CA18105

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Risk-based meat inspection and integrated meat safety assurance

Multi-criteria risk categorisation of abattoirs with a focus on the food safety management system

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Objectives

RIBMINS WG3 Scope: **Abattoir-level controls and risk categorisation of abattoirs**

WG3, Objective 3: **Assessment of the performance of food safety management systems in abattoirs**

(to be used in Obj. 4: Risk categorisation of abattoirs)

Risk-based categorization: basic principles

- End-point is food safety (public health impact)

- Focus on causal factors that drive this food safety

- Science-based

- Transparent procedure

- User-base: FBOs and competent authorities

- Methodology: MultiCriteria Decision Analysis (MCDA)

- Each causal factor is a criterion

- Criteria weights to reflect relative importance
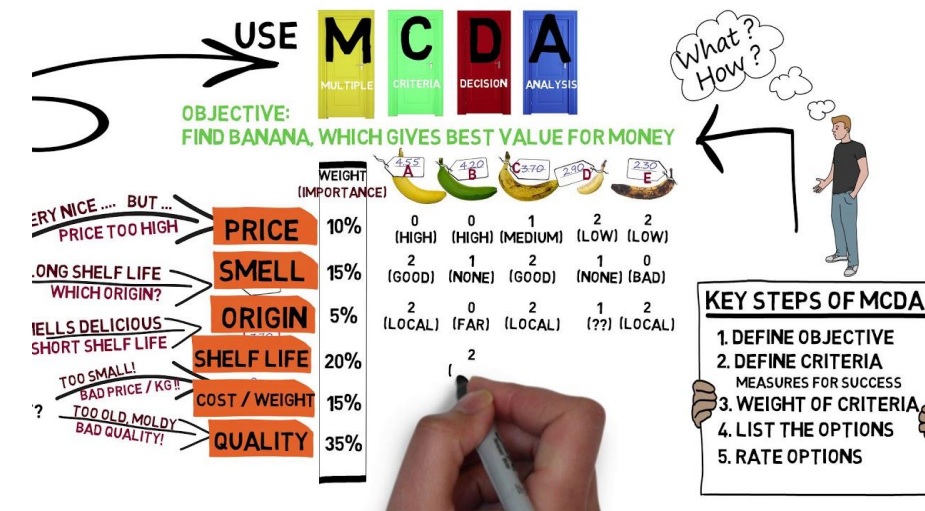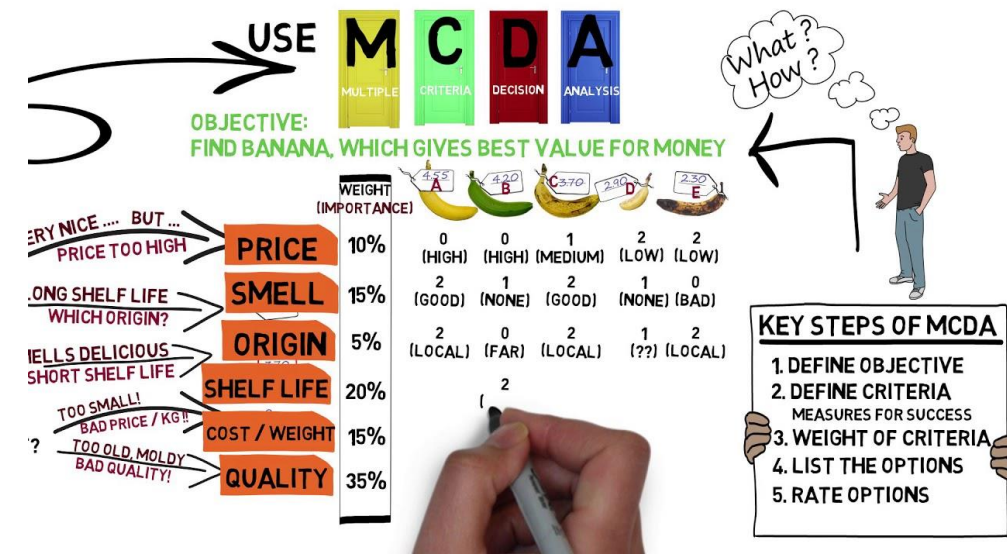
Three key types of criteria

- **System**:
  - Food Safety Management System
  - Monitoring system and results
  - …

- **Process**:
  - Horizontal vs. vertical slaughtering
  - Separation of clean vs. dirty areas
  - Post-chilling interventions
  - …

- **Personnel**
  - Knowledge and skills
  - Food safety culture
  - …

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Food Safety Management System Performance Assessment (FSMS-PA) - Definitions

1. What is a '*Food Safety Management System*' in an abattoir?

'*the set of **interrelated** and **interactive** policies, objectives and processes that achieve the assurance that the produced carcase meat will not cause **adverse health effect** to the consumer when it is prepared (cooked) and consumed in accordance with its intended use'** (adapted from ISO 22000)

2. What is '*performance*' and '*assessment*'?

Performance = the fulfilment of a promise or duty (or objective) OR a measurable result

Assessment = making an (ideally measurable) judgment on something

*It is clear from this definition almost all activities in an abattoir can be considered part of the FSMS

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3. In this work FSMS-PA in an abattoir is defined as...

'a ***measurable judgment*** *on the degree or quality of fulfilment or execution of the set of interrelated and interactive policies, objectives and processes to achieve the assurance that the **produced carcase meat** will not cause adverse health effect to the consumer when it is prepared (cooked) and consumed in accordance with **its intended use**'*

WG3.3 Objective therefore is to develop a tool or method for the this judgment

The 'ideal' FSMS-PA tool or method

1. Specific, measurable, clear and objective targets

2. Clear, objective limits between categories

3. Cost efficient

4. Easy to implement (staff training, equipment, lab work etc.)

5. Critical FSMS components identified appropriately weighted

6. One score per hazard OR One score for ALL hazards

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FSMS-PA Challenges

1. **Complex (interlinking and overlapping policies, procedures etc.)**

2. **Many and variable hazards. Hazard prioritisation**

3. **Lack on data on hazard sources and risk levels (EPI data, farm picture etc.)**

4. **No SMART criteria (hazards not measurable, test results not timely etc.)**

5. **Source of hazards outside the control of abattoirs**

6. **Flexibility needed to accustom different abattoirs sizes**

7. **Cost**

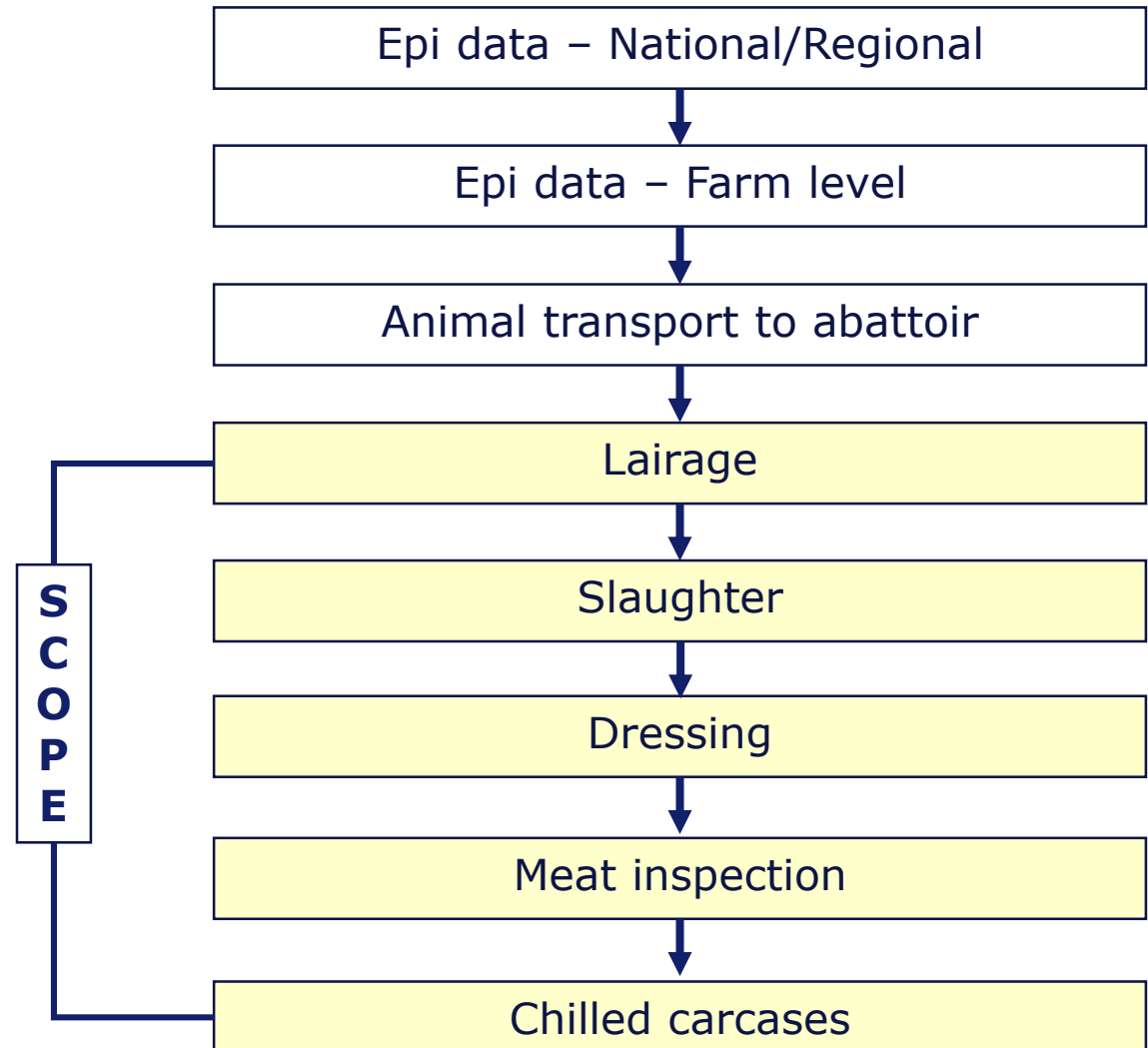**RIBMINS**

FSMS Key points: Scope and hazards

1. FSMS Scope

- Raw materials and finished products
- Production stages and levels

In this work:

The scope includes al stages from lairage to the carcases in the chiller

(NOTE: Action on FCI is part of this, as it takes place with these stages)

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Epi data – National/Regional

↓

Epi data – Farm level

↓

Animal transport to abattoir

↓

Lairage

↓

Slaughter

↓

Dressing

↓

Meat inspection

↓

Chilled carcases

SCOPE

2 FSMS-PA models

A. Holistic FSMS-PA

B. Outcome-based FSMS-PA

A. Holistic FSMS-PA

Process and principles

1. Break FSMS down in components (**FSMS mapping**)

2. Assess ideal effectiveness of each FSMS component against each hazard (weighting factor)

3. Assess (score) the real-life effectiveness of each component in an abattoir (audits etc.)

4. Multiply real-life component scores with component and hazard weighting factors

5. SUM the products for final FSMS performance score for a hazard

6. Add scores from **all hazards** for final abattoir FSMS performance score

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B. Outcome-based FSMS-PA

Process and principles for <u>each</u> determined hazard

1. Agree outcome (e.g. level of hazard on carcases in chiller)

2. Agree units of measurement (e.g. cfu/g)

3. Agree number of outcome categories (=degrees of effectiveness), e.g. L, M and H

4. Establish the limits separating the outcome categories

5. Design monitoring protocol

   - *How*: Sampling method

   - *What*: Carcase, environment etc.

   - *Frequency*: how often in terms of time, number of carcases etc.

3. Implement monitoring protocol and assign FSMS to outcome appropriate outcome category

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B. Outcome-based FSMS-PA

Note:

In the Outcome FSMS-PA model the only thing that counts is the final outcome. The process and any other factors are irrelevant!

How important is this fact?

Animals

High levels of contamin.

Abattoir A

Good practices

Carcases (outcome)

Medium levels of contamin.

Animals

Low levels of contamin.

Abattoir B

Poor practices

Carcases (outcome)

Medium levels of contamin.

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Strengths and weaknesses of the two FSMS-PA models

	Strengths	Weaknesses
Holistic FSMS-PA	• Can identify the source of problems • More effective	• Higher cost • More complex
Outcome-based FSMS-PA	• Easy to design and monitor • More Intuitive. Easier to understand • Cheaper	• Does not identify the source of a problem • Cannot separate the effect from the abattoir FSMS on outcome from influence from external factors (e.g. source prevalence)

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Where are we now?

A. Holistic method

Completed

1. Hazard selection

2. FSMS breakdown (mapping)

3. FSMS components assessment (weighting)

Ongoing

1. Hazards weighting

2. FSMS components scoring system

3. Present FSMS-PA model in an **interactive form**

4. Work on **alternative model**

**B. Outcome-based method**

Completed

1. Model design

Ongoing

1. Application of model on Campylobacter in poultry

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Cattle

	Salmonella	VTEC	Dioxins	DLPBs	Total component scores against ALL hazards
Monitoring and continuous improvement	1.90	1.90	0.70	0.78	5.28
Inform and follow up with farms	1.40	1.40	1.13	1.00	4.93
Use different sale channels	1.80	1.80	0.75	0.57	4.92
Internal auditing	1.70	1.70	0.75	0.57	4.72
Preselection of herds before slaughter (WP2)	1.80	1.80	0.50	0.56	4.66
HACCP (as per Codex)	1.80	1.80	0.60	0.44	4.64
Microbiological testing	1.90	1.90	0.20	0.22	4.22
Staff training	1.80	1.80	0.10	0.33	4.03
Communication	1.00	1.00	1.00	1.00	4.00
FCI with additional WG2 suggestions	1.44	1.56	0.43	0.43	3.86
Carcase interventions at slaughter	1.90	1.90	0.00	0.00	3.80
Adapting line speed	1.80	1.80	0.00	0.00	3.60
Good hygiene practices	1.80	1.80	0.00	0.00	3.60
Special slaughter arrangements	1.80	1.80	0.00	0.00	3.60
Logistic slaughter	1.60	1.70	0.11	0.13	3.54
Conventional chilling (carcase fit for human consumption: dry chilling, blast freezing)	1.50	1.50	0.00	0.00	3.00
Hygiene assessment systems	1.50	1.50	0.00	0.00	3.00
Carcase interventions during chilling	1.38	1.38	0.00	0.00	2.76
Post-chilling carcase interventions (cutting/deboning stage)	1.33	1.33	0.00	0.00	2.66
GMPs	1.30	1.30	0.00	0.00	2.60
Pre-slaughter, inside lairage interventions (shearing/clipping)	1.20	1.40	0.00	0.00	2.60
Financial penalisation of farmers	1.30	1.20	0.00	0.00	2.50
FCI as it is now	0.89	0.78	0.38	0.38	2.43
Carcase grading (class A, B, C etc.)	1.00	1.00	0.30	0.11	2.41
Carcase freezing	1.00	1.00	0.00	0.00	2.00
Other PRPs (pest control, storage conditions etc.)	1.00	1.00	0.00	0.00	2.00
	38.84	**39.05**	**6.95**	**6.52**	

Overall FSMS Components effectiveness against all hazards in cattle
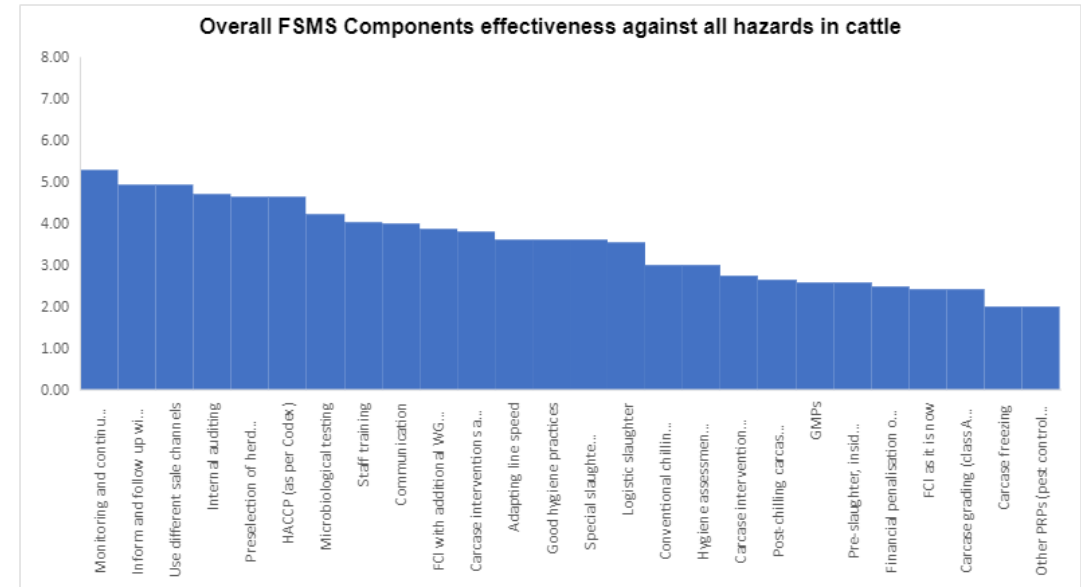
Where are we now? Example: Pigs

Pigs	Samonella spp	Y. enterocolitica	T. gondii	Total component scores against ALL hazards
Use different sale channels	1.70	1.89	1.90	5.49
FCI with additional WG2 suggestions	1.78	1.56	1.67	5.01
Preselection of herds before slaughter (WP2)	1.80	1.67	1.40	4.87
Microbiological testing	1.90	1.89	0.50	4.29
Monitoring and continuous improvement	1.70	1.67	0.88	4.25
Inform and follow up with farms	1.30	1.33	1.56	4.19
Carcase freezing	1.00	1.00	1.90	3.90
Carcase interventions at slaughter	1.80	1.89	0.10	3.79
HACCP (as per Codex)	1.60	1.56	0.60	3.76
Internal auditing	1.60	1.56	0.56	3.72
Good hygiene practices	1.70	1.78	0.00	3.48
Communication	1.20	1.22	1.00	3.42
Staff training	1.60	1.44	0.30	3.34
Logistic slaughter	1.60	1.56	0.10	3.26
Carcase grading (class A, B, C etc.)	1.00	1.11	0.90	3.01
FCI as it is now	1.56	0.78	0.67	3.01
Carcase interventions during chilling	1.22	1.38	0.11	2.71
Post-chilling carcase interventions (cutting/deboning stage)	1.25	1.43	0.00	2.68
Adapting line speed	1.33	1.25	0.00	2.58
Conventional chilling (carcase fit for human consumption: dry chilling, blast freezing)	1.30	1.22	0.00	2.52
Special slaughter arrangements	1.38	0.88	0.22	2.48
Hygiene assessment systems	1.11	1.22	0.11	2.44
GMPs	1.20	1.00	0.20	2.40
Financial penalisation of farmers	0.78	0.67	0.67	2.12
Other PRPs (pest control, storage conditions etc.)	0.89	0.88	0.33	2.10
Pre-slaughter, inside lairage interventions (shearing/clipping)	0.50	0.33	0.13	0.96

Overall FSMS Components effectiveness in pigs

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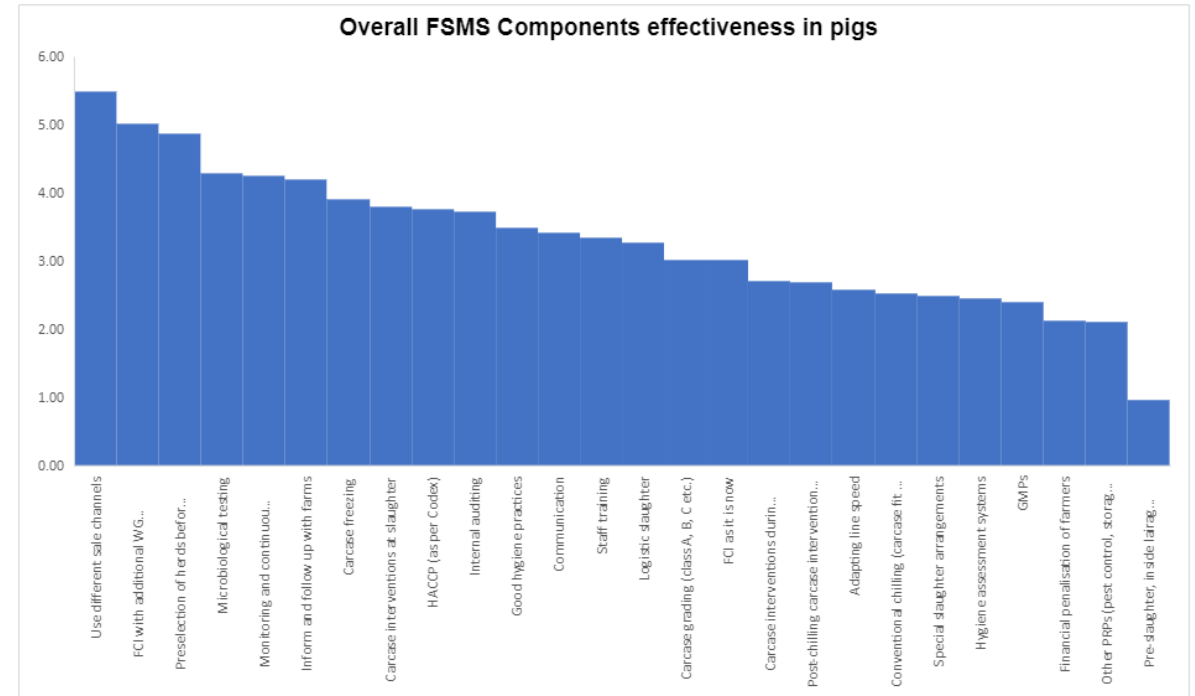
Next steps

1. **Finish ongoing issues**

2. **Apply FSMS-PA models**

3. **Prepare and submit paper**

4. **Prepare and submit final report**

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