

Measuring microbial food safety output and comparing self-checking systems of food business operators in Belgium

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Objective of research ?

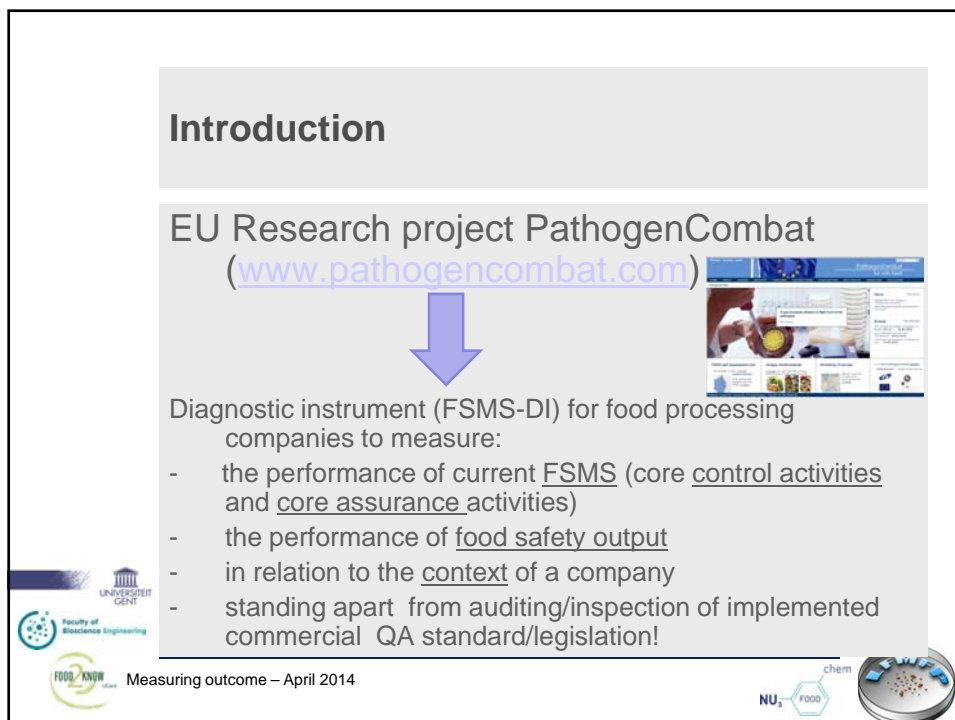
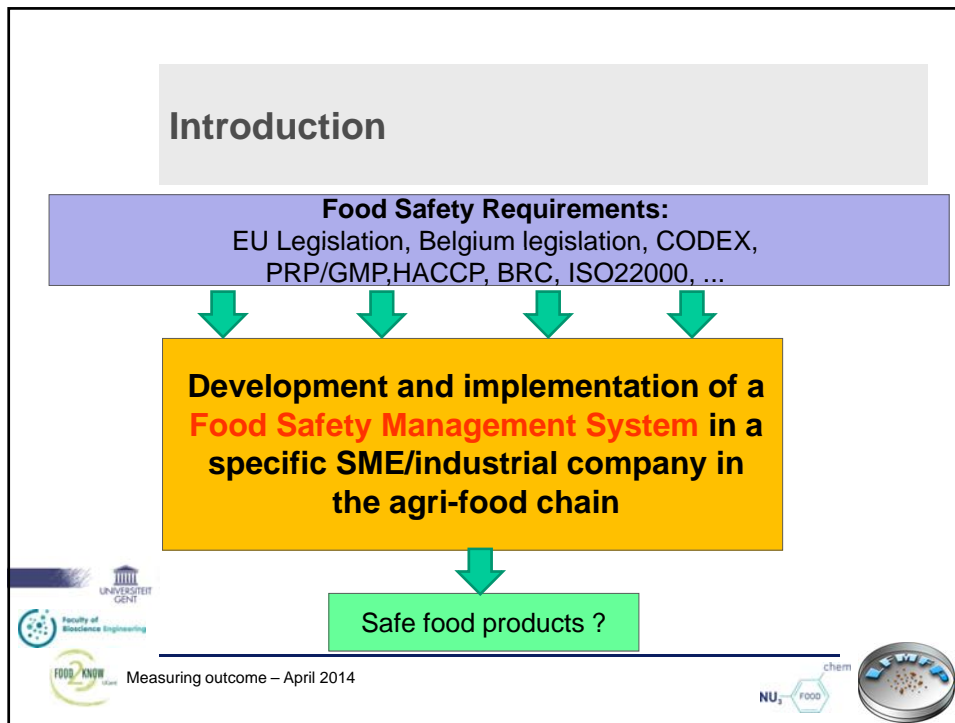
Belgian risk management decision in 2003 to :

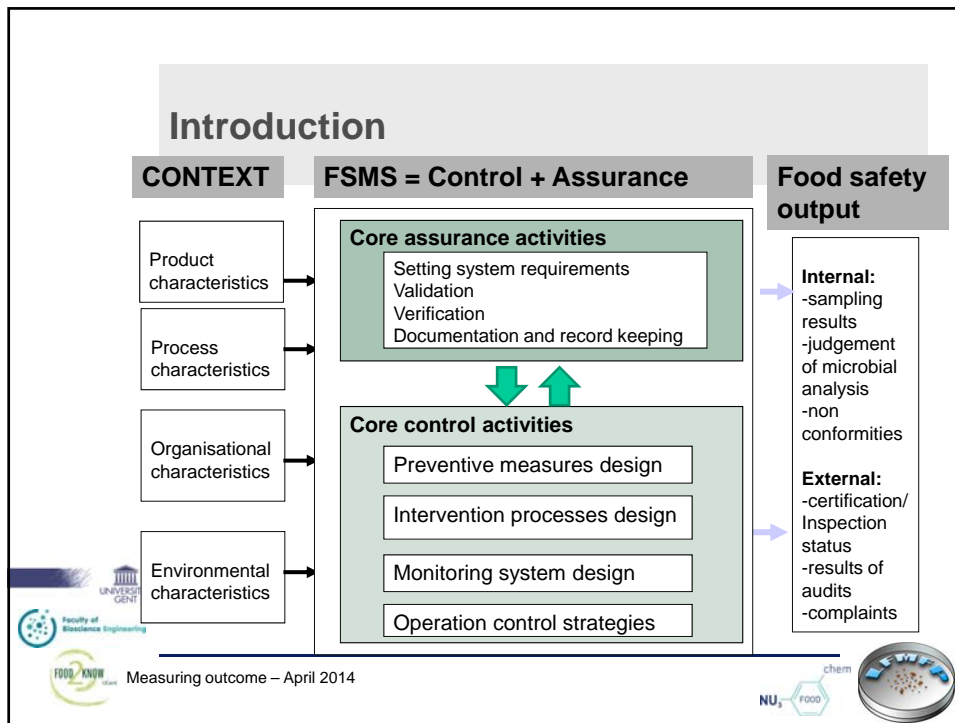
- introduce 'self-checking system' based on PRPs, HACCP, traceability, notification, legal quality aspects
- each food business operator along the agri-food chain must implement a 'self-checking system'
- certification is possible by commercial third parties or validation by governmental food safety authority
- certificate/validation → minus on yearly taxes
- **Research question : does the introduction of a self-checking system improve the safety ?**



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Introduction

- **FSMS-DI – content (58 indicators)**
 - Part I: Introductory section for Food Safety Management System (FSMS)**
 - A. Introduction questions (1 -11)
 - B. Selection of Representative Production Unit (RPU) for self-assessment (12-20)
 - Part II: assessment of contextual factors**
 - A. Assessment of product characteristics (A1-3)
 - B. Assessment of process characteristics (B4-6)
 - C. Assessment of organisation characteristics (C7-13)
 - D. Assessment of chain environment characteristics (D14-17)
 - PART III: assessment of core safety control activities**
 - E. Assessment of preventive measures design (E18-23)
 - F. Assessment of intervention processes design (F24-27)
 - G. Assessment monitoring system design (G28-34)
 - H. Assessment of operation of preventive measures, intervention process and monitoring systems (H35-41)
 - PART IV: assessment of core assurance activities**
 - I. Assessment of setting system requirements activities (I42-43)
 - J. Assessment validation activities (J44-46)
 - K. Assessment of verification activities (K47-48)
 - L. Assessment of documentation and record-keeping to support food assurance (L49-50)
 - PART V: assessment of food safety performance**
 - M. EXTERNAL Food Safety Performance (M51-54)
 - N. INTERNAL Food Safety Performance (N55-57)

Introduction

- FSMS-DI – indicators translated into grids

1. In which situation would you place the risk of your raw materials in your RPU (representative production unit)?

Situation 1

- Basic/major raw materials are not associated with high initial microbial levels and pathogens.
- Storage at (uncontrolled) room temperature conditions

Situation 2

- Minor raw materials/ingredients associated with high initial microbial levels and pathogens, which potentially can affect safety of final product.
- Storage at lower than room temperature but no specific, strict control requirements

Situation 3

- Basic/major raw materials associated with high initial microbial levels and pathogens, which potentially can affect safety of final product.
- High requirements on storage conditions and its control

Supporting information to differentiate situation 2 and 3

- When your raw materials are associated with high initial microbial levels and/or pathogens, and when they should be stored below room temperature, then it is level 2 or 3.
- Crucial for level 3 is that high requirements on storage are crucial for prevention of undesired growth of micro-organism (including pathogens).

Previous Next



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Introduction

- Indicators are organised in spiderwebs
- Results can be applied as internal audit
- Short/mid/long term improvements of FSMS

Back to questions

Here you can download the [questions of the FSMS assessment tool](#)

Product and process characteristics

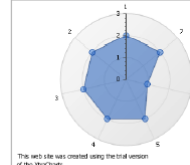


The web site was created using the trial version of the NeaChart.

Legend:
 1: A1: Risk of raw materials
 2: A2: Risk of production processes
 3: A3: Safety consequences of no-business concept
 4: B1: Extent of intervention steps
 5: B2: Production process changes
 6: B3: Rate of production process design changes

Mean score: 2.7

Organisation characteristics



The web site was created using the trial version of the NeaChart.

Legend:
 1: C1: Technological staff
 2: C2: Variability of workforce composition
 3: C3: Operator competence
 4: C4: Management commitment
 5: C5: Employee involvement
 6: C6: Technological
 7: C7: Information systems

Mean score: 1.9



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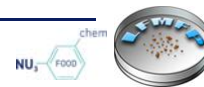
Introduction

- FSMS-DI:

- Tool available for PROCESSING FOOD INDUSTRY
 - On line www.pathogencombat.com – on paper
 - Dutch, French, English, Spanish, Greek
 - Data companies in database of WU
- ↓
↓
- Profiling countries – sectors – interventions - ...
 - Applied in Belgium study (june 2010 – october 2010)
 - Cooperation FASFC (Belgian authority) – UGent – WU



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Belgian study

- Quantitative study in Belgian food/feed processing companies
- Different sectors - different size
- With/without certified self checking systems : can we see a difference in level of food safety and level of implemented FSMS ?



- 200 companies invited → 82 respondents
- 50% certified for self checking
- 90% certified for commercial system (BRC, IFS, GMP+, etc)
- Only 3 companies without any certificate ...



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Belgian study

BIAS in our study ...

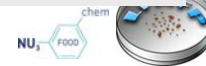
- Difficult to get companies involved
- Involved companies → assumed to have higher level in FSMS due to (multiple) certification
- Involvement of non certified companies ?

Questions:

- Can we identify clusters/profiles in FSMS performance in food processing companies in Belgium ?
- Do we see a difference in level of performance of food safety output (low – moderate – good) ?
- Do we see a difference in level of performance of actual implemented FSMS (basic – generic – tailored/scientific underpinned) ?



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Characterisation of respondents

n = 41

n = 41

Production sector	Micro and small (1-9 & 10-49)		Medium (50-249)		Large (> 249)		Total
	Not certified	Certified	Not certified	Certified	Not certified	Certified	
Meat products	10	2	2	3		2	19
Red meat slaughterhouses/cutting		3		5			8
Poultry slaughterhouses/cutting	2		4	2	2	1	11
Ready-to-eat meals	2	2	1	2			7
Dairy			3	2		1	6
Fish processing	4	1	1		1		7
Vegetables, fruits, potatoes trade/processing	2	1	2	3		2	10
Industrial bakery		1	2			1	4
Brewery		1		1		1	3
Feed		2		1			3
Others	2		1	1			4
Total	22	13	16	20	3	8	82

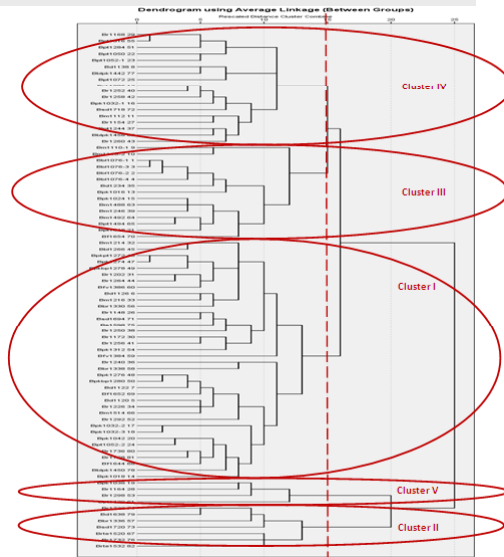
n = 35

n = 36

n = 11

Results - Clusters ?

- Individual database
- Hierarchical cluster analysis
- Dendograms
- 5 clusters could be defined



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Results - identification of clusters

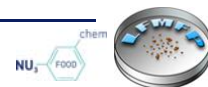
73% of all companies and 76% certified SC

Cluster	Number of companies	% certified for self checking	Sector
Cluster I	38	60	Animal products
Cluster II	7	71	Non animal products (FVP, candies, brewery, feed, bakery)
Cluster III	15	20	Animal products
Cluster IV	18	44	Mixture of companies but no intervention possible in process
Cluster V	4	50	Mixture

Overall performance



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Results – Cluster I versus III

Cluster I:
97 %
commercial
60 % self
checking

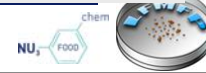
Cluster III:
90 %
commercial
20 % self
checking



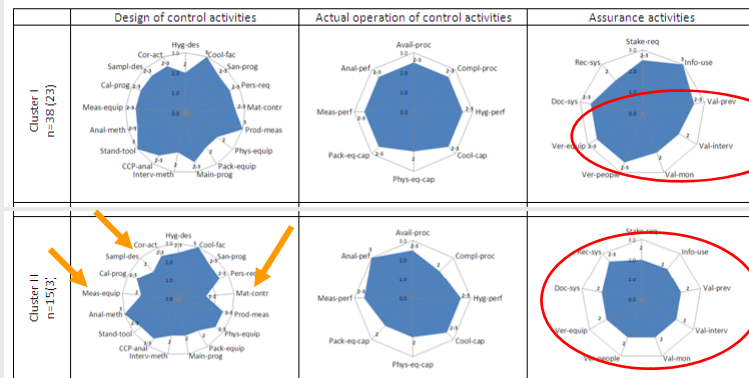
- Cluster I and Cluster III : all animal products



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Results – Cluster I versus III



- Cluster III less advanced FSMS compared to cluster I



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Belgian results in the European context

- Survey also conducted in Spain, Greece, the Netherlands
- Outside Europe e.g. Japan
- Differences with Belgium ?
 - Lower food safety output → internal evaluation of food safety output (e.g. product sampling, judgement criteria, non conformities) → more severe internal judgement by Belgian companies
 - Core assurance activities (validation and verification) → elaborated at higher level in Belgian companies
 - Belgian companies high level of performance of FSMS (more advanced, tailored and scientific underpinned)
 - Awareness of importance of food safety and FSMS ?
 - Drive of legislation / self checking systems ?

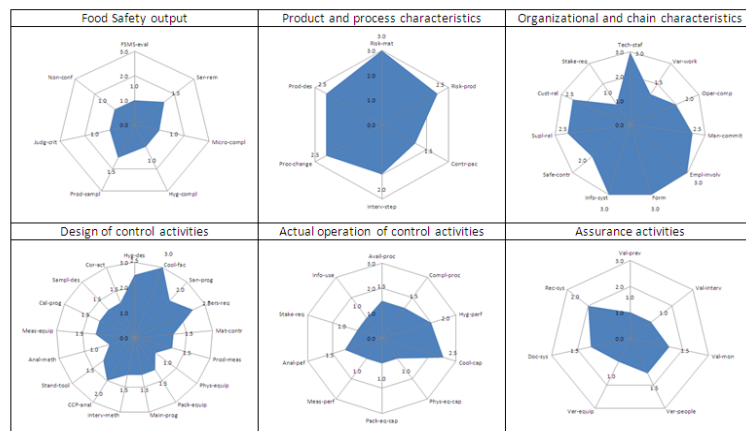


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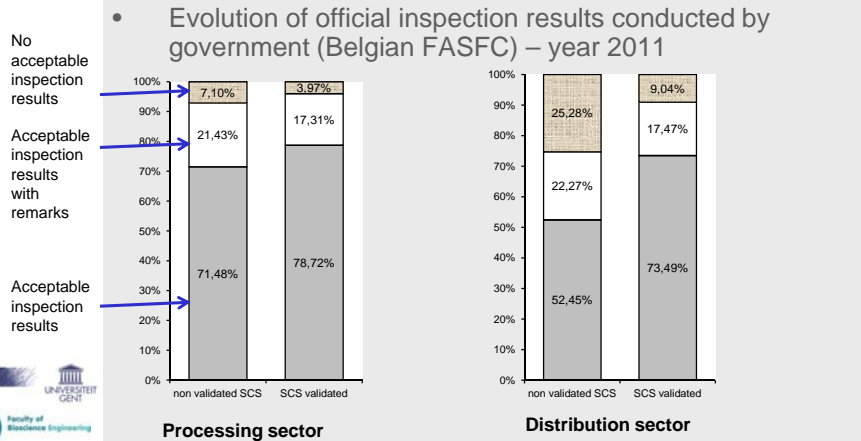


Belgian results in the European context

- Example of lowest cluster in European study (no Belgian companies...)



Improvement of FSMS by introduction self checking system ?



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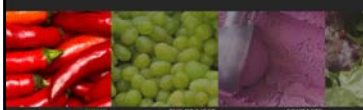
Conclusions

- Overall Belgian food processing companies demonstrated good performance of food safety output and rather advanced level of food safety management systems
- Validation and verification activities in a FSMS are less advanced worked out
- Impact of introduction of self checking systems was more difficult to see in transformation sector due the the high presence of voluntary standards and certification

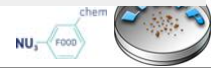
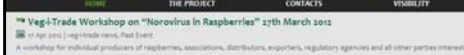
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Conclusions

- To be continued...
- Current running FP7 project 'Veg-i-Trade' 
- Extended to other actors in the chain (e.g. primary production, trade sector)
- Context → aspect of globalisation will be included
- Focus also on mycotoxins and pesticide residues next to microbial hazards
- Veg-i-Trade
 - www.veg-i-trade.org



Impact of Climate Change and Globalisation on Safety of Fresh Produce
Governing a Supply Chain of Uncompromised Food Sovereignty

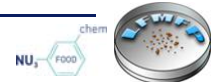


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- Responding companies



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Scientific papers

- 2 papers are published in Food Control
 - o Belgian study Jacxsens et al. (2014)
 - o European study Luning et al. (2014)

Contents lists available at ScienceDirect

Food Control

Journal homepage: www.elsevier.com/locate/foodcon

Performance assessment of food safety management systems in animal-based food companies in view of their context characteristics: A European study

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ABSTRACT

The Belgian food safety authority has provided incentives for food business operators to set up a certified self-checking system (SCS) based upon good practices and HACCP principles. A selection of food processing companies in Belgium was invited to take part in a self-assessment study to evaluate the effect of SCS certification on the performance of an implemented food safety management system (FSMS) and on company's microbiological food safety output according to their sector and company size and to compare the added value of SCS against voluntary standard certification.

Results revealed that the majority of food processing companies (FSOs) were already certified for a voluntary standard such as BRC or IFS prior to or soon to the Belgian SCS certification (SCS). Although the elements could be identified among the eight non-participating companies in the performance profile of their food safety management system and microbiological food safety output, overall no significant difference could be identified between SCS certified and non-certified SCS food processing companies.

