

# Microbiological Testing and Distribution of Microorganisms in food

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Verification  
by MicroCrit

Monitor Critical Limits

Validated CCPs

HACCP

PRP (GMP, GHP, ....)

verification  
by MicroCrit



# Sampling plan: *Salmonella* absent ???

Food category: powdered infant formulae (PIF):

Microorganism	Sampling plan		Sample weight (g)	Analytical method
	n	c		
<i>Cronobacter</i> spp.	30	0	10	ISO/TS 22964
<i>Salmonella</i>	60	0	25	ISO 6579

CODEX Code of hygienic practice for powdered formulae for infants and young children CAC/RCP 66-2008

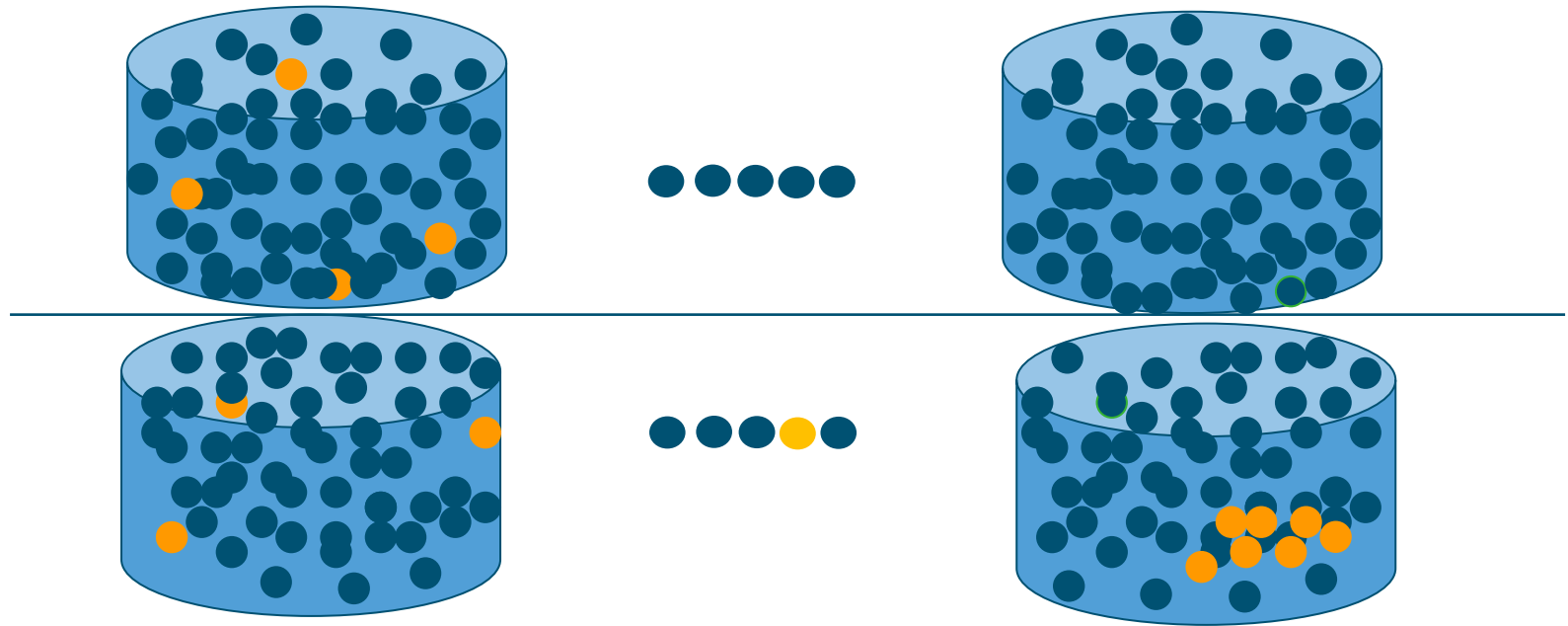
# Sampling plan: Hygiene criteria

Food category: powdered infant formulae (PIF):

Micro-organism	Sampling plan		m	M	Analytical method
	n	c			
Mesophiles	5	2	500/g	5000/g	ISO 4833
<i>Enterobacteriaceae</i>	10	2	0/10 g	-	ISO 21528-1/21528-2

CODEX Code of hygienic practice for powdered formulae for infants and young children CAC/RCP 66-2008

# End product testing useful or lottery ?



Positives mean something, negatives are no guarantee

## MISCONCEPTION

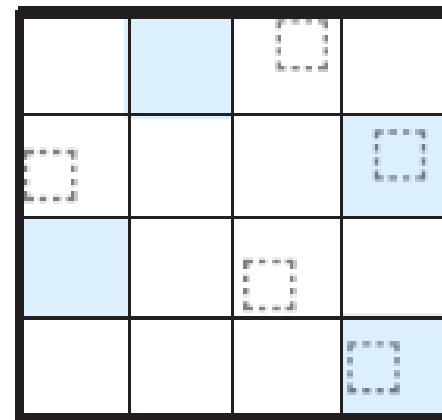
*If the tested **sample** units are negative, the **batch** is free of the pathogen.*

# Statistical Aspects of Food Safety Sampling

I. Jongenburger, H.M.W. den Besten,  
and M.H. Zwietering

Annu. Rev. Food Sci. Technol. 2015. 6:479–503

**a**

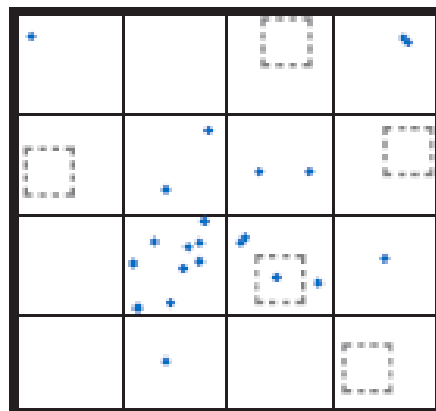


Homogeneous  
contamination

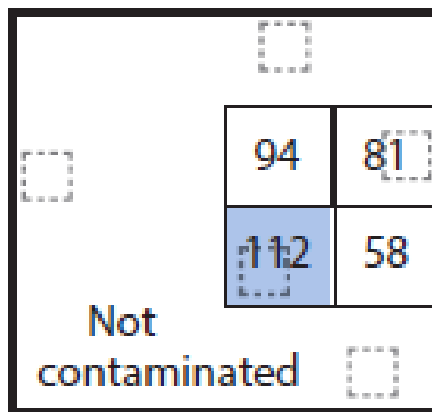
**b**

22	113	94	49
8	10	93	105
520	59	81	17
19	101	36	33

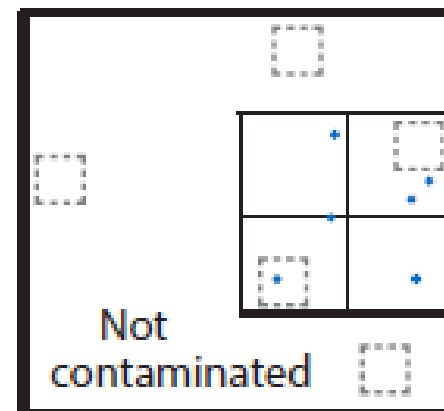
Heterogeneous  
high-level  
contamination

**c**

Heterogeneous  
low-level  
contamination

**d**

Localized high-level  
contamination

**e**

Localized low-level  
contamination



**a**


Homogeneous  
contamination

# Probability that no contamination is found

$P_{\text{defective}}$	$n=1$
	$1 - P_{\text{def}} =$
0.00	1.00
0.01	0.99
0.05	0.95
0.10	0.90
0.15	0.85
0.20	0.80
0.25	0.75
0.30	0.70

1 % defectives of 100,000 products, means 1,000 products

$$P_{\text{accept}} = (1 - P_{\text{defective}})^n$$

# Conclusions

- All samples negative is no guarantee of absence
- A positive sample is indicating presence
- Sampling is useful for verification



see <http://www.icmsf.org>

***Control*** of safety is only to a very limited extend supported by end-product testing