Difference between sampling during production process or for validation

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Farmhouse and Artisan Cheese & Dairy Producers European Network

Erasmus+

Food Safety

Knowledge about the hazard or risk and ways of minimising the risk

What are the hazards in cheese and dairy products?

Food Safety

Knowledge about the hazard or risk and ways of minimising the risk

What are the hazards in cheese and dairy products?

Example: Fragments of glass	Physical Hazards
Example: *Listeria monocytogenes*	Microbiological Hazards
Example: Antibiotics	Chemical Hazards

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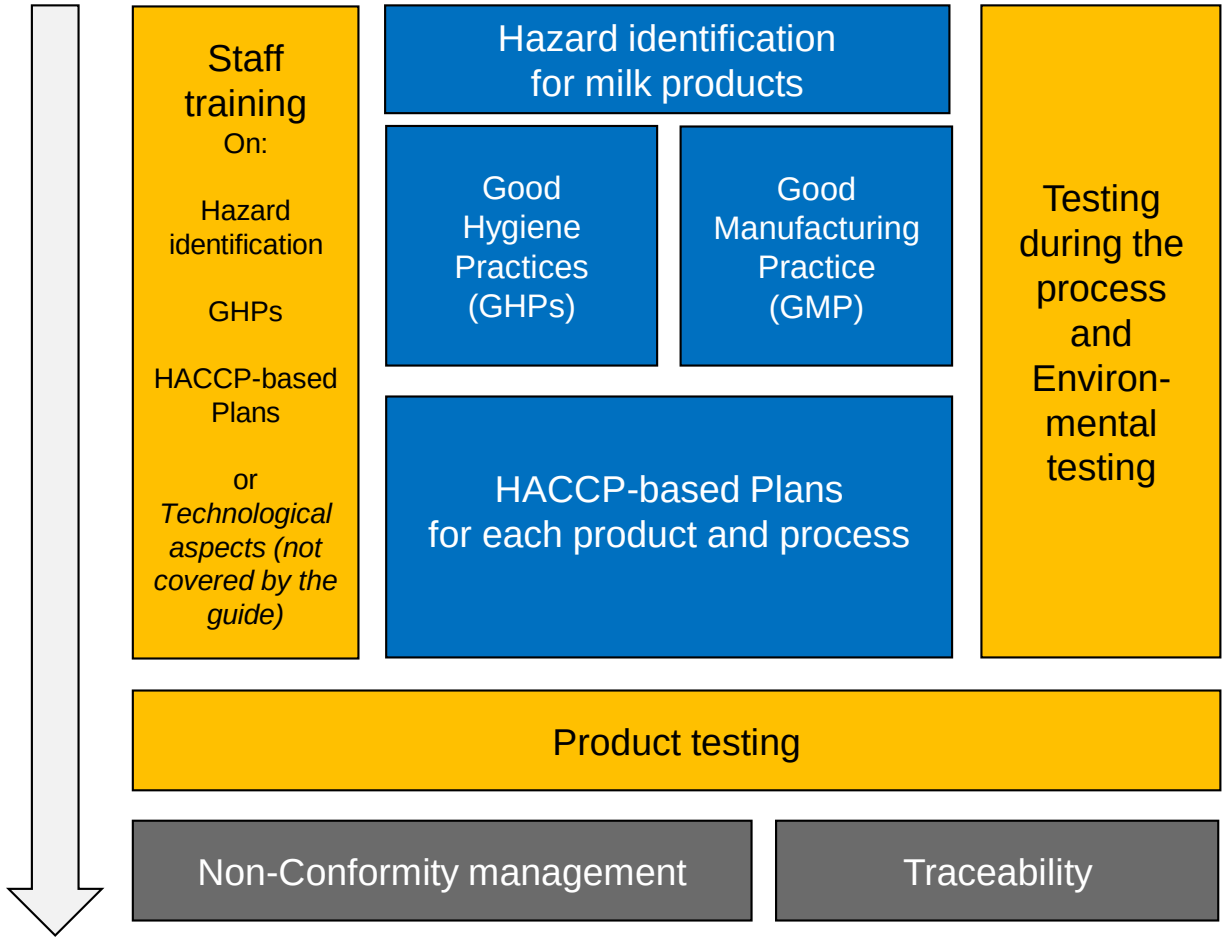
Self Monitoring Measures

play an essential role in the delivery of the food safety management system

How to control the hazards in cheese and dairy products?



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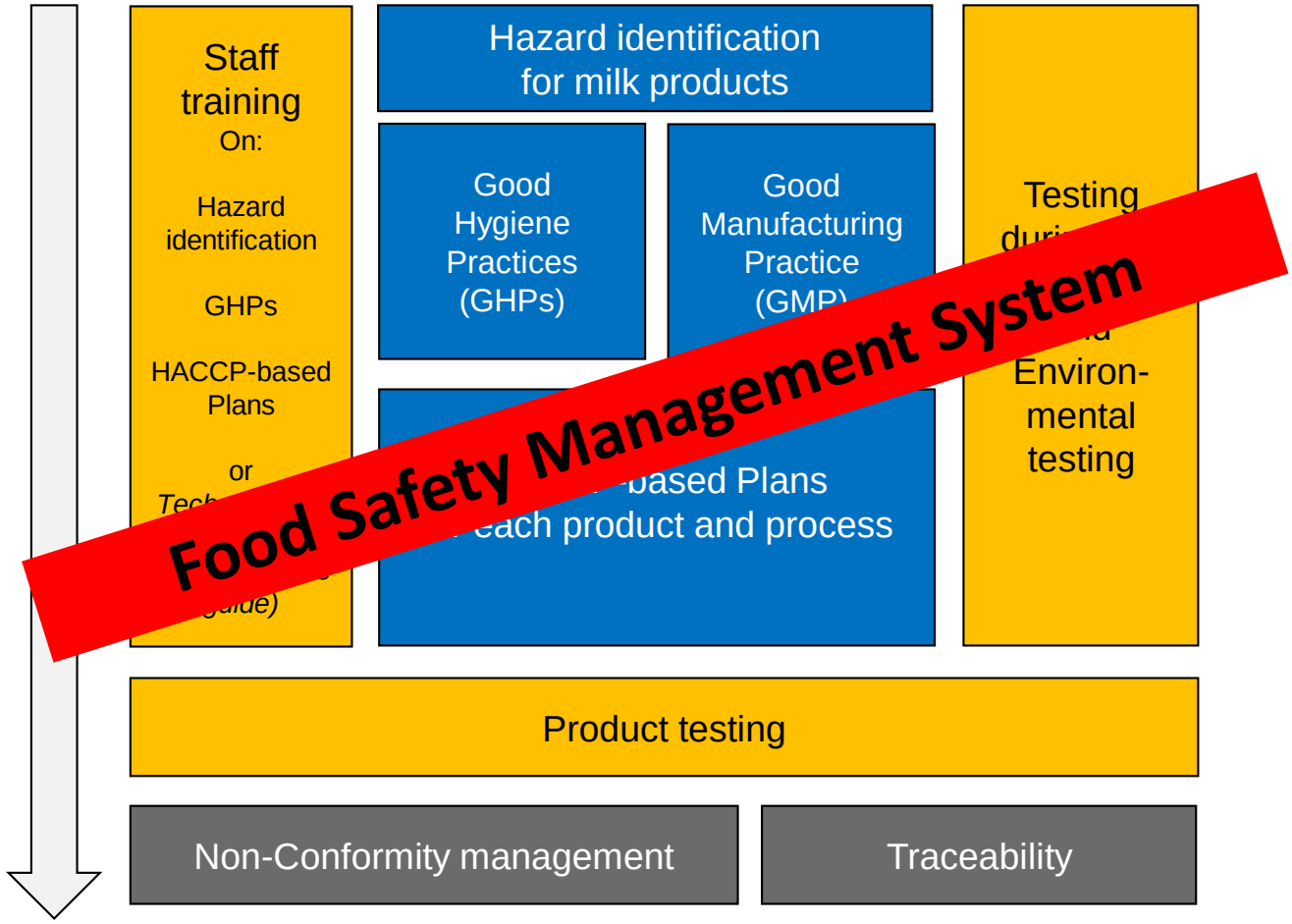

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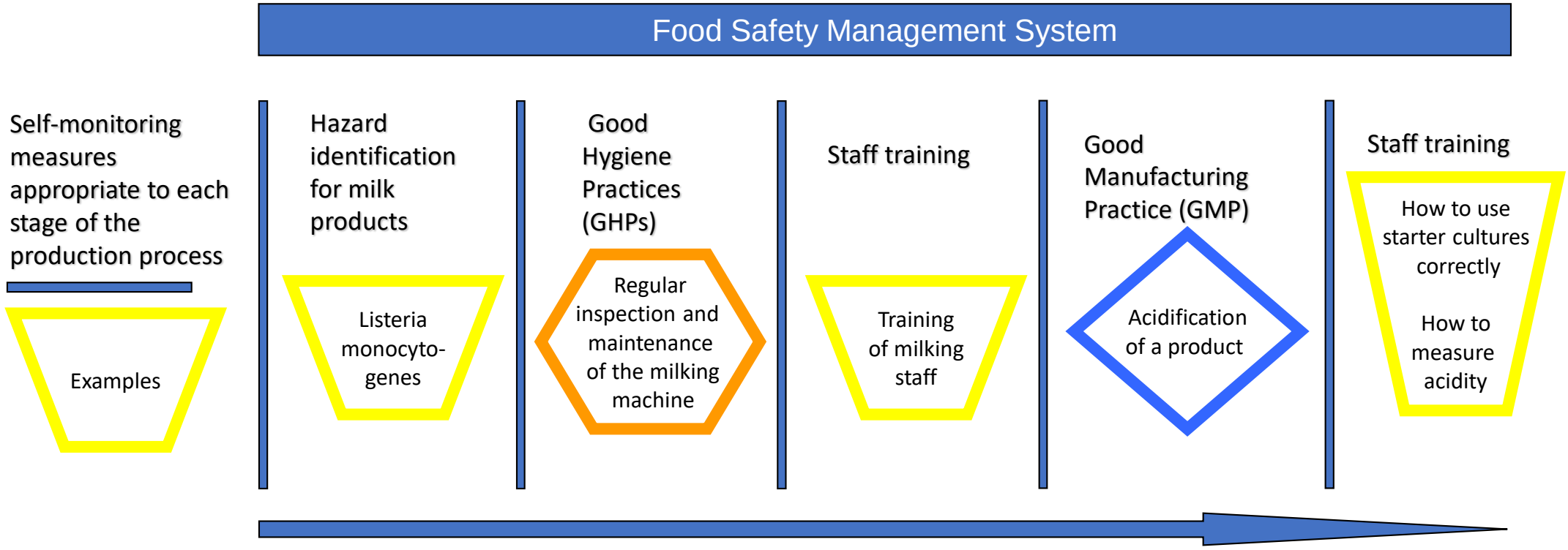
Self Monitoring Measures

The food safety management system should set out self-monitoring measures appropriate to each stage of the production process.



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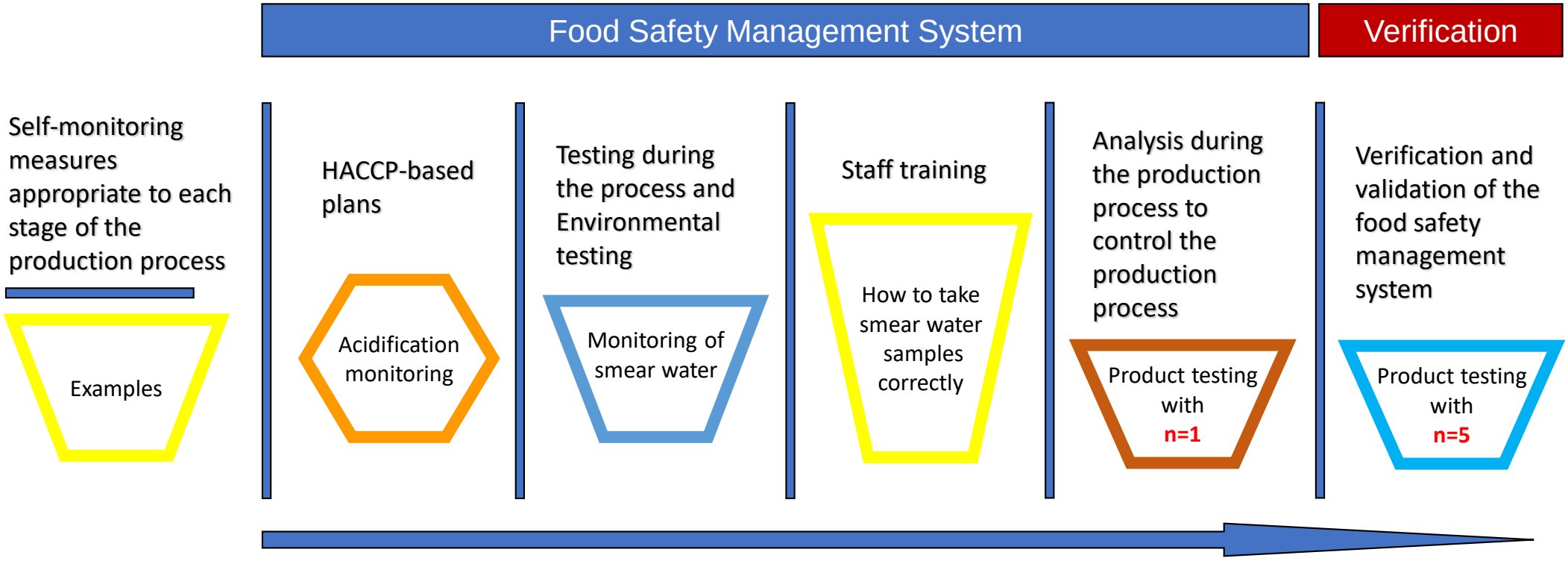


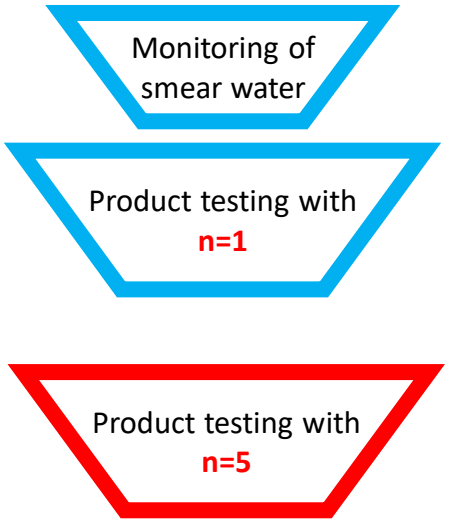
Means of Analysis

Difference between „testing during the process“, „environmental testing“ and „product testing for validation“

How to control the hazards in cheese and dairy products?

Producers can only assure food safety by the use of a food safety management system. Reliance on end-product testing **alone** is not sufficient and ineffective.

- **Self monitoring:** Analysis during the production process to control the production process
- **Verification:** Verification and validation of the food safety management system



Preventive Actions (some examples)

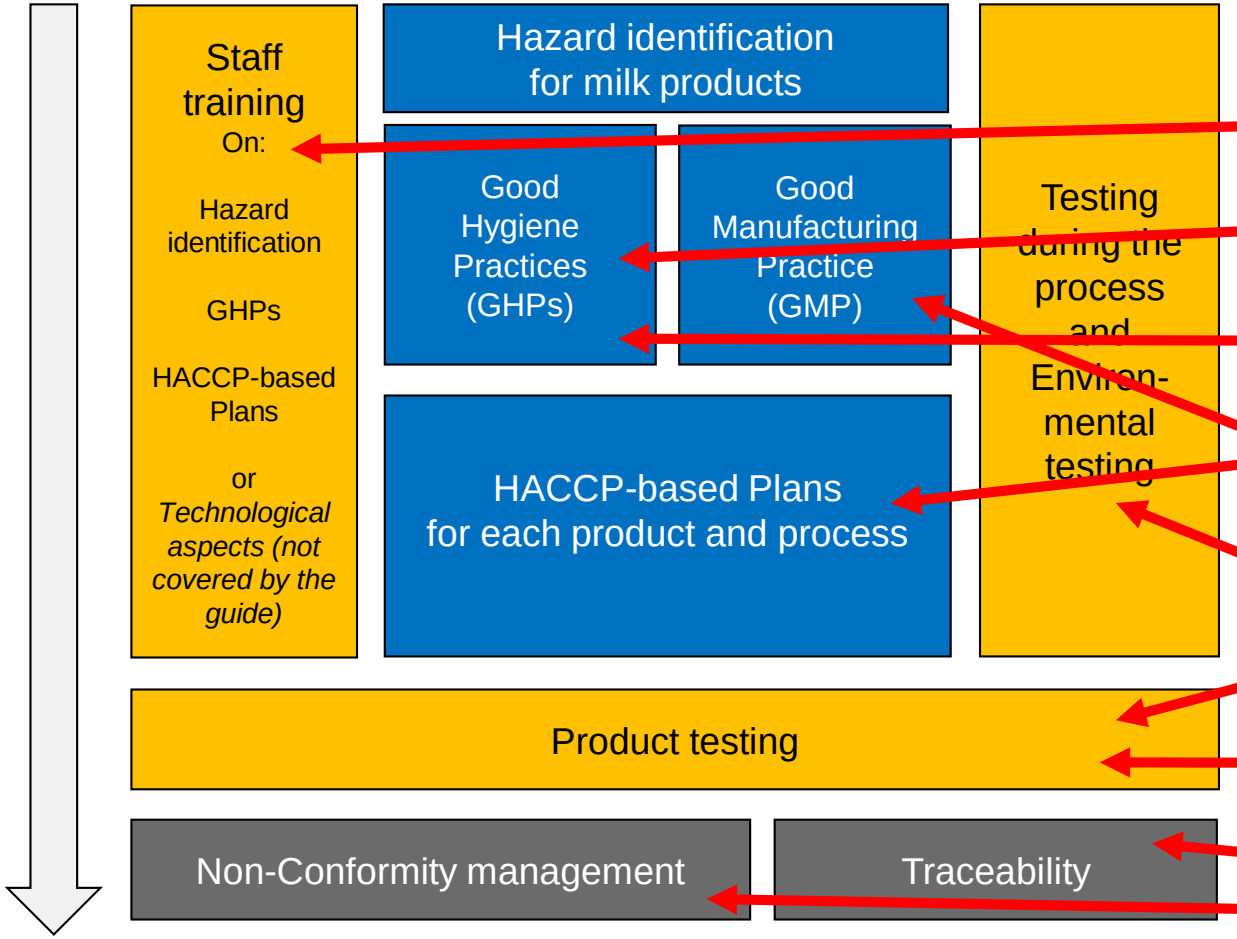
Knowledge about the hazard or risk and ways of minimising the risk

Degrees of probability: high, medium, low

Process step	Facultative measures to prevent	Listeria monocytogenes	Salmonella	Staphylococcus aureus	Escherichia coli
Milk production	Choosing well cleanable and maintainable milking equipment	Prevent poor type or condition of milking equipment		Prevent poor type or condition of milking equipment	Prevent poor type or condition of milking equipment
	Periodic milking machine maintenance	X	X	X	X
	Staff training on process hygiene	Proper milking procedures, hygiene in milk production, milking order	Identification of clinical signs of salmonellosis like diarrhoea, Use of manure from other farms with great caution	Proper milking procedures, hygiene in milk production, milking order	Identification of E. coli mastitis
	Cattle testing prior to purchase		Carriers of Salmonella may excrete the bacteria in their stools	Carriers of staphylococci aureus may excrete the bacteria in the milk	
	Regularly milk testing for somatic cell counts			X	
	Regularly bulk milk testing	X	X	X	X
	Employee training on personal hygiene		Salmonella may cause diarrhea, carriers of Salmonella may excrete the bacteria in their stools	Covering wounds, use of masks in case of a bad cold	
	Stool sample of each employee		X		
	Develop cleaning and disinfecting plan	X	X	X	X
	Validation of cleaning and disinfection procedures	X	X	X	X

How to control a hazard?

Application of self monitoring measures to control *Listeria monocytogenes*

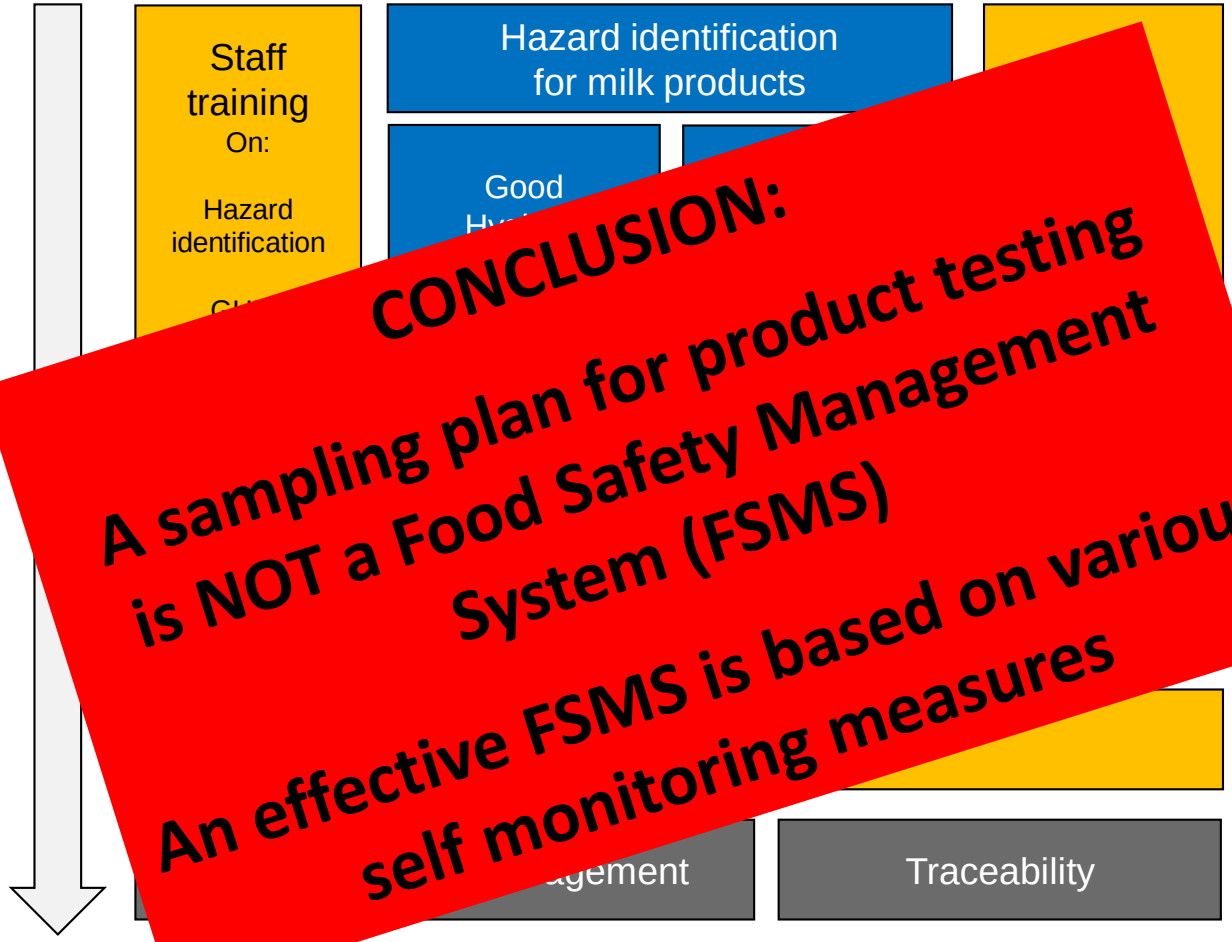


Example: How to control Listeria monocytogenes

- **Training of milking staff**
  e.g. Proper milking procedures, hygiene in milk production, milking order
- **Regular inspection and maintenance of the milking machine**
  e.g. Prevent poor type or condition of milking equipment
- **Training of staff**
  e.g. Clothing and footwear exchange before entering production and ripening rooms
- **Acidification Monitoring**
  e.g. Identification of inactive starter cultures
- **Monitoring of smear water**
  e.g. Early detection of surface contamination with L.M. (Bottleneck management)
- **Testing during the process**
  e.g. Product testing to predict product stability with n=1
- **Verification of FSMS**
  e.g. Product testing of a new product with n=5
- **Record keeping system which enables tracing back and forward**
- **Suspension of distribution and product withdrawal or recall**

How to control a hazard?

Application of self monitoring measures to control *Listeria monocytogenes*



CONCLUSION:

A sampling plan for product testing is NOT a Food Safety Management System (FSMS)

An effective FSMS is based on various self monitoring measures

Example: How to control Listeria monocytogenes

- **Training of milking staff**
  e.g. Proper milking procedures, hygiene in milk production, milking order
- **Regular inspection and maintenance of the milking machine**
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Monitoring of smear water
e.g. Early detection of surface contamination with L.M. (Bottleneck management)

Testing during the process
e.g. Product testing to predict product stability with n=1

- **Verification of FSMS**
  e.g. Product testing of a new product with n=5
- **Record keeping system which enables tracing back and forward**
- **Suspension of distribution and product withdrawal or recall**

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How to create a sampling plan?

Important considerations when creating a sampling plan

The assurance of food safety cannot be based on end-product testing but microbiological testing can be part of an FSMS. A sampling plan helps to structure the sampling procedure.

- **Purpose for collecting a sample**
  The first step to create a sampling plan is to define the purpose for collecting a sample. Does the producer want to demonstrate the efficiency o the FSMS, to determine the adherence to Good Manufacturing Practices or the utility of ingredients for a particular purpose (e.g. raw milk soft cheese) or to predict product stability. According to the purpose the producer will assess a sampling plan for testing during the process, environmental testing or end-product testing.

- **Effectiveness of sampling**
  To achieve a reasonable certainty it can make sense to favour testing during the process or environmental testing. End-product testing is an ineffective way of detecting low level contamination. (e.g. when rind washing, analysis of smear water for presence of L.M. can be more effective at detecting a sporadic, low-level of contamination than end-product testing)

- **Bottleneck Management**
  Every hazard has his most important sources of contamination. It can be more effective to develop and put in place target-oriented process monitoring steps than unspecific end-product-testing (e.g. analysis of stool samples of the employees for presence of Salmonella can be more effective at detecting a sporadic contamination than end-product testing.)

Following the considerations above it´s the producers task to fill the sampling plans framework (see sampling options on the following slides 13 and 14) with useful criteria appropriate to his situation. How a sampling plan can be made step by step is shown in tool 9.3 and 9.4.

Example: Sampling Plan for Cheese

Difference between 'Testing during the process' and 'Verification'

Yellow cells: Criterias are not mandatory. It´s the producers choice to include useful criterias to his FSMS.

I. TESTING DURING THE PROCESS - Raw milk (Number of samples per batch: n=1)			
Organism	**Time of the investigation**	**Standard value**	**What is checked?**
Escherichia coli	Bulk milk	See « Section VIII »	Milk
Coagulase-positive staphylococci	Bulk milk		Milk
Listeria monocytogenes			Milk or swabs from milk receiver or milk pump after milking
Salmonella			Milk (only in cases of suspected disease of animals)

II. TESTING DURING THE PROCESS - Product (Number of samples per batch: n=1)			
Organism	**Time of the investigation**	**Standard value**	**What is checked?**
Escherichia coli	At the time during the manufacturing process when the number of E. coli is expected to be highest	See « Section VIII »	Product
Coagulase-positive staphylococci	At the time during the manufacturing process when the number of staphylococci is expected to be highest		Product
Listeria monocytogenes	Before the food has left the immediate control of the food business operator, who has produced it		Product or via environmental testing
Salmonella	Products placed on the market during their shelf-life		Product or via environmental testing

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Example: Sampling Plan for Cheese

Difference between 'Testing during the process' and 'Verification'

Yellow cells: Criterias are not mandatory. It´s the producers choice to include useful criterias to his FSMS.

III. ENVIRONMENTAL TESTING - (Number of samples: n=1)

Organism	Time of the investigation	Standard value	What is checked?
Listeria monocytogenes in smear water	analysis of smear water after rind washing of the whole stock	Experience of the cheesemaker	Smear water (only if rind washed cheeses are produced)
Listeria monocytogenes in raw milk	Swabs from milk receiver or milk pump after milking		Swabs (only if raw milk is used)
Salmonella in samples of faeces	stool samples of the employees		Stool samples

IV. VERIFICATION OF FSMS - (Number of samples per batch: n=5)

Organism	Time of the investigation	Standard value	What is checked?
Escherichia coli	At the time during the manufacturing process when the number of E. coli is expected to be highest	See « Section VIII »	a new product or after loss of control
Coagulase-positive staphylococci	At the time during the manufacturing process when the number of staphylococci is expected to be highest		a new product or after loss of control
Listeria monocytogenes	Before the food has left the immediate control of the food business operator, who has produced it		a new product or after loss of control
Salmonella	Products placed on the market during their shelf-life		a new product or after loss of control