

Food safety culture

Interplay between food safety climate, food safety management system and microbiological hygiene and safety

Illustrated in farm butcheries and affiliated butcher shops

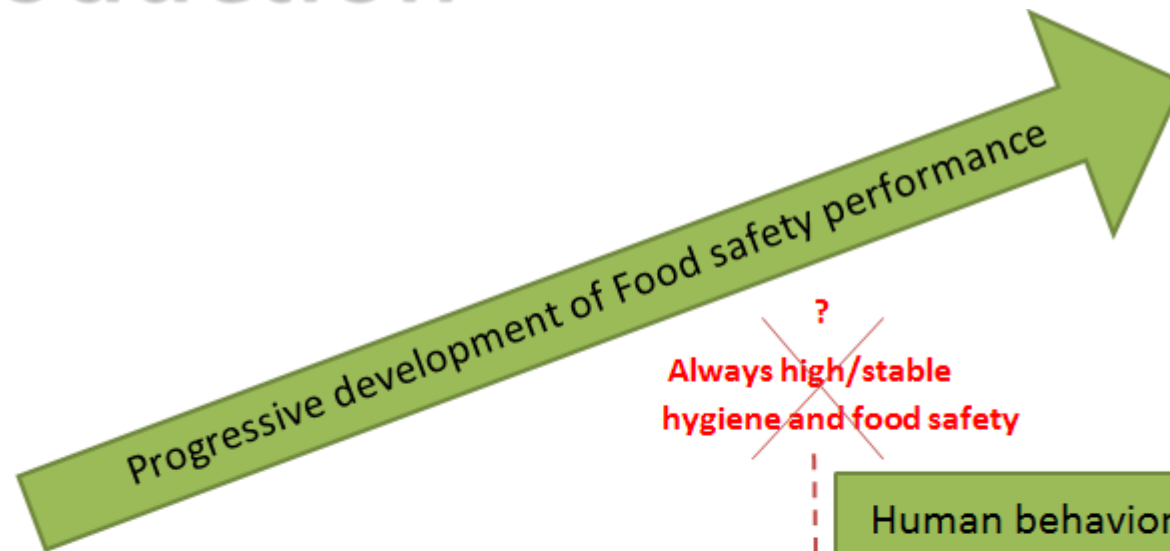
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Introduction



~~Always high/stable
hygiene and food safety~~

Human behavior
and Food safety
climate

Food safety
management and
Risk assessment

Food safety
technology and
analytical
procedures



Objective



- ▶ How to measure the food safety culture/ climate ?
 - Definition of Food Safety Climate/Culture
 - Definition of components of Food Safety Climate
 - Selection of indicators ⇒ tool to measure Food Safety Climate
 - Expert validation of tool



Multidisciplinary research: organizational psychologists and food safety management/food engineering

Objective



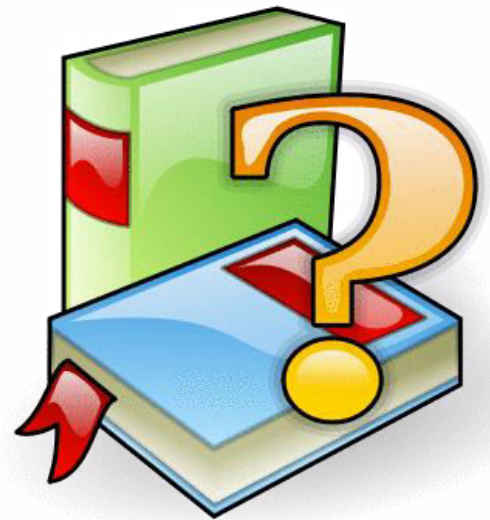
- ▶ Case study: Interplay between food safety climate, food safety management system and microbiological hygiene and safety

small scale farm butchereries vs affiliated butcher shops



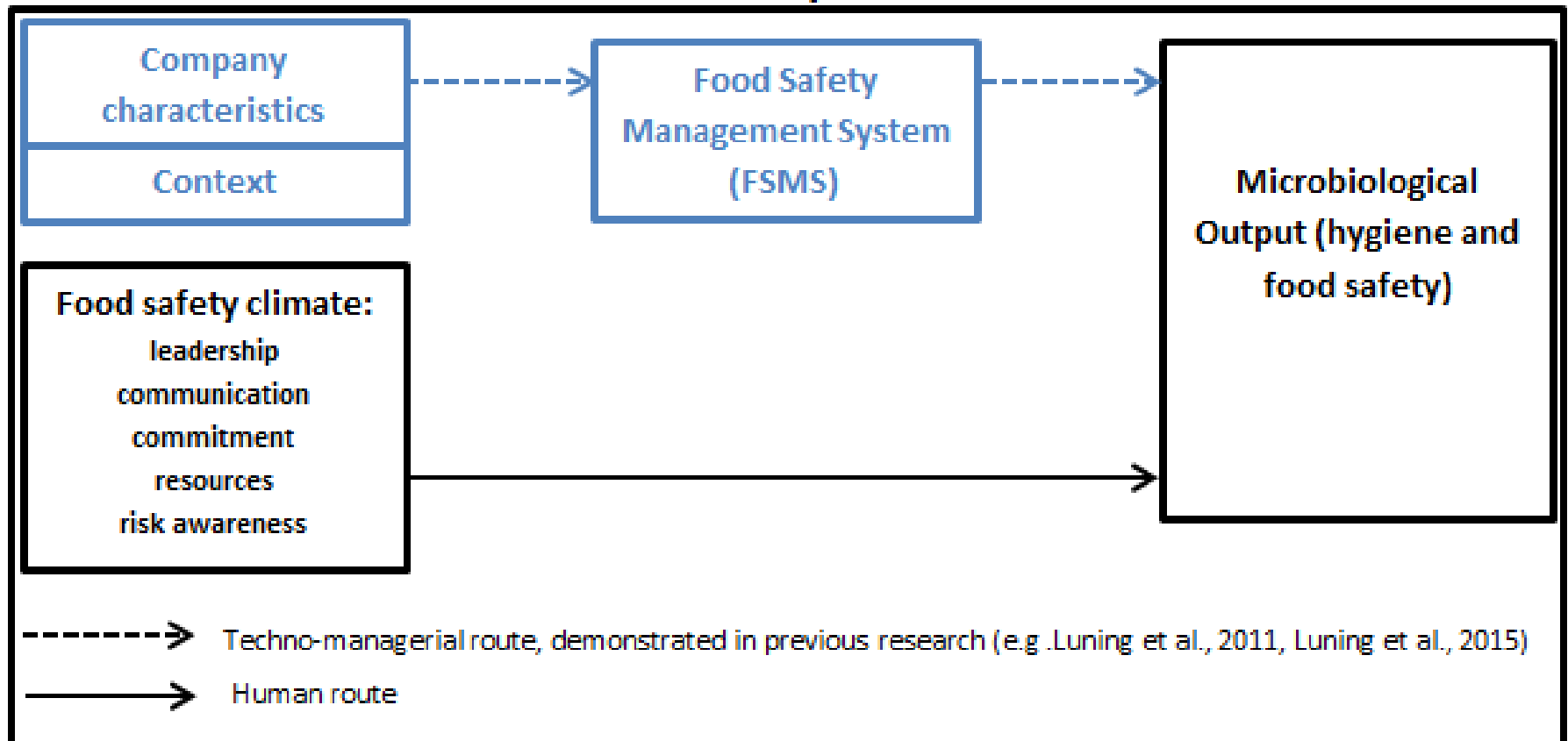
Definition Climate–Culture?

- ▶ Literature: No unanimous definition
- ▶ Climate/Culture? (Wiegmann et al. 2002)
 - Climate: – more temporary
– more subjective
– perception of individual
- ▶ Our research
 - FSClimate: – employees' perception
– snapshot
 - FSCulture: – bigger framework
– FSClimate is component
– Interplay of two routes



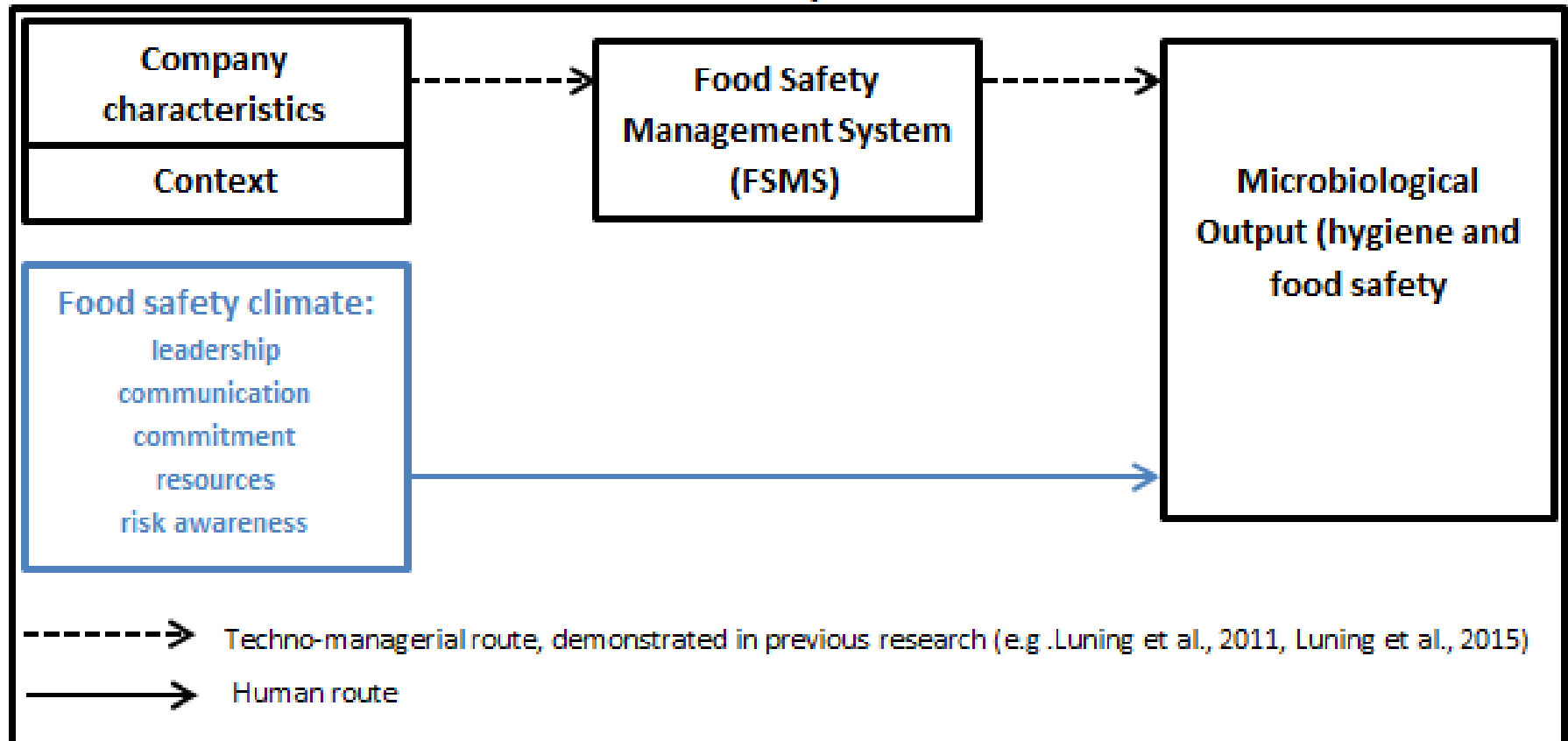
Definition Food Safety Culture

Food safety culture



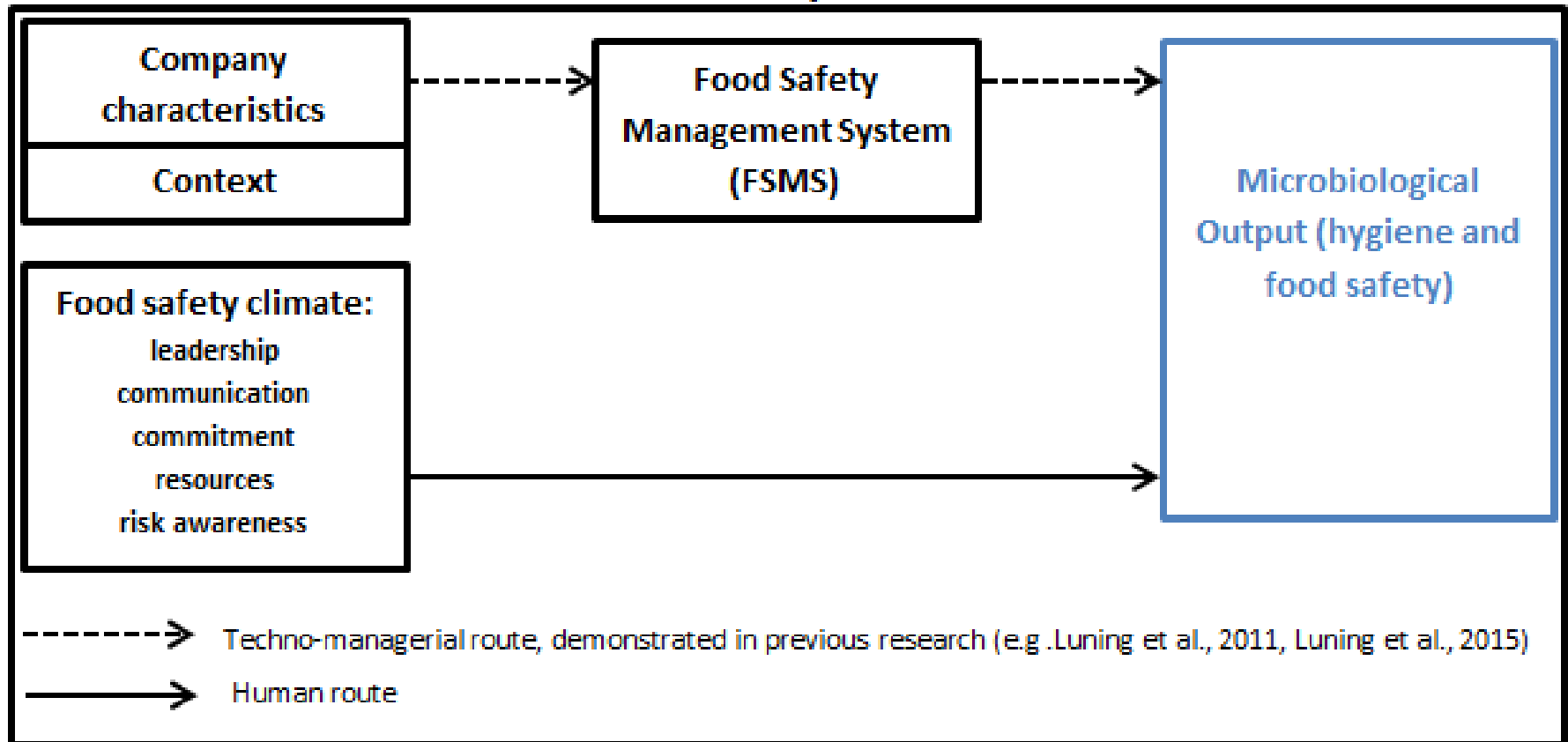
Definition Food Safety Culture

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Definition Food Safety Culture

Food safety culture



Development of a Food Safety Climate assessment tool: components

COMMITMENT

Perception of the extent of engagement and involvement concerning hygiene and food safety of all parties within the organization.



RESOURCES

Perception of the extent to which physical and non-physical means, necessary to operate in a hygienic and food safe way, are present in the organization.



FOOD SAFETY CLIMATE

RISK AWARENESS

Perception of the extent to which the organization is aware of the risks concerning hygiene and food safety and has these under control.



COMMUNICATION

Perception of the extent of transfer of hygiene and food safety related information within the organization.



LEADERSHIP

Perception of the extent to which the organization's leader(s) are able to engage staff in hygiene/safety performance and compliance to meet the organization's goals/vision/standards concerning hygiene and food safety.



Development of a Food Safety Climate assessment tool: indicators

Component	Example indicator
Leadership	In my organization, the leaders are able to motivate their employees to work in a hygienic and food safe way.
Communication	In my organization, the leaders communicate in a clear way with the operators about hygiene and food safety.
Commitment	In my organization, employees are actively involved by the leaders in hygiene and food safety related matters.
Resources	In my organization, employees get sufficient time to work in a hygienic and food safe way.
Risk awareness	My colleagues are alert and attentive to potential problems and risks related to hygiene and food safety.

Likert Scale: 1 → 5

Totally disagree → Totally agree

Validation of the Food Safety Climate assessment tool

- ▶ Twenty experts (Belgium/the Netherlands)
 - governmental agencies (n=4)
 - third party certification bodies (n=3)
 - sector associations (n=3)
 - universities (n=1)
 - Industry (big companies: n=6, small companies: n=3)
- ▶ Method: Kirezieva et al. (2013)
 - Relevant: Yes/No
 - 50% or less (n=10) relevant → considered for deletion
 - Importance score (not important ⇒ very important;
0 ⇒ 3)
 - Open suggestions



Validation of the Food Safety Climate assessment tool



Indicator	Relevance ^a	Importance rating (0→3, not to very important) ^b
LEADERSHIP		
L1	20 (20)	2.5 (1)
L2	20 (20)	3 (1)
L3	20 (20)	2 (1)
L4	20 (20)	2 (1)
L5	19 (19)	2.5 (1)
L6	c	c
COMMUNICATION		
C1	20 (20)	3 (1)
C2	19 (20)	2 (1)
C3	19 (20)	2 (1)
C4	19 (20)	2 (1)
C5	20 (20)	3 (1)
COMMITMENT		
E1	20 (20)	2.5 (1)
E2	19 (19)	2 (1)
E3	19 (19)	2 (0)
E4	20 (20)	3 (0)
E5	20 (20)	3 (1)
E6	19 (19)	2 (0.75)

Indicator	Relevance ^a	Importance rating (0→3, not to very important) ^b
RESOURCES		
M1	19 (20)	2 (1)
M2	20 (20)	2 (1)
M3	20 (20)	2 (1)
M4	20 (20)	2 (1)
M5	19 (20)	3 (1)
M6	19 (20)	3 (1)
RISK AWARENESS		
R1	20 (20)	3 (0.75)
R2	16 (19)	2 (1)
R3	19 (20)	2 (2)
R4	18 (19)	3 (1)
R5	20 (20)	2 (1)
^a number of experts considering the indicator relevant (total number of respondents for the indicator) ^b median of the importance rating (interquartile distance) ^c indicator added after expert validation		

L6: In my organization, the leaders strive for a continuous improvement of hygiene and food safety.

Case study: Interplay between food safety climate, food safety management system and microbiological hygiene and safety in farm butcheries and affiliated butcher shops

▶ Set-up

- 4 micro scale farm butcheries (FB1–FB4)
 - <10 employees (EC., 2003) = micro scale
 - Less elaborated/basic FSMS (expected)
- 4 affiliated butcher shops (AB1–AB4)
 - affiliates of a large scale central coordinated meat distribution company
 - >250 employees (EC., 2003) = large scale
 - Elaborated/fit-for-purpose FSMS (expected)



Case study: Interplay between food safety climate, food safety management system and microbiological hygiene and safety in farm butcheries and affiliated butcher shops



▶ Material & Methods

- Assessment of context riskiness and FSMS performance
 - FSMS Diagnostic instrument (questionnaire with 58 indicators)
 - Demonstrated in previous research (e.g. Luning et al. 2011)
- Assessment of Food Safety Climate
 - The Food Safety Climate assessment survey
 - owners and every employee of butcheries FB1–FB4 (n=16)
 - all employees in affiliates AB1–AB4 (n=23)

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▶ Assessment of microbiological output (food safety/hygiene)



Three visits:

- 2 samples raw minced beef meat
 - Hygiene indicators: *E. coli*, *S. aureus*
 - Overall contamination: Total aerobic count, Lactic acid bacteria
 - Pathogens: *Salmonella*, *E.coli* O157:H7, *L.monocytogenes*
- 5 Swabs of knives, cutting board, mincer
 - Total Aerobic Count, *Enterobacteriaceae*
- 5 *L.monocytogenes* swabs
- Hands (present staff)
 - *E. coli*, Total Aerobic Count



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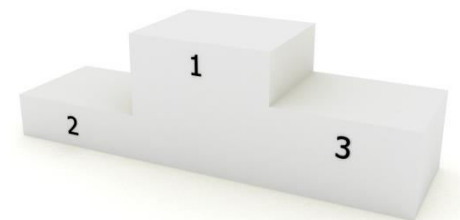
▶ Results case study

- Ranking of the butcheries for the different variables
 - Food Safety Climate
 - Context riskiness
 - Level of FSMS
 - Microbiological output (food safety/hygiene)



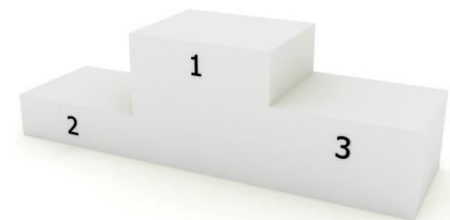
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Level	<u>FSClimate</u>	<u>Context</u>		<u>FSMS</u>	<u>MO hygiene/safety</u>
		Prod/Proc	Org/Ch		
					AB2 (4)
	AB (4.39±0.66)	AB+FB (2_3)	FB (2_3)	AB (2_3-3)	FB1 and AB1 (7)
					AB3 (9)
					FB2 and AB4 (11)
	FB (4.09±0.72)		AB (1_2)	FB (1)	FB4 (13)
					FB3 (14)



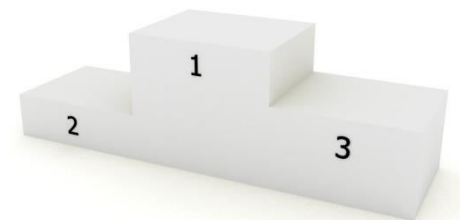
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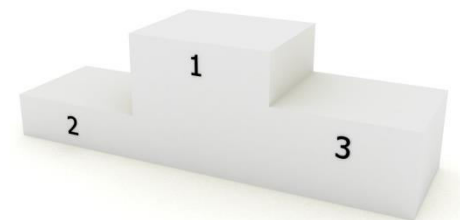
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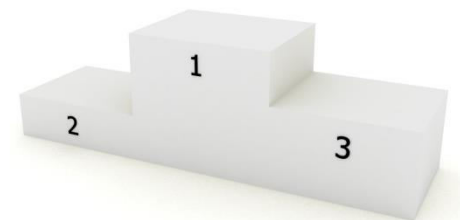
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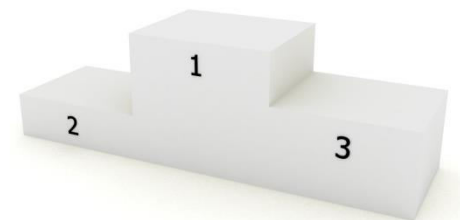
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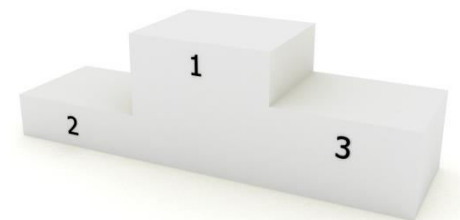
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Conclusion



- ▶ New assessment tool to measure FSClimate developed and validated

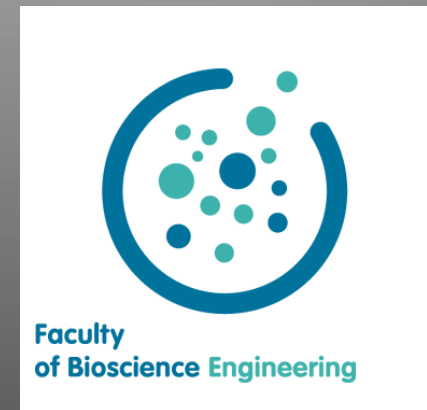
 - ▶ Case study
 - FSClimate score: AB > FB (but still high)
 - Microbiological hygiene/safety: AB > FB
 - FSMS : AB > FB
 - FSCulture: AB > FB
 - Good food safety climate not sufficient to counteract the lower level of the FSMS

 - ▶ Future perspectives
 - More focus on individual employees
- ↓
- Investigating the impact of employees' characteristics and employee behavior in the relation between FSClimate and microbiological output.



Thank you for your attention!

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