Møller, C. O. D. A. (Author). (2014). Modulagem de contaminação cruzada: teoria e aplicação. Sound/Visual production (digital)

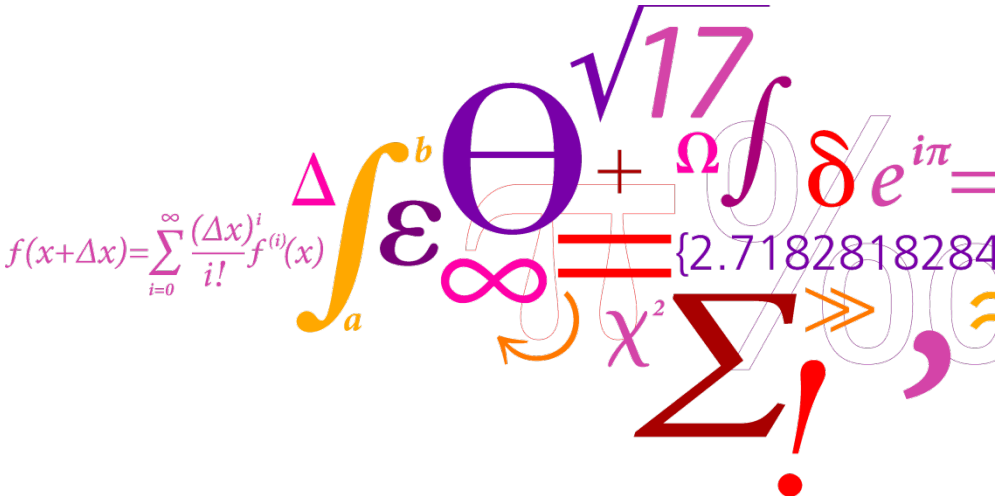
Modulagem de contaminação cruzada: teoria e aplicação

Cleide Oliveira de Almeida Møller

National Food Institute, Technical University of Denmark, Søborg, Denmark.

Correspondence

Cleide Møller. E-mail: clemo@food.dtu.dk



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Outline:

- Modelagem de contaminação cruzada
  - ✓ Introdução
  - ✓ Objetivos do estudo
  - ✓ Resumo do trabalho desenvolvido
  - ✓ Processo para construir o modelo
  - ✓ Resultados
  - ✓ Desafios e perspectivas
- Projeto Brasil-Dinamarca
- Aplicação

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Transfer study

Modelling transfer of *Salmonella* Typhimurium DT104 during grinding of pork

C.O.A. Møller[1], M.J. Nauta[1], B.B. Christensen[2], P. Dalgaard[3], T.B. Hansen[1]

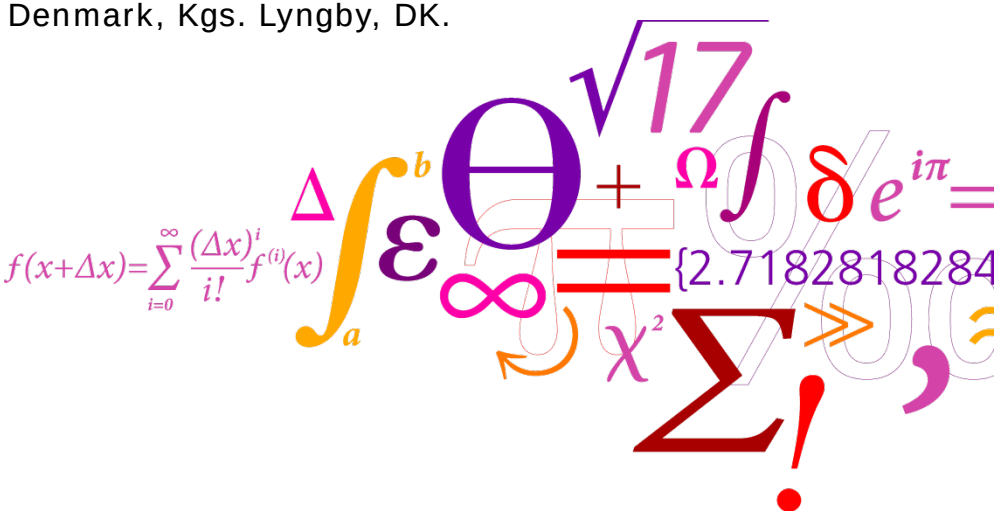
1 National Food Institute, Technical University of Denmark, Søborg, DK.

2 Department of Food Science, Faculty of Life Sciences, University of Copenhagen, Copenhagen, DK.

3 National Food Institute, Technical University of Denmark, Kgs. Lyngby, DK.

Correspondence

Cleide Møller. E-mail: clemo@food.dtu.dk



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Introduction

- *Salmonella* is a critical pathogen (CDC, 2011; EFSA, 2010).
- Pork still is an important source of salmonellosis (EFSA, 2010; van Hoek *et al*., 2012; Wegener *et al*., 2003).
- Ground meat is frequently associated with outbreaks of salmonellosis (Stock and Stolle, 2001).
- Up to 70% of foodborne illnesses are estimated to be linked to catered food (Filion and Powell, 2011; Hensen et al., 2006; Jones et al., 2004; Lee and Middleton, 2003).
- In Denmark, 61 of 86 reported outbreaks in 2011 were associated with outside-the-home settings (anonymous, 2012).
- To model the distribution of pathogens during the processing operation are of major relevance to risk analysts (Flores, 2006).

Objective

The aim of this study was to develop a model able to predict cross contamination of *Salmonella* in pork grinding.

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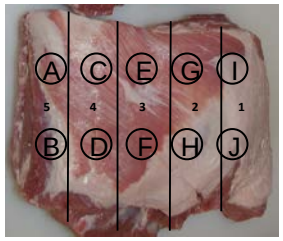
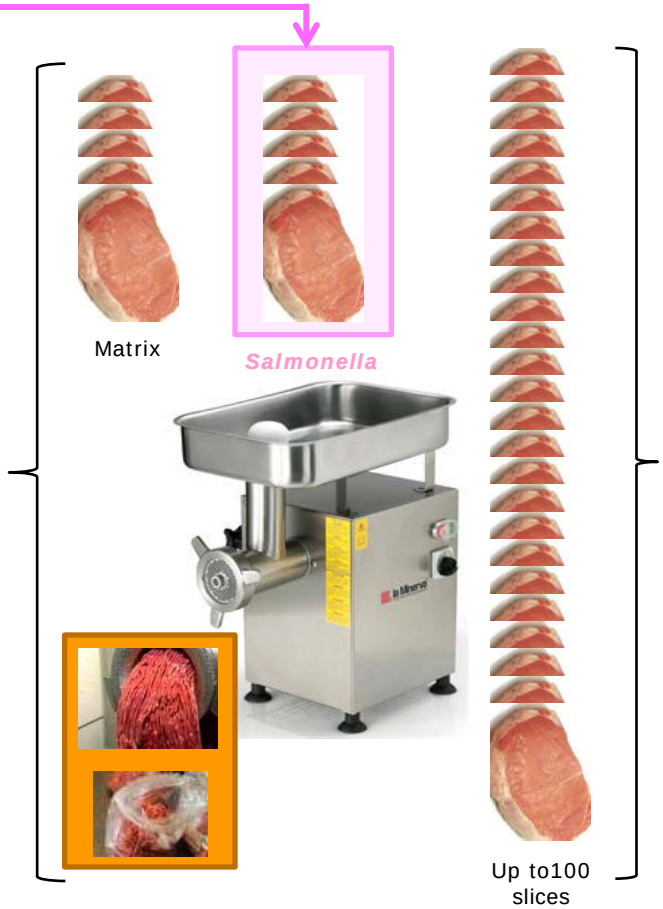
Experimental work

S. Typhimurium DT104

37° C ,overnight + 5° C, 1-3 days

Ca.10^9 *Salmonella* / g

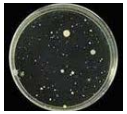




Distribution of Salmonella

37° C, 24h

22° C, 3d



- Analysis performed
- Build up the model
- Validation

Transfer Modelling

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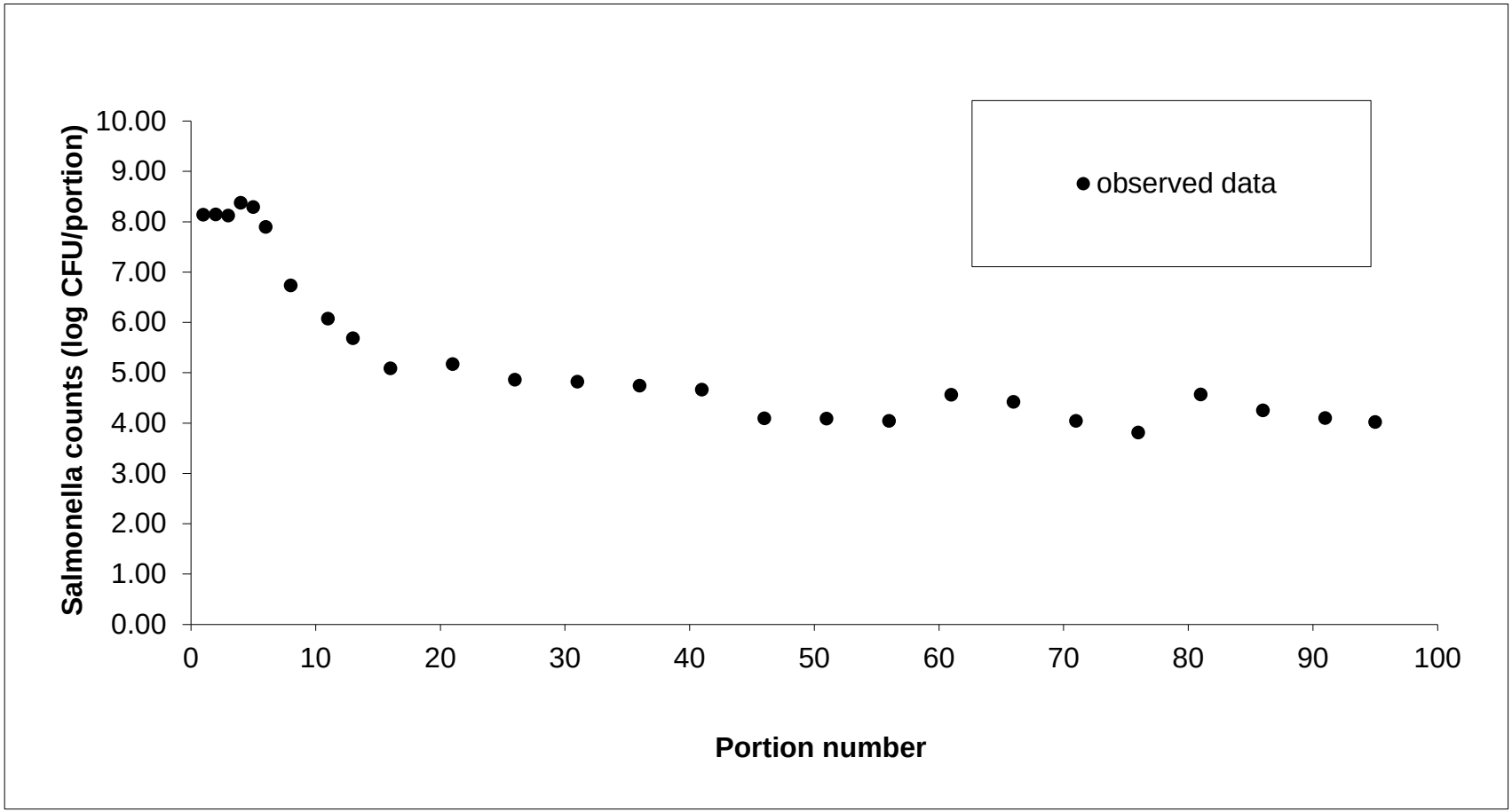
Describing the transfer rates of *Salmonella* during pork grinding



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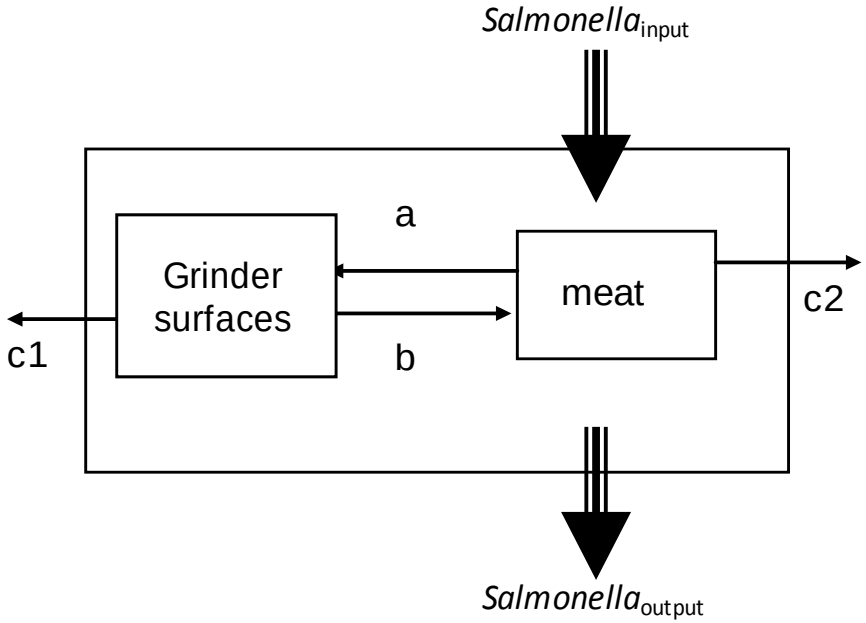
Modelling cross-contamination during pork grinding

Nauta et al. (2005) Model



a: transfer of *Salmonella* from met to grinder

b: transfer of *Salmonella* from grinder to meat

c_1: *Salmonella* inactivated on grinder during the process

c_2: *Salmonella* inactivated on the ground meat

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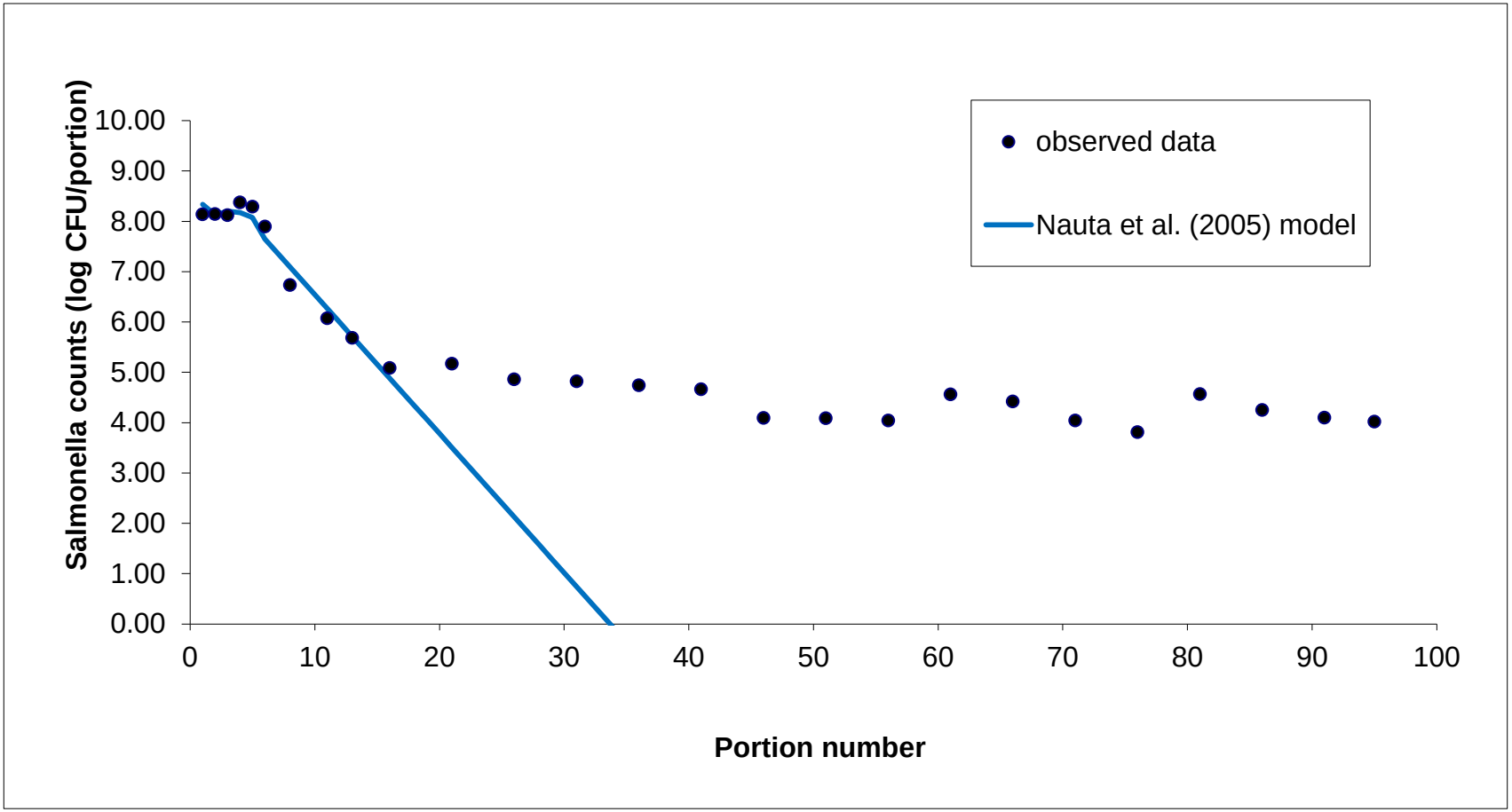
Transfer study

Describing the transfer rates of *Salmonella* during pork grinding



Transfer rates of *Salmonella* DT104 based on cell count data fitted to the suggested model

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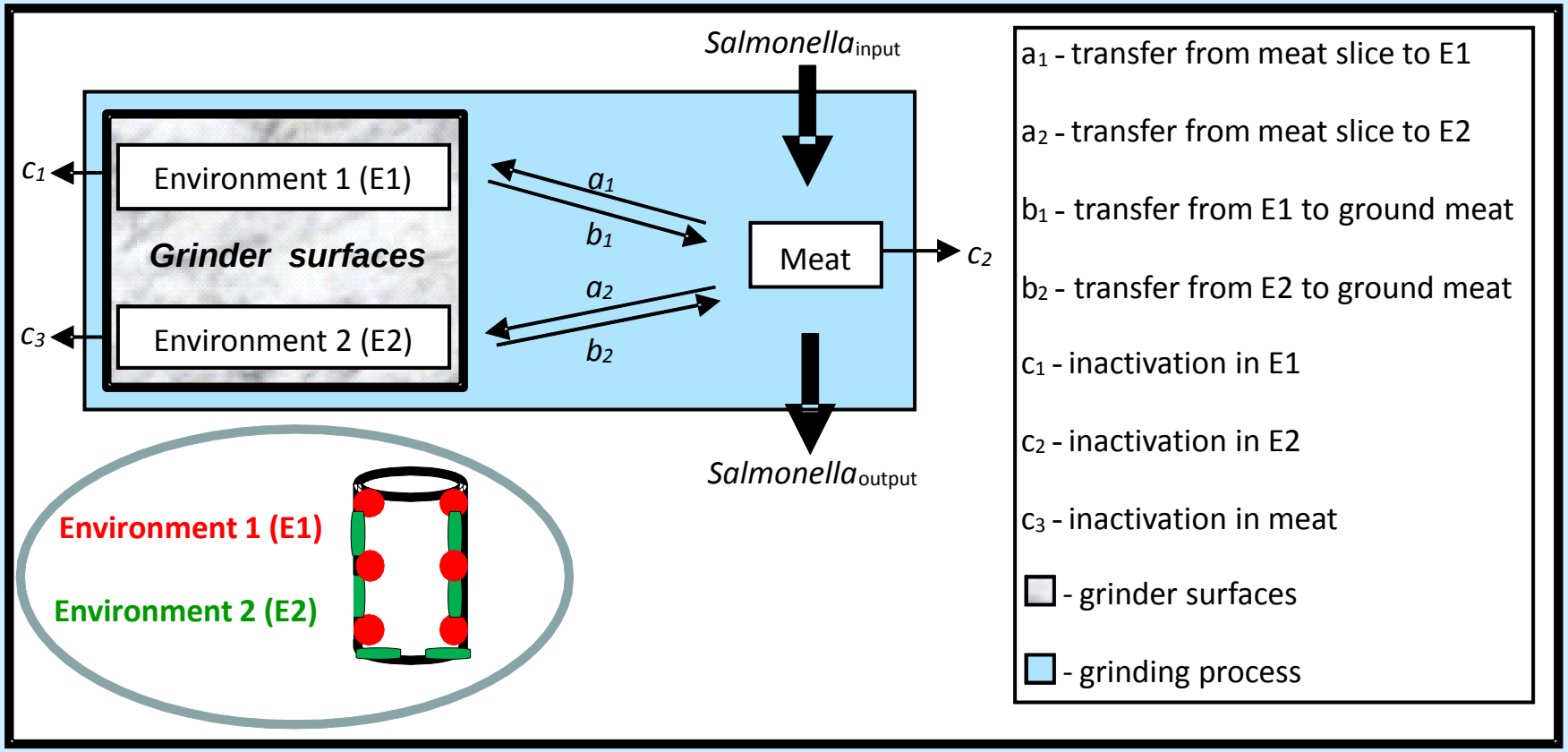
Transfer study

Modelling cross-contamination during pork grinding

Suggested Model



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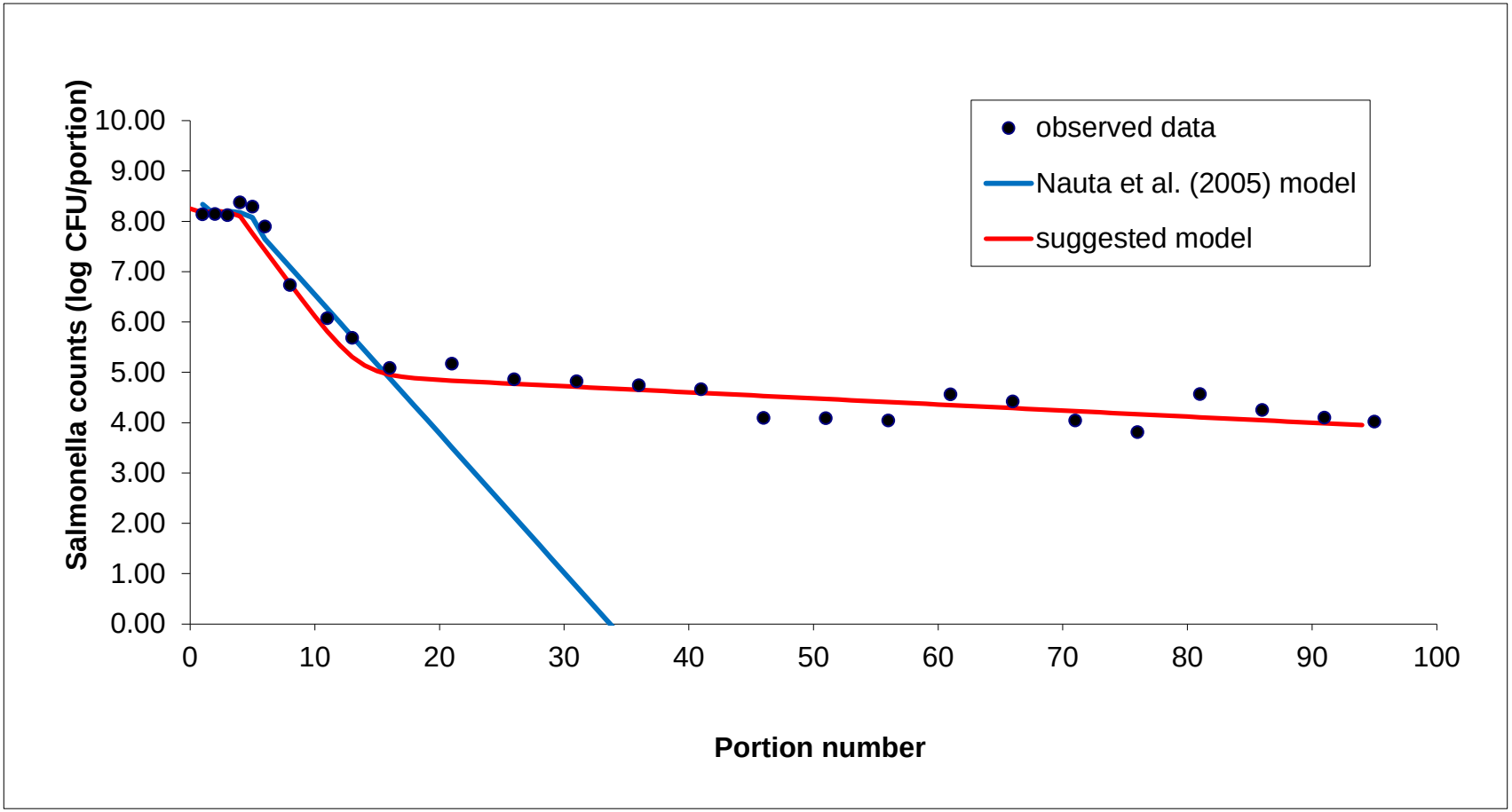
Describing the transfer rates of *Salmonella* during pork grinding



Transfer rates of *Salmonella* DT104 based on cell count data fitted to the suggested model

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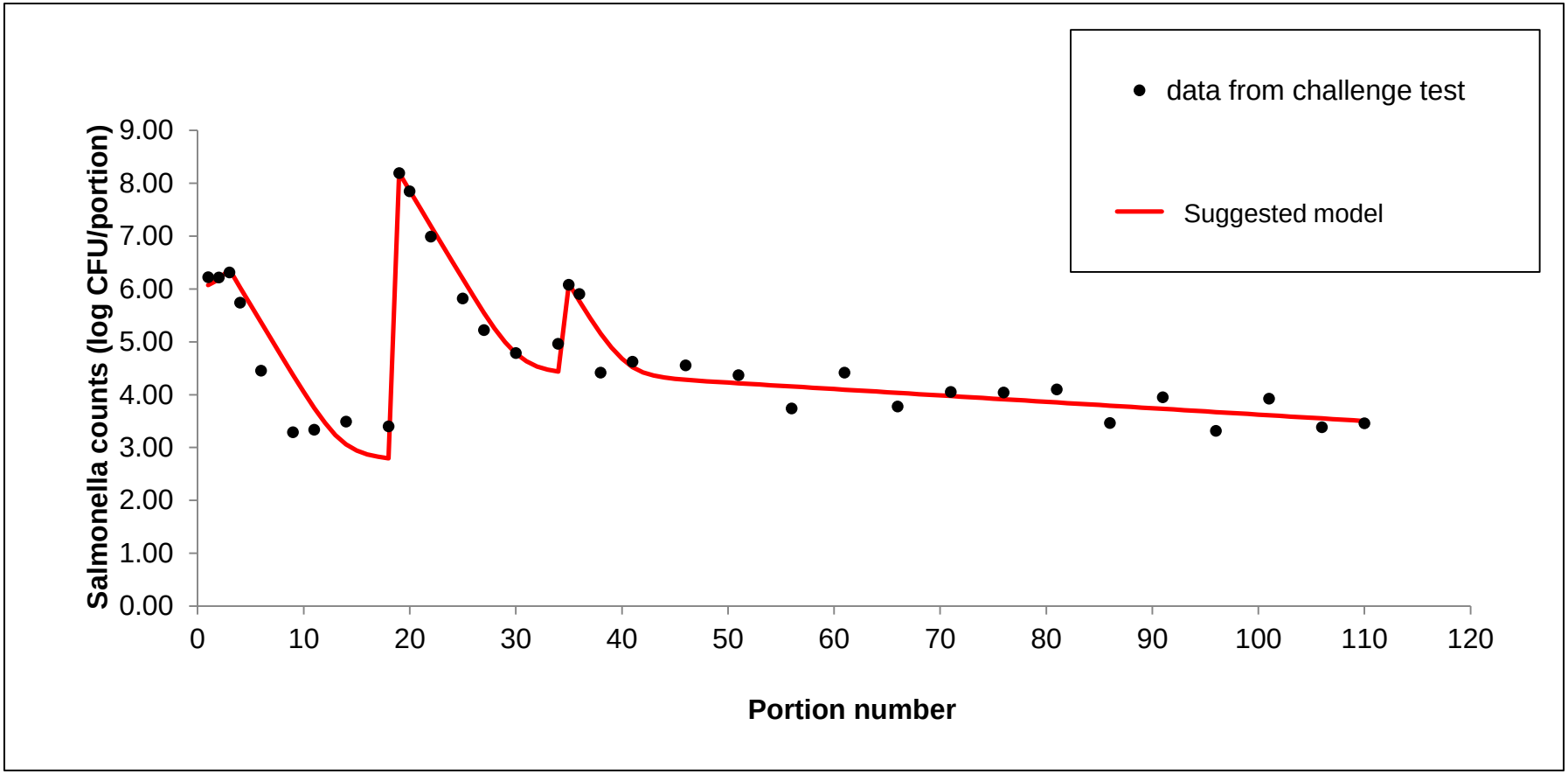
Challenges in cross-contamination during pork grinding



Describing the transfer rates of *different pathogens* during slicing in other matrices rather than pork using literature data:

- when applying the data published by Vorst *et al.* (2006), simulating cross contamination of *L. monocytogens* during turkey slicing, R^2 = 0.86,was found.
- when the data presented by Aarnisalo *et al.* (2007), regarding transfer of *L. monocytogens* during slicing of gravad salmon, was used R^2 = 0.74 was obtained.
- and for the data published by Sheen and Hwang (2010) related to cross contamination of *E. coli* O157:H7 during ham slicing, R^2 was 0.78.

Remarks and future perspectives

Journal of Applied Microbiology

Journal of Applied Microbiology ISSN 1364-5072

ORIGINAL ARTICLE

Modelling transfer of *Salmonella* Typhimurium DT104 during simulation of grinding of pork

C.O.A. Møller[1], M.J. Nauta[1], B.B. Christensen[2], P. Dalgaard[3] and T.B. Hansen[1]

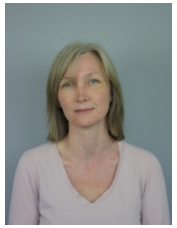
- Tail phenomenon
  - ✓ Food processors
    - o Control measures
    - o Cleaning and sanitization
- Observed transfer successfully modelled
- Model can describe different processes
- Tool to support risk assessors

- **To be investigated:**
  - ✓ Food matrices
  - ✓ Pathogens
  - ✓ Inoculum levels
  - ✓ Processings

Acknowledgements

✓ This research project was financed by the Technical University of Denmark through the FoodDTU programme

✓ Constructive advice and critical comments were given by:



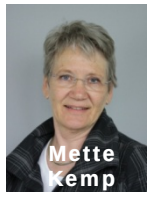
Tina Beck Hansen

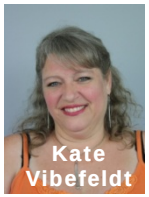
Maarten Nauta

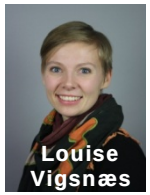
Paw Dalgaard

Bjarke Bak Christensen

✓ Skillful technical assistance was provided by colleagues from the Division of Food Microbiology at the National Food Institute.







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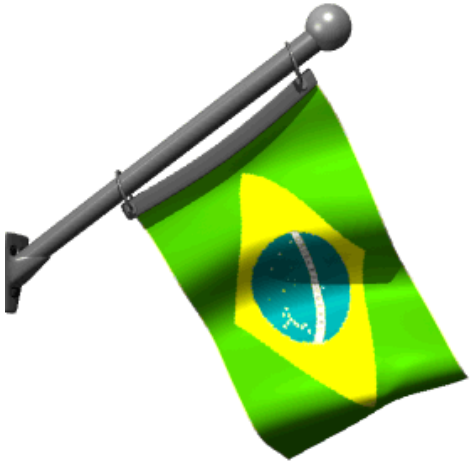

Meat-Cross-Con

MEAT SAFETY: An innovative modelling approach to evaluate microbial pathogen transfer and cross contamination from farm to fork

Acknowledgements

Let's start the practical application of the cross contamination model?

Thanks