Industry uses of microbiological testing and microbiological criteria in the manufacturing and marketing of processed foods

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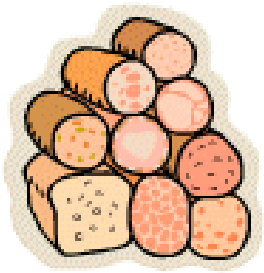
Different types of criteria exist







They are used to determine the acceptability of a food.

Microbiological standards

Public Health Authorities

Codex Principles

They are used to determine the acceptability of a food or compliance with regard to a regulation or policy

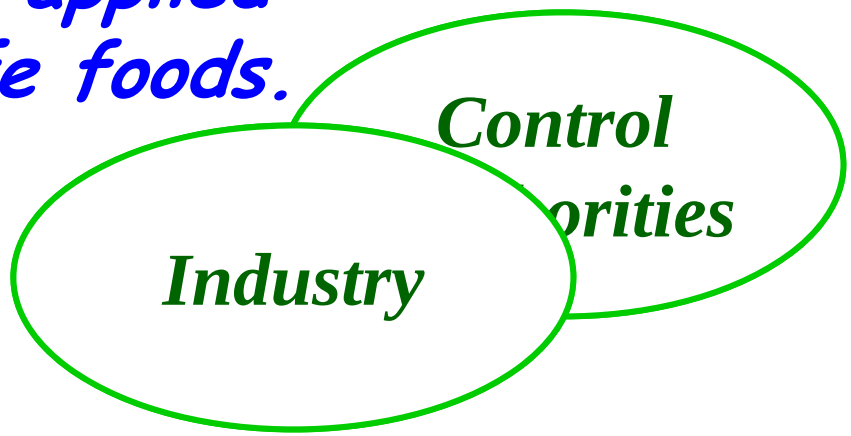
Industry

Control Authorities

Microbiological guidelines

Control Authorities
Industry
Associations

Are advisory and may be established to indicate expectations when best practices are applied to manufacture safe foods.



Microbiological specifications

Industry
Retail

Purchase specifications defining the microbiological limits for an ingredient or a finished product.

Supplier

Customer

How are criteria established ?

Basic Texts — Codex Alimentarius

PRINCIPLES FOR THE ESTABLISHMENT AND APPLICATION OF MICROBIOLOGICAL CRITERIA FOR FOODS

CAC/GL21 -1997

Based on principles of the ICMSF (Vol 2)

New approach - From MRA

ALOP → FSO/PO → MC

FSO

Goal for process design to obtain acceptable food.

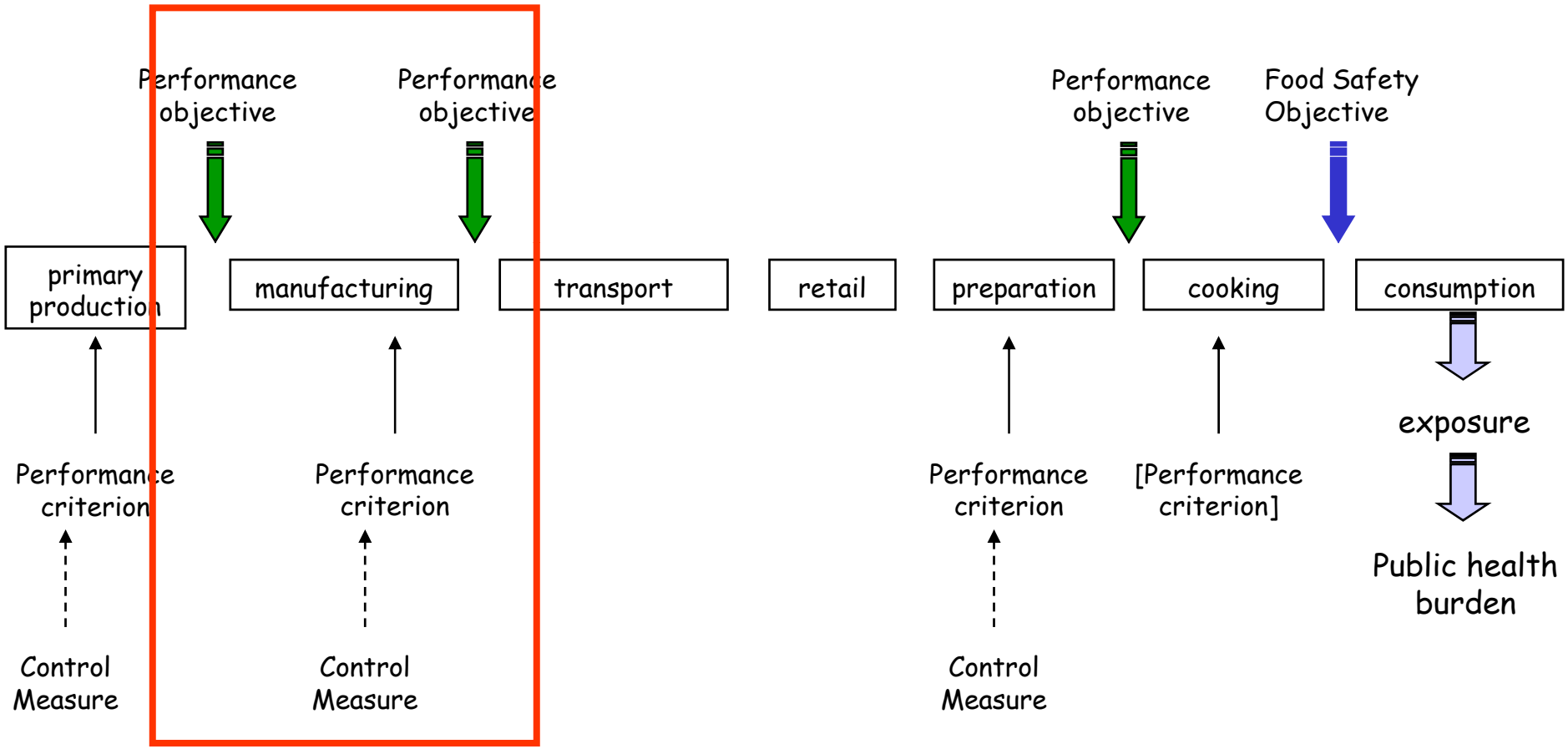
Applied to processing operations

Micro Criteria

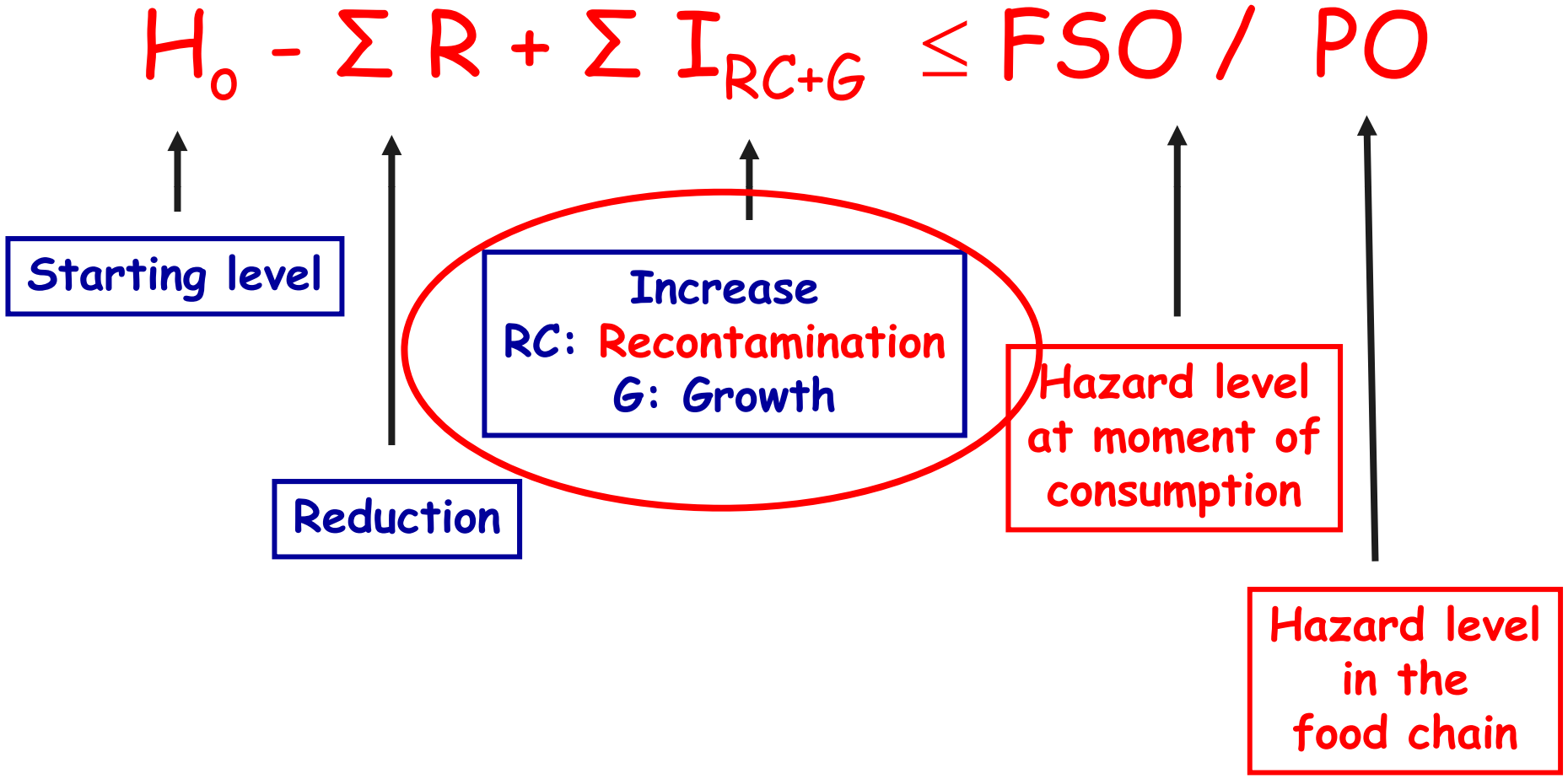
Statement of conditions that differentiates acceptable from unacceptable lots of food.

Applied to individual lots or consignements of food.

Food Chain - Example



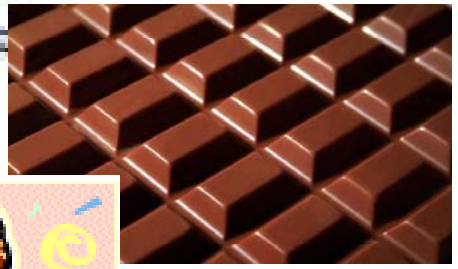
How are FSO or PO used by industry?



Food Chain - Ingredients

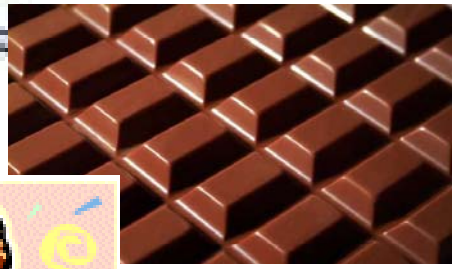
Ingredients - Specifications

Milk Powder



Ingredients - Specifications

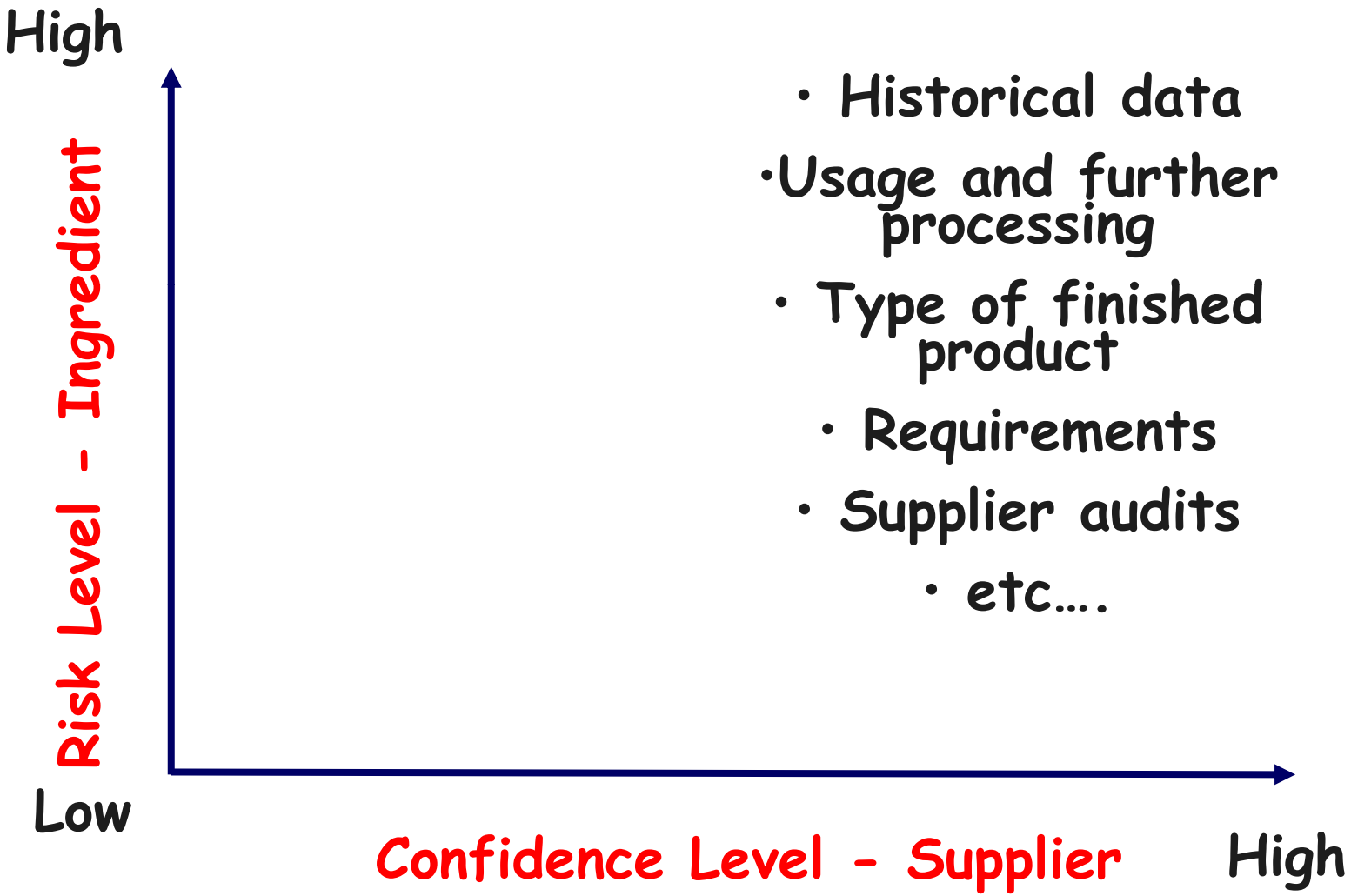
Milk Powder



Different Ingrdient specifications

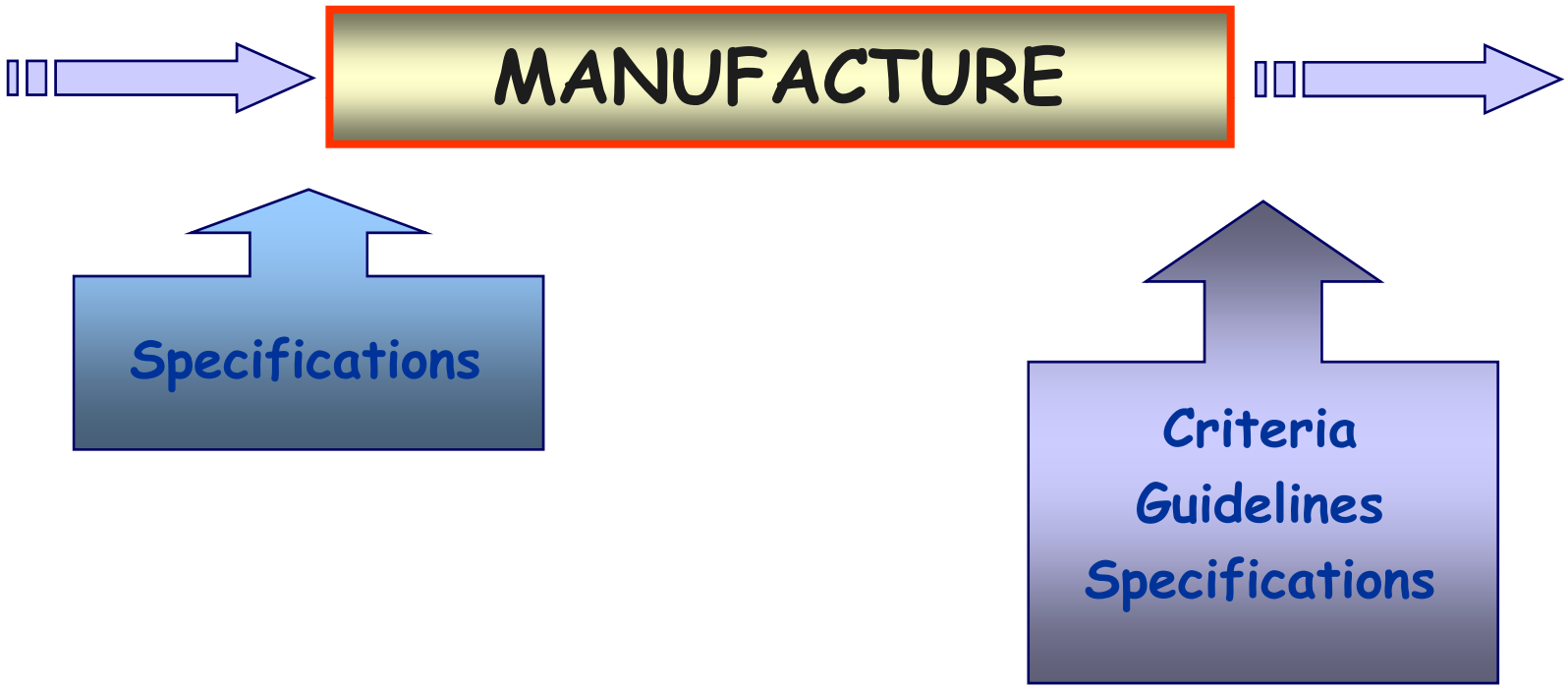
Different End product specifications

Ingredients - Specifications



- Historical data
- Usage and further processing
- Type of finished product
- Requirements
- Supplier audits
- etc….

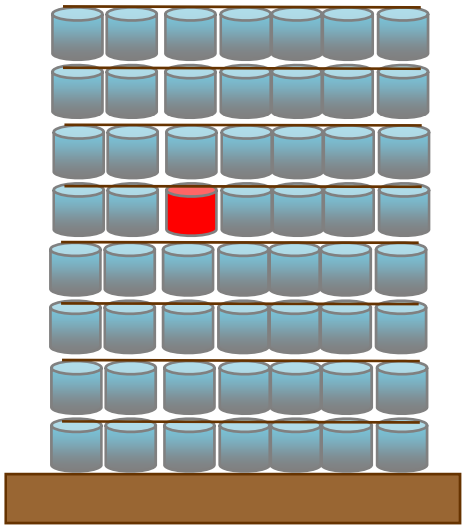
Food chain – Finished Goods



Limitations of testing end product

10 samples

0.1% contaminated ~1% probability of detection

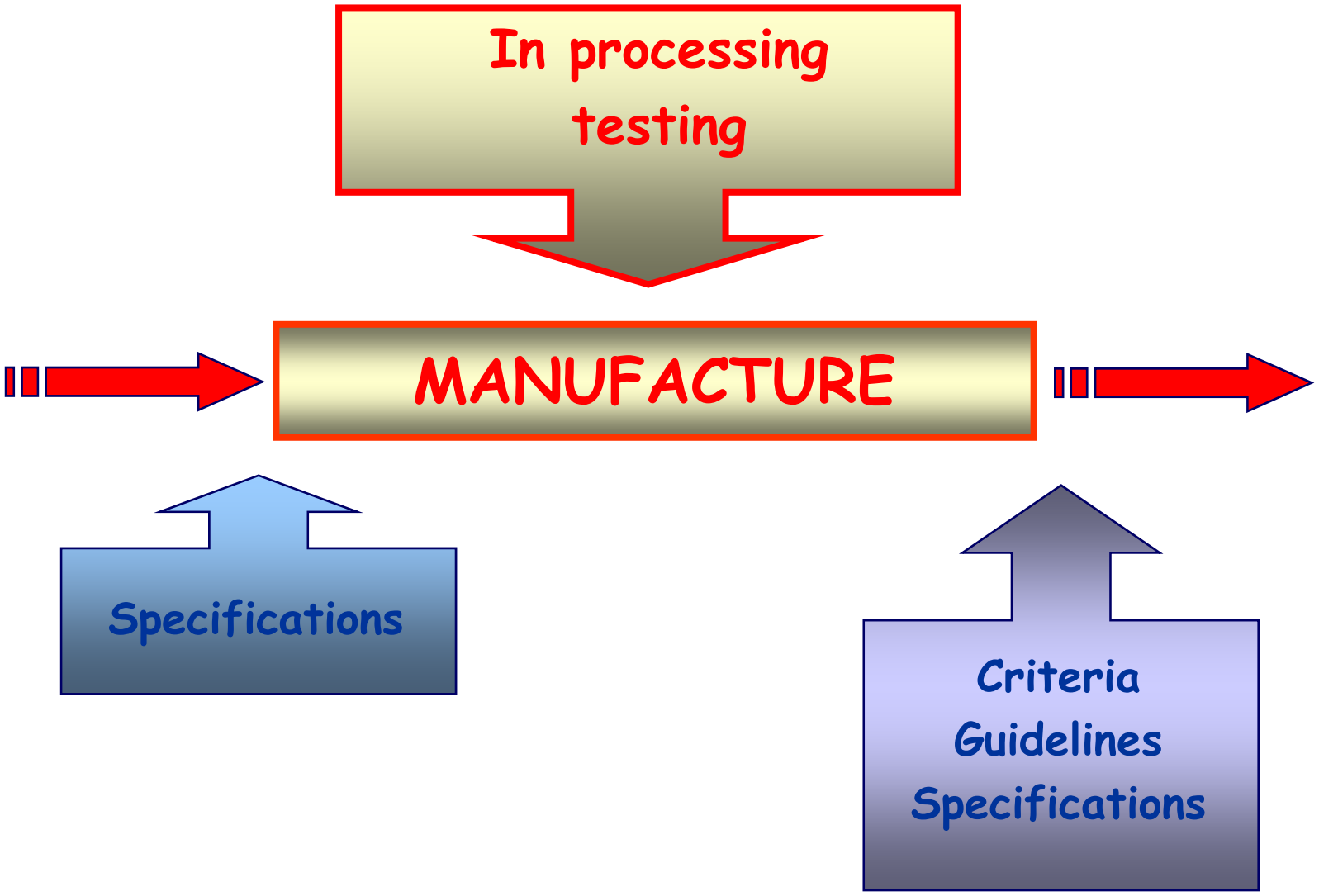


20 % contaminated

10 samples

~35% probability of acceptance

Food chain – Manufacturing

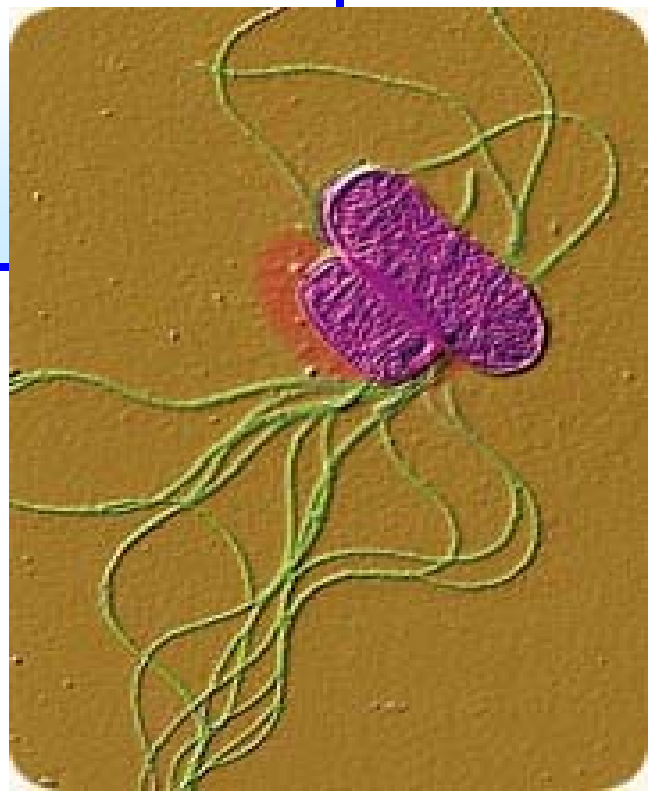


Food chain – Examples

What is then the purpose

of

***Salmonella* testing ?**

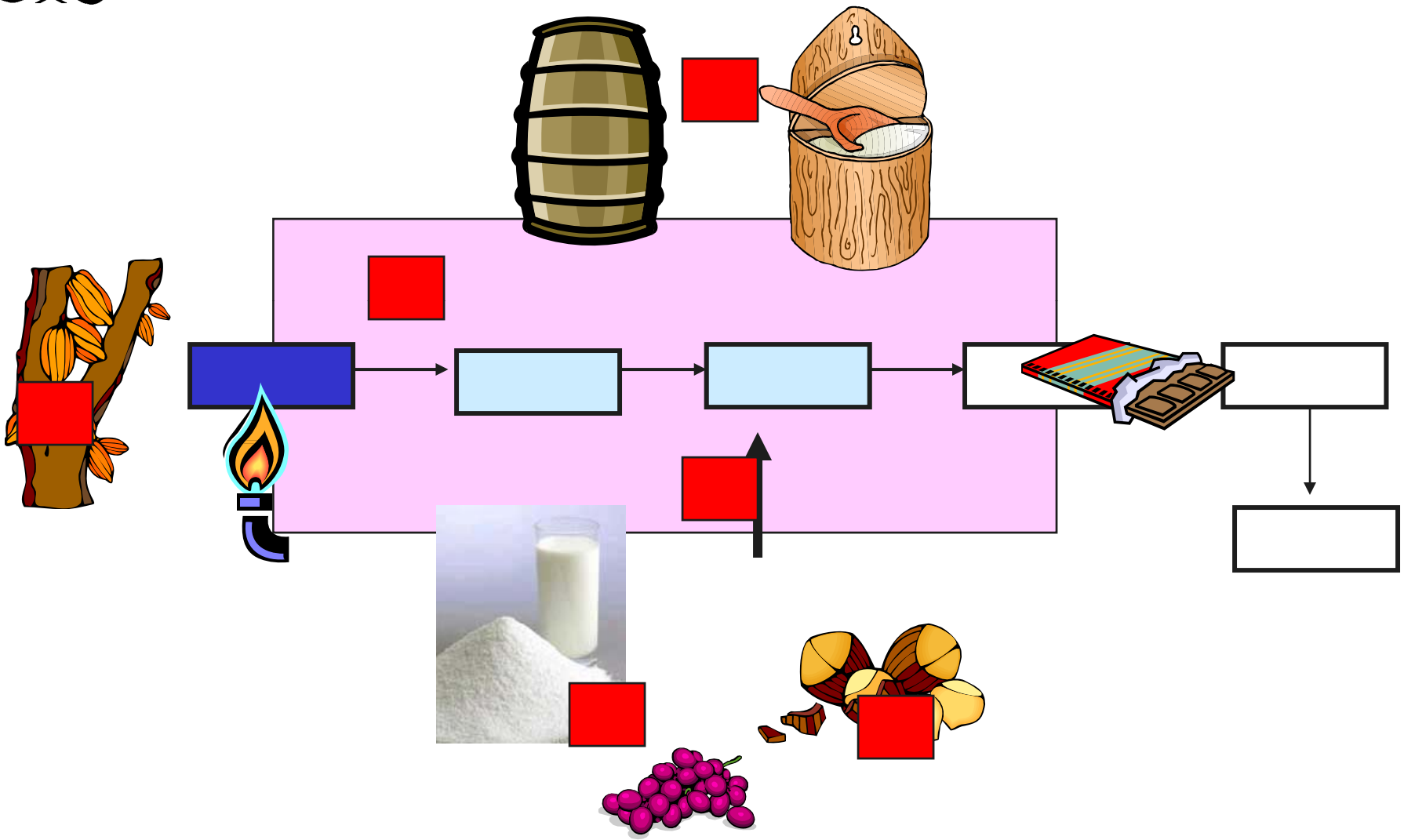


Food chain – Chocolate

Salmonella n = 5 to 15, c = 0, m = 0 (in 25g)

Enterobacteriaceae n = 5, c = 2, m = 10, M = 100

Food chain - Chocolate



Chocolate - Ingredients

Total: 14'383 samples tested (survey 1998)

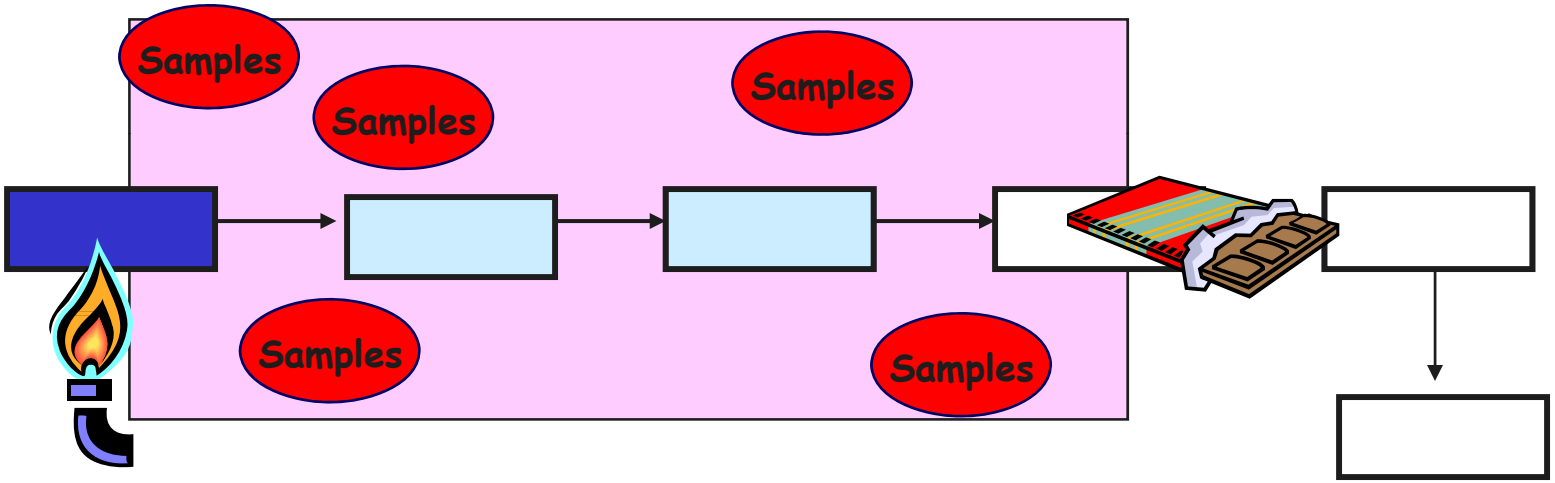
MSK – 361 (6 positives)

Whey powder – 1515 (1 positive)

Flour – 632 (3 positives)

Nuts and nut meats – 828 (1 positive)

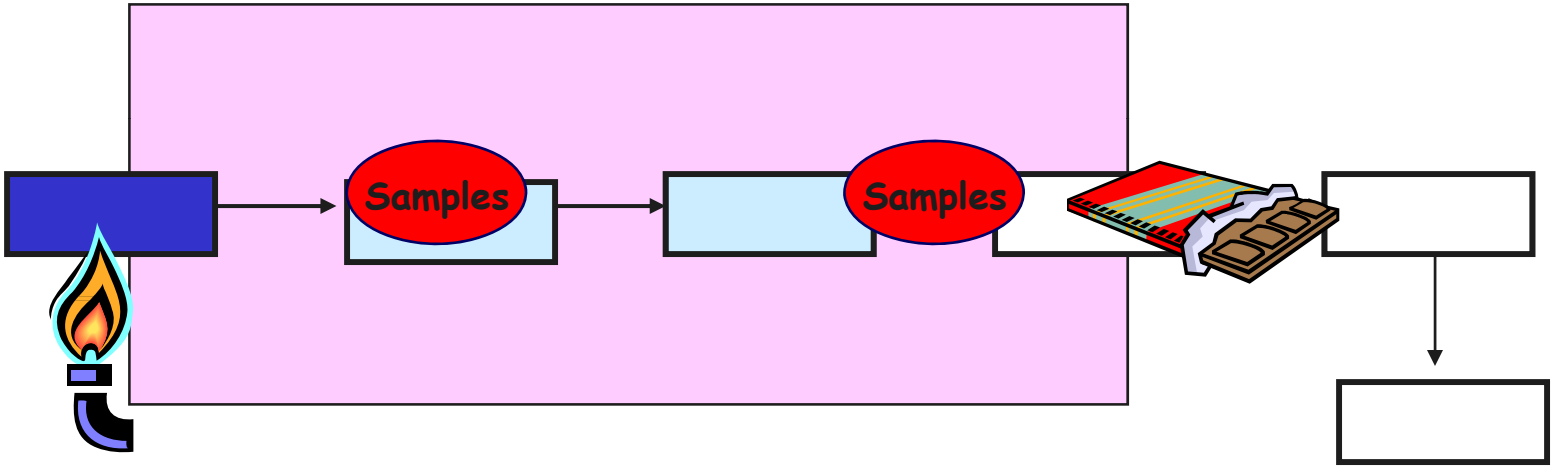
Chocolate – Processing Environment



Salmonella Absence

Enterobacteriaceae – max. 100 – 1000 cfu/sample

Chocolate – Processing Processing Line

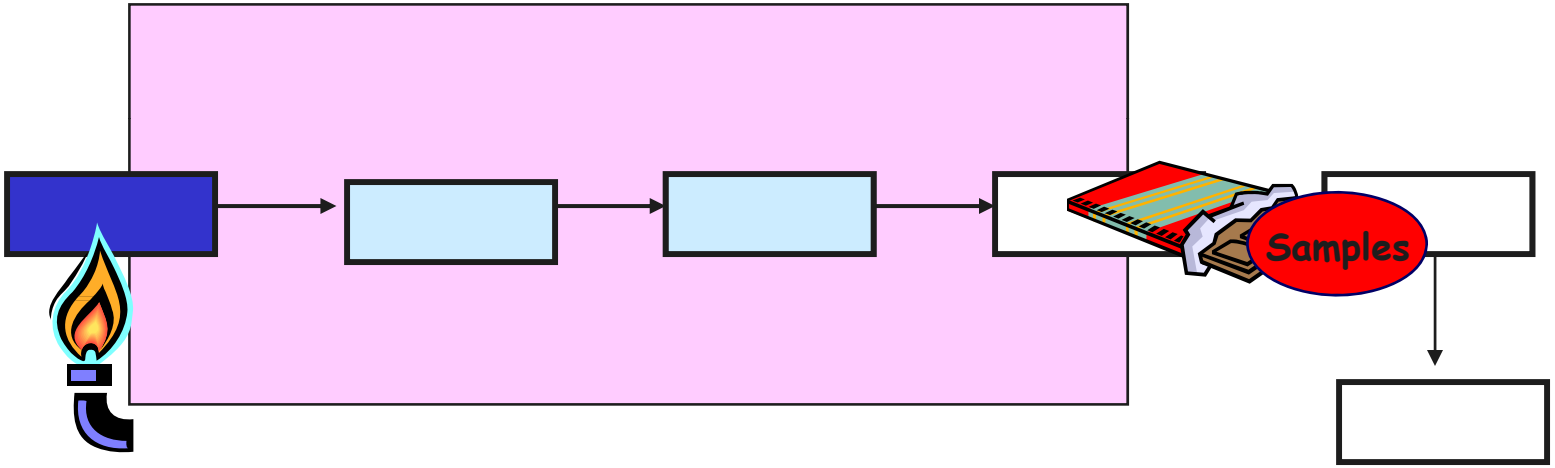


Salmonella absence in 25g

Enterobacteriaceae – max. 10 cfu/sample

Aerobic mesophilic counts

Chocolate - Processing Finished Products



Salmonella only for monitoring

Food chain – Milk powder

Salmonella

n = 15 to 30, c = 0, m = 0 (in 25g)

Enterobacteriaceae

n = 5, c = 2, m = 1 to 10, M = 10 - 100

Food chain – Infant formulae

Salmonella

n = 30 to 60, c = 0, m = 0 (in 25g)

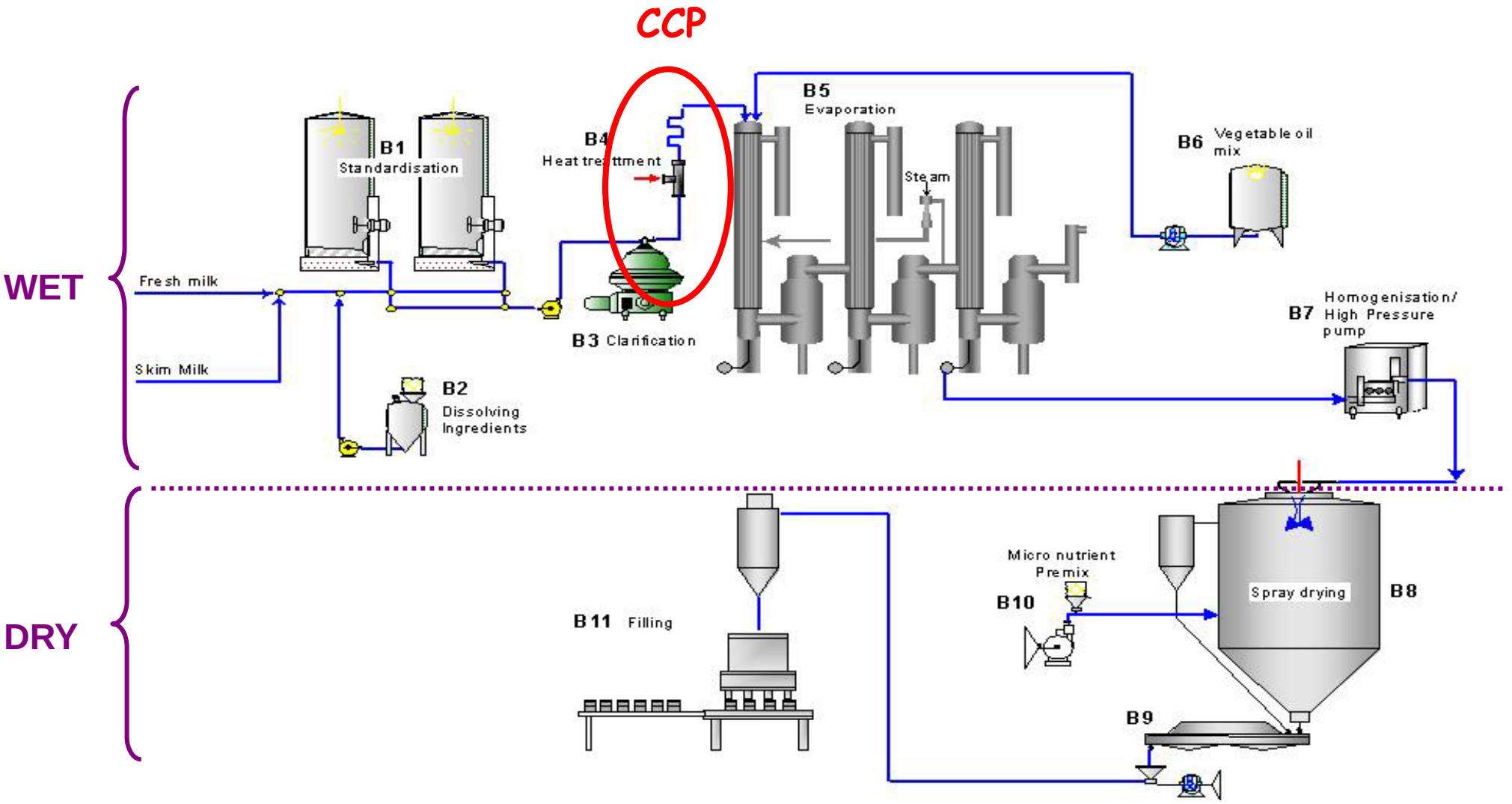
Enterobacter sakazakii

n = 30, c = 0, m = 0 (in 10g)

Enterobacteriaceae

n = 10, c = 0 to 2, m = 0 (in 10g)

Example – Milk Powder Infant formulae



What is the heat resistance of vegetative pathogens ?

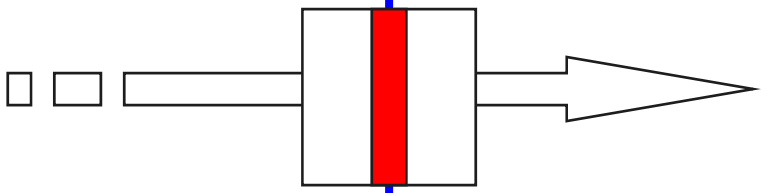
E. sakazakii and *Salmonella*

does not survive pasteurization !

Heat processes (CCP) applied in production will allow to kill 60 log units or more.

How to control Salmonella or Enterobacteriaceae?

Medium Hygiene



High Hygiene

Zoning includes appropriate

sign of building(s),

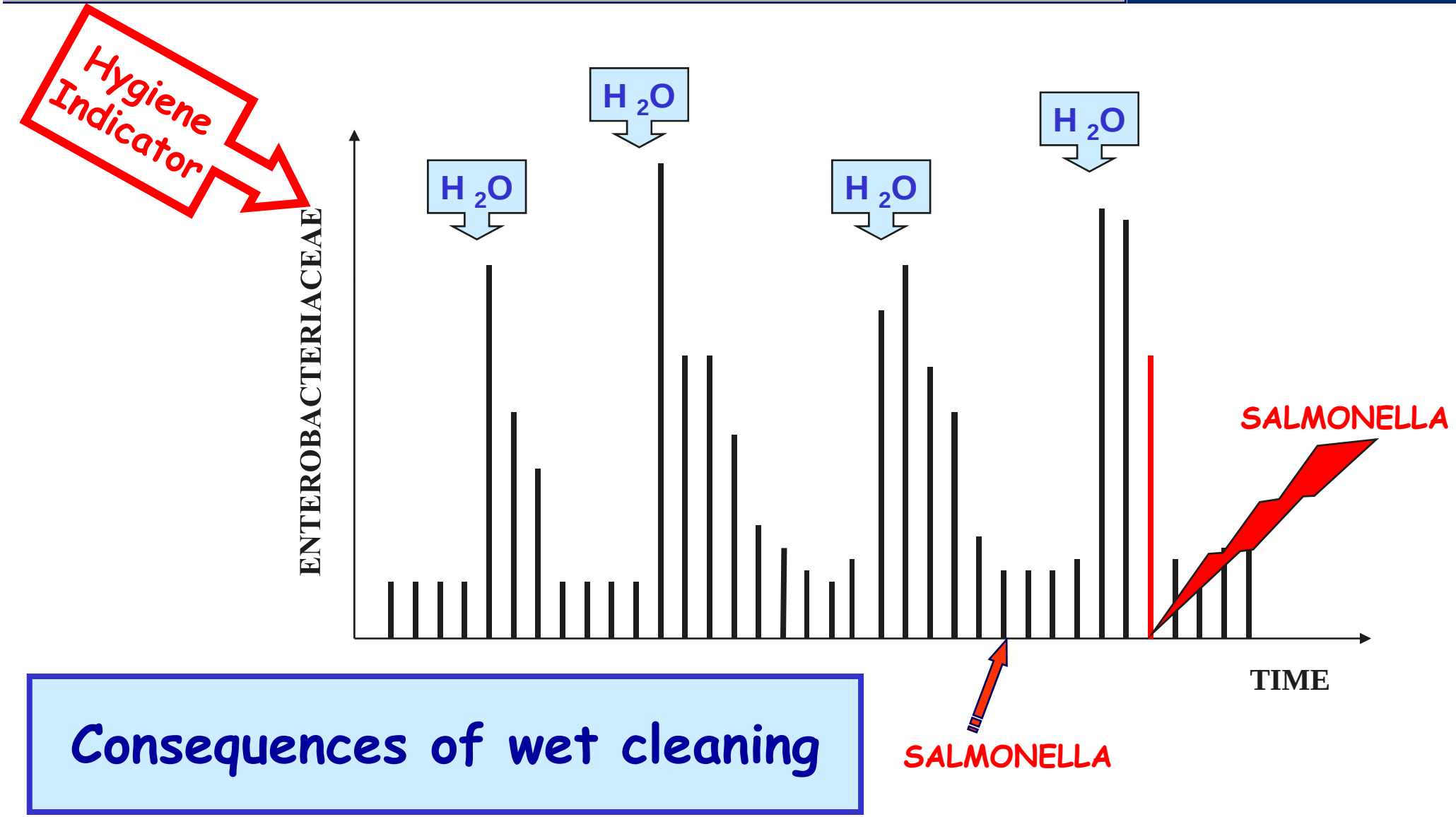
of air handling/flow,

people and materials

How to control Salmonella or Enterobacteriaceae?

DRY CLEANING

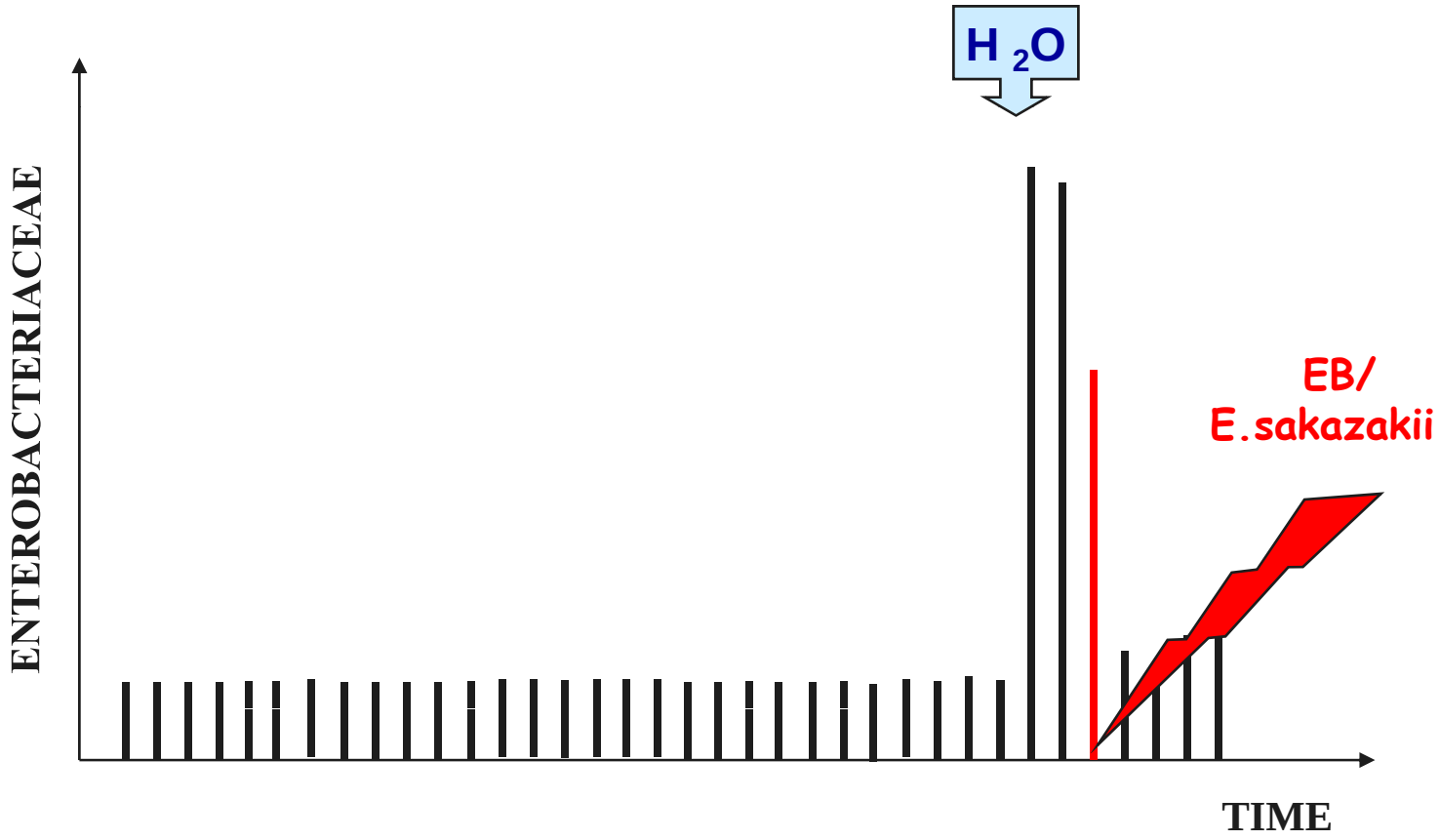
How to control Salmonella or Enterobacteriaceae?



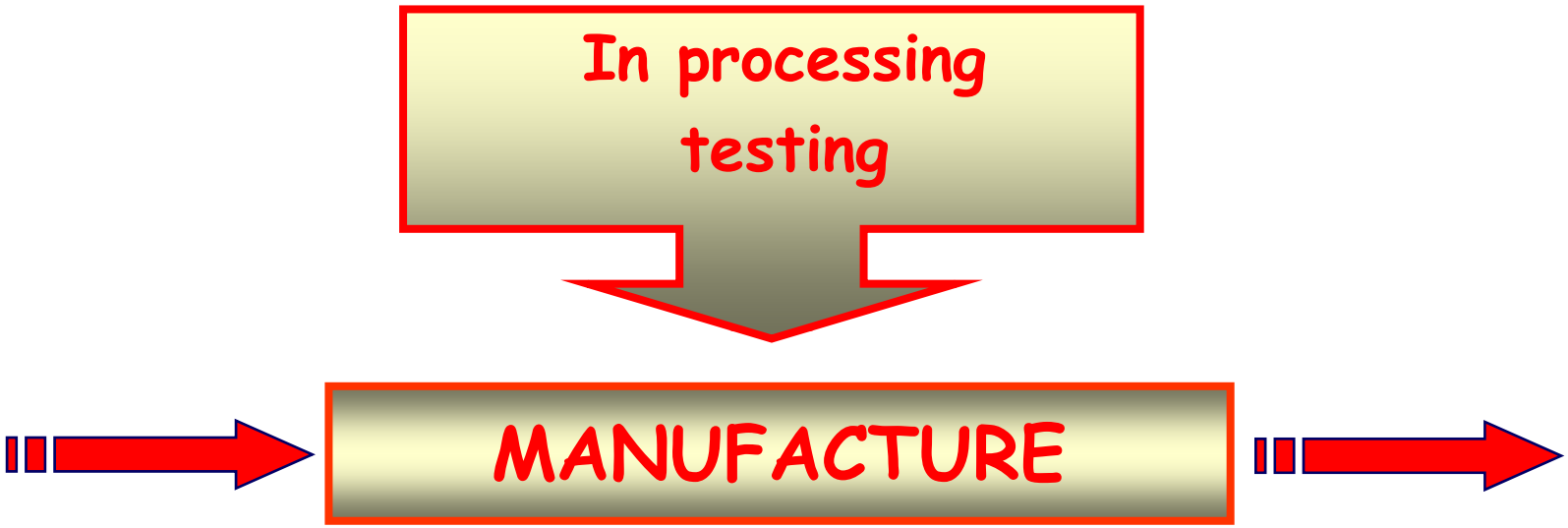
Consequences of wet cleaning

How to control Salmonella or Enterobacteriaceae?

Low levels of EB can only be achieved in the total absence of water



Food Chain – Manufacturing

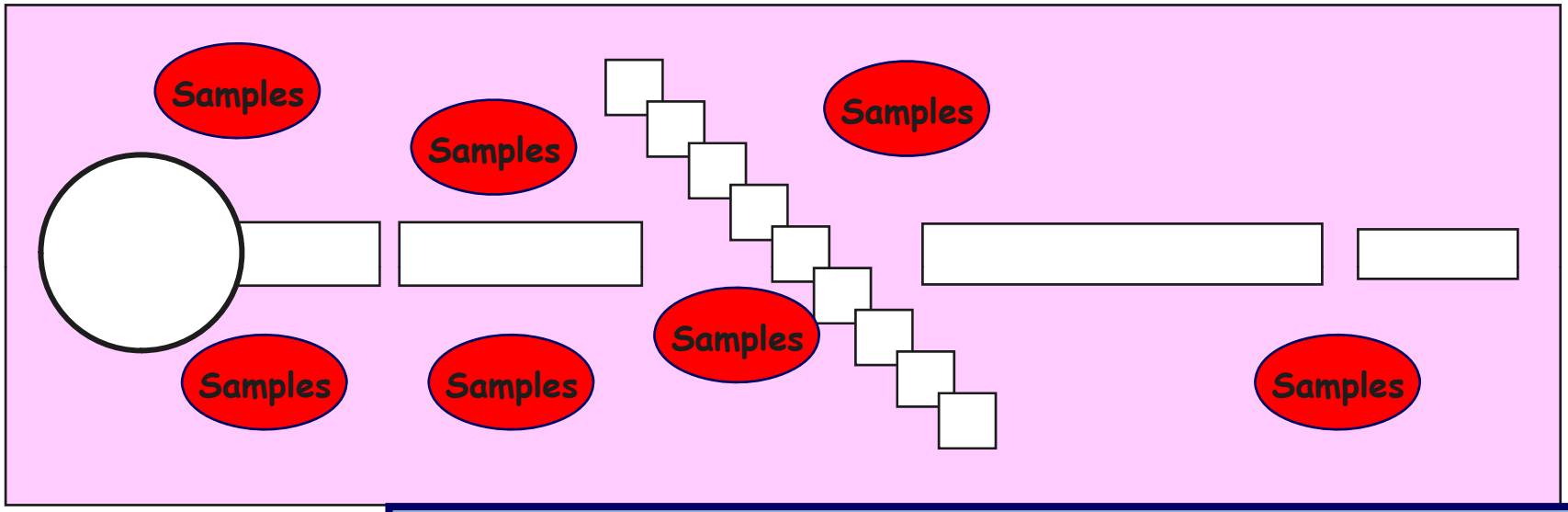


Product / Semi-finished product

Line – Food contact surfaces including residues

Environment – Points close to remote from line

Milk Powder Infant formulae Processing Environment

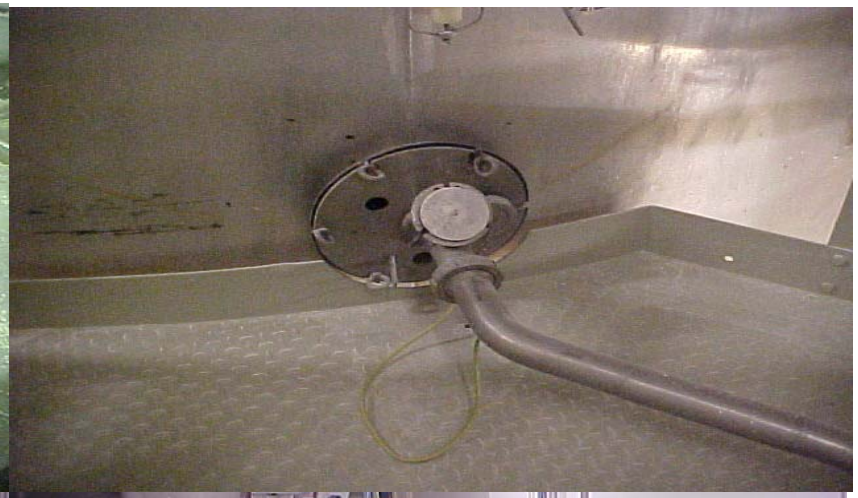
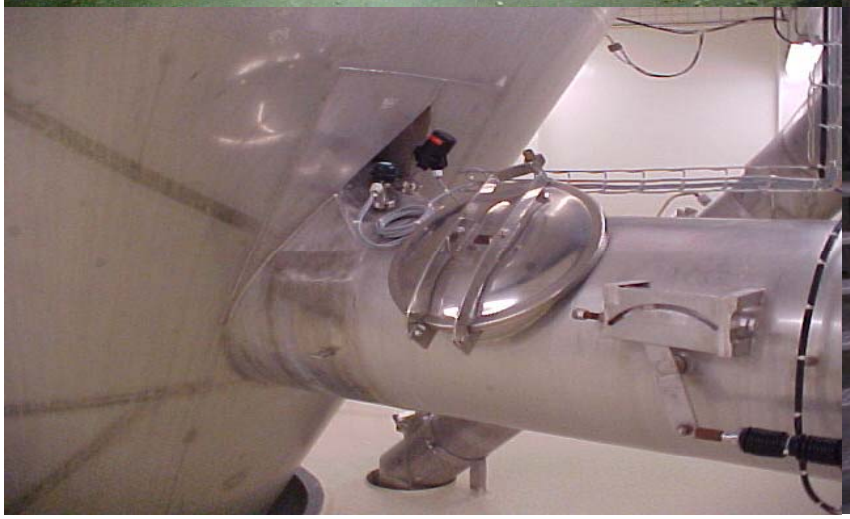


Salmonella absence

Enterobacteriaceae – max. 100 (– 1000) cfu/sample

Enterobacteriaceae – max 10 cfu/sample

Environmental samples - Examples

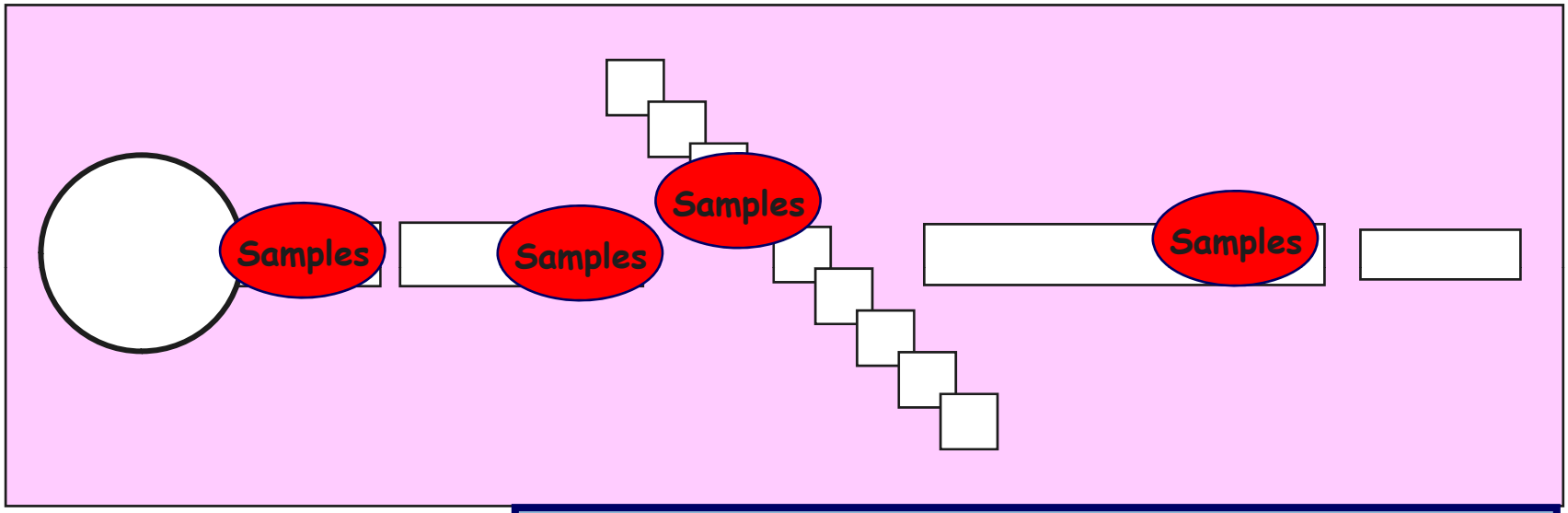

Environmental samples - Examples

Sampling of the processing environment

Environmental samples - Examples

Sampling of the processing environment

Milk Powder Infant formulae Processing Line



Salmonella absence in 25g

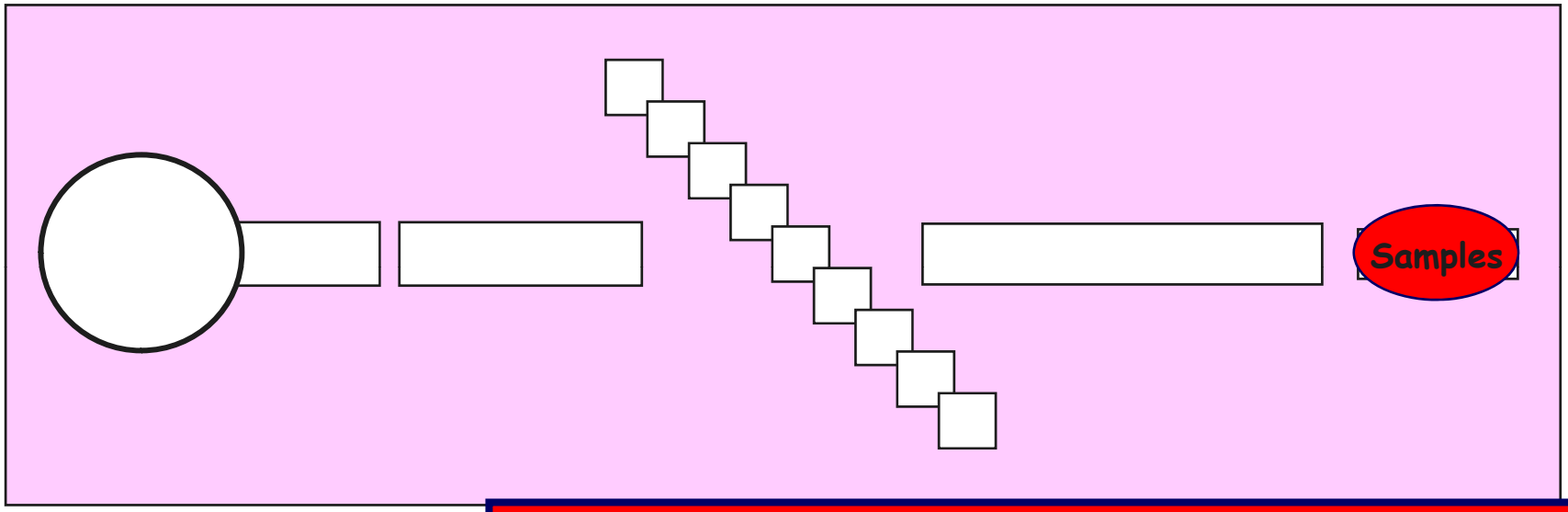
Enterobacteriaceae – max. 10 cfu/sample

Enterobacteriaceae – absence in 10 g

Line samples - Examples

Sampling of food contact surfaces - line samples

Milk Powder Infant formulae Processing Line

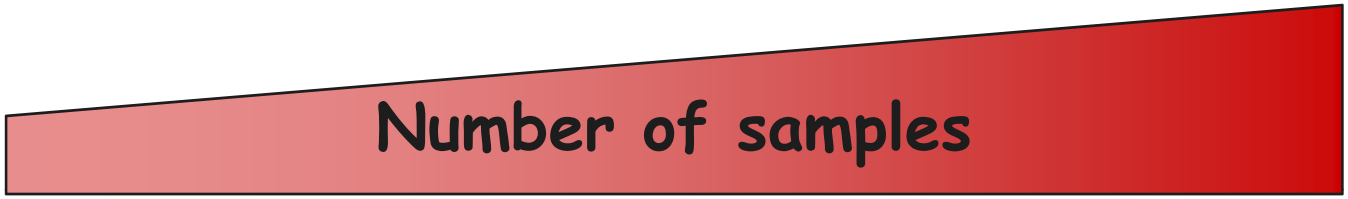


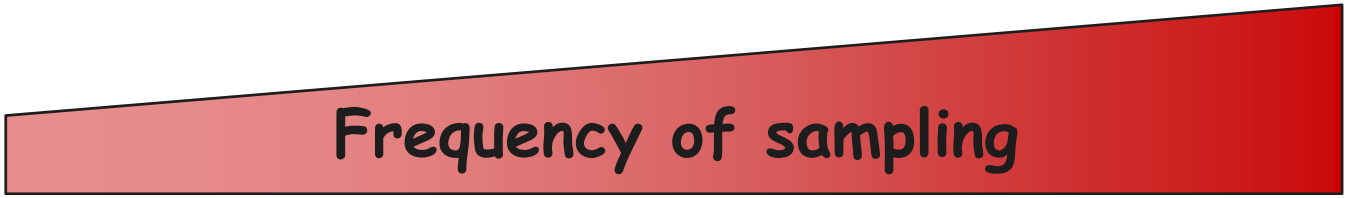
Salmonella for monitoring

Differences in sampling and testing

Chocolate

Infant Formulae





Processing Environment

Processing Lines