Workshop on:

Microbiological Sampling and Testing in Food Safety Management

"Securing Global Food Safety"

Sebel Albert Park Hotel, Melbourne, Australia

September, 2011

the australian institute of food science and technology incorporated

International Commission on Microbiological Specifications for Foods (ICMSF)

International Association for Food Protection.

Sampling and monitoring: 2

Sampling Workshop, Melbourne, September 2011

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Laboratory of Food Microbiology
Wageningen University

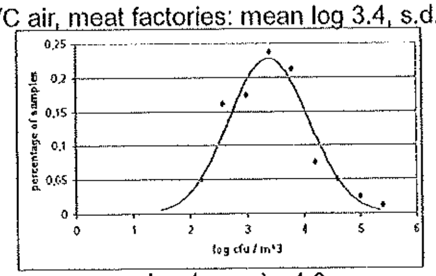
Pdefective sample: distribution !

P(C>m)

- Bacteria are often distributed LOG-NORMAL
- Most products: large standard deviation (σ)
  - raw meat, fish, vegetables, eggs
  - dry products
- Well mixed products: smaller standard deviation (σ)
  - Liquids, hamburger meat, pooled eggs

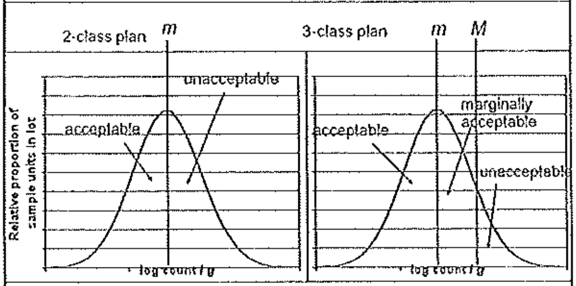
Products and distributions: example

TVC air, meat factories: mean log 3.4, s.d. 0.7



log (mean)= 4.0

Two- and three-class attributes plan



When to apply which plan ?

Degree of concern	Conditions expected after sampling: Reduce concern	No change	Increase concern (growth)
Utility	Case 1	Case 2	Case 3
Indicator	Case 4	Case 5	Case 6
Moderate hazard	Case 7	Case 8	Case 9
Serious hazard	Case 10	Case 11	Case 12
Severe hazard	Case 13	Case 14	Case 15

Increase stringency

When to apply which plan ?

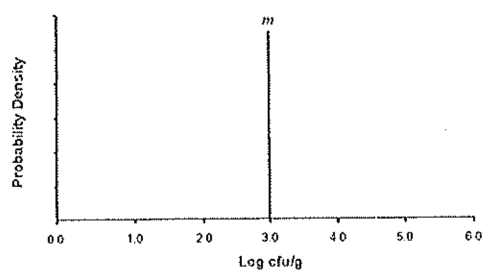
Degree of concern	Conditions expected after sampling: Reduce concern	No change	Increase concern (growth)
Moderate hazard	Case 7: n=5, c=2	Case 8 n=5, c=1	Case 9 n=10, c=1
Serious hazard	Case 10 n=5, c=0	Case 11 n=10, c=0	Case 12 n=20, c=0
Severe hazard	Case 13 n=15, c=0	Case 14 n=30, c=0	Case 15 n=60, c=0

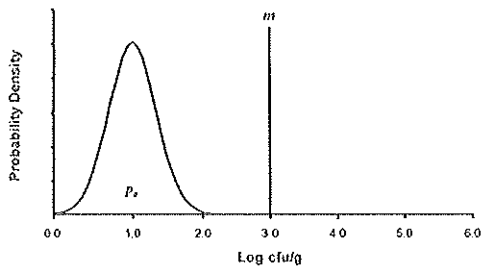
Microbiological Criteria in Relation to Mean Concentration

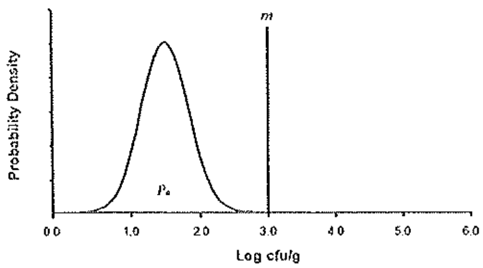
- Distributional assumption for sampling results
  e.g. log-normal with standard deviation known from previous experience
- Determine proportions acceptable, (marginally acceptable), and defective for possible mean log cfu/g
- Calculate acceptance probabilities and plot against mean log cfu/g

Procedure

- Lognormal distribution $(\mu,\sigma)>m$: proportion defective P_d
- With n, c: P_a of the lot




m
Probability Density
Pa
0.0
1.0
2.0
3.0
4.0
5.0
6.0
Log cfu/g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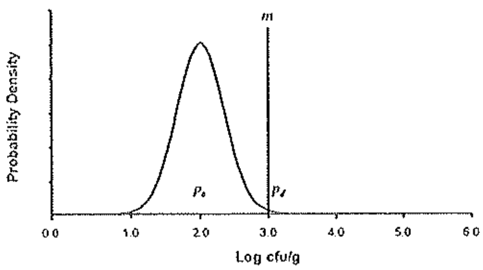
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Probability Density
Pa
Pd
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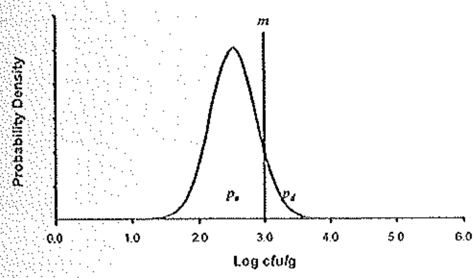
1.0
2.0
3.0
4.0
5.0
6.0
Log cfu/g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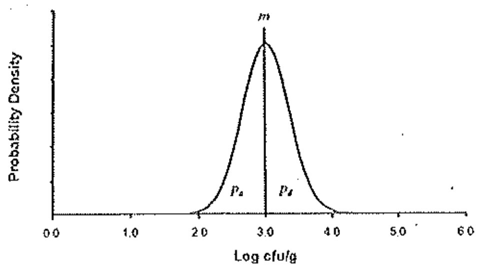
Probability Density
Pa
Pd
0.0 1.0 2.0 3.0 4.0 5.0 6.0
Log cfu/g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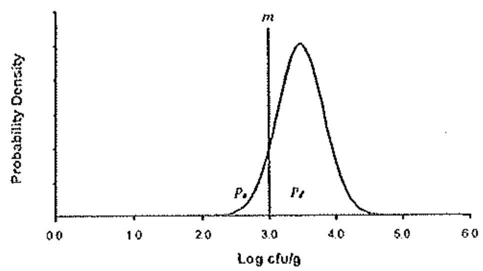
Log cfu/g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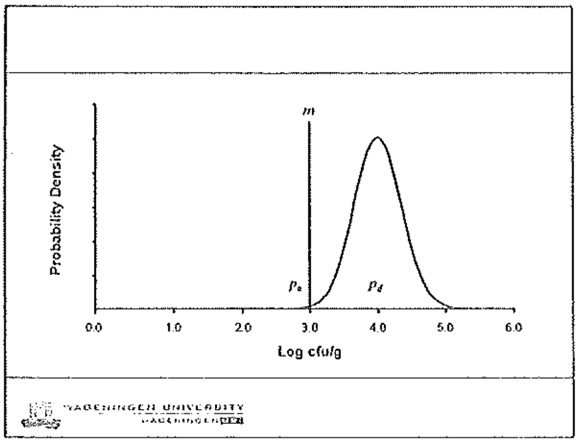
m
Probability Density
p_a
p_d
0.0
1.0
2.0
3.0
4.0
5.0
6.0
Log cfu/g
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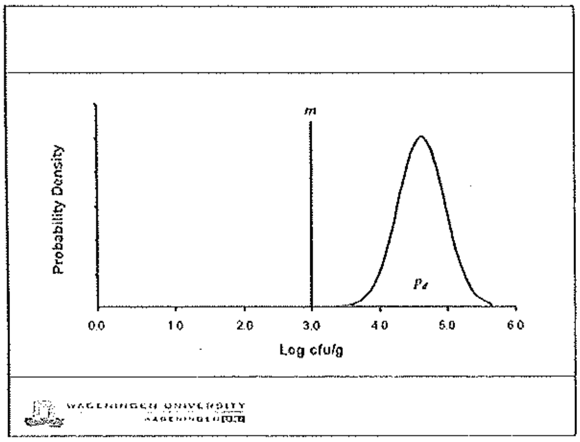
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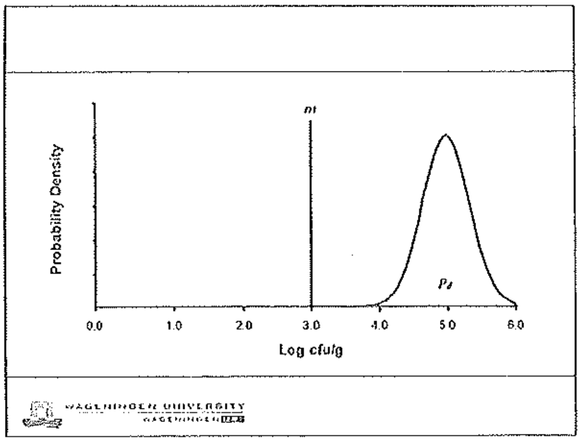
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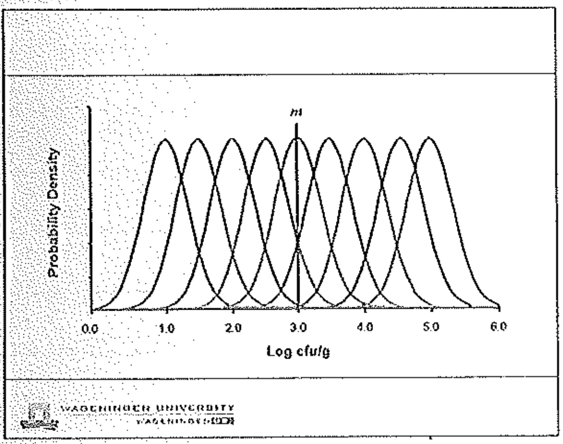
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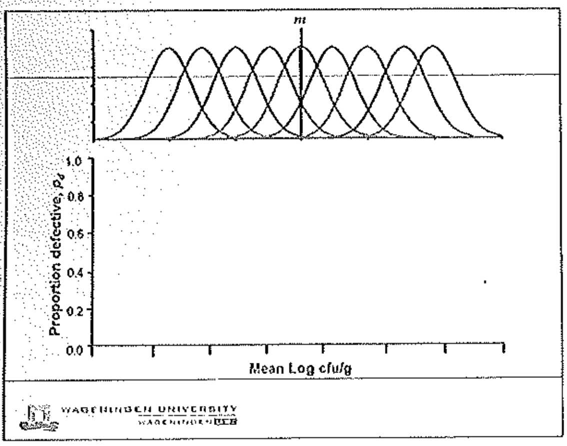
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Proportion defective, p_d
Mean Log cfu/g
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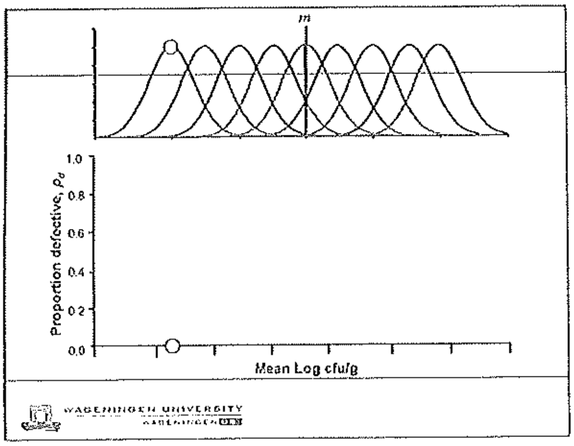
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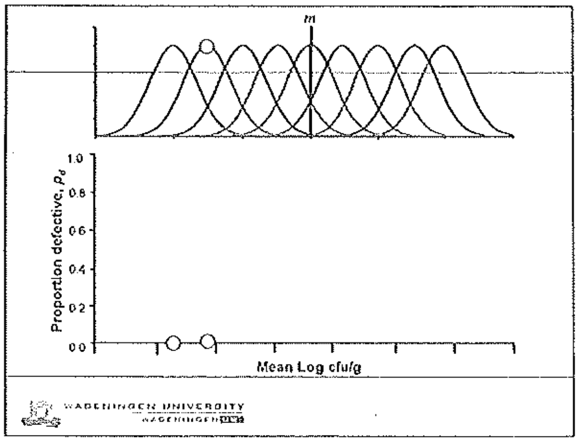
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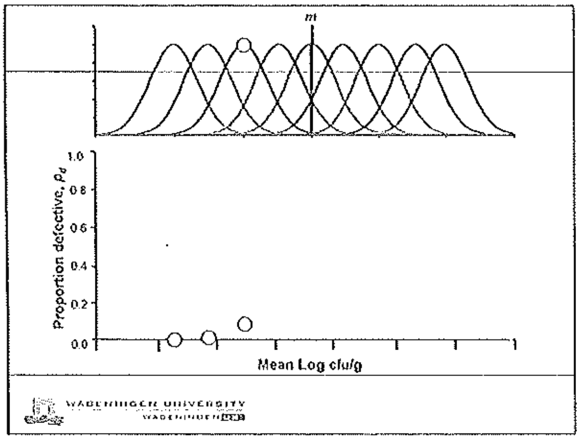
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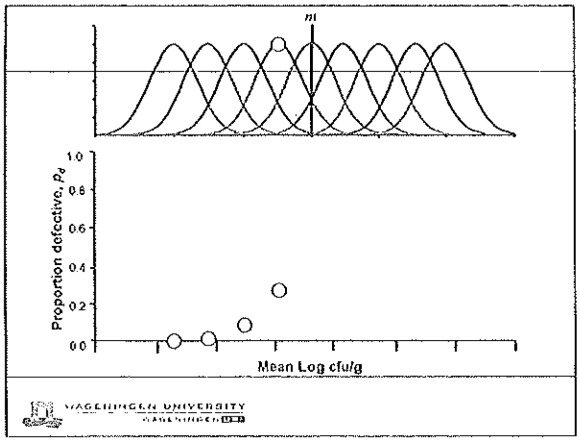
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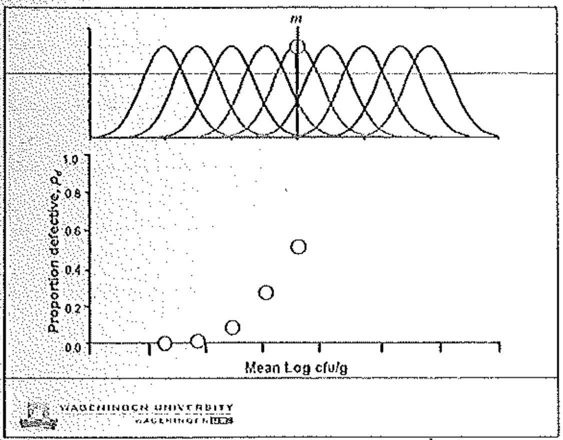
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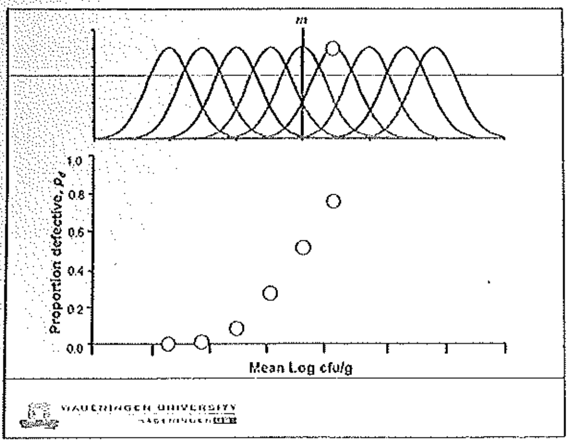
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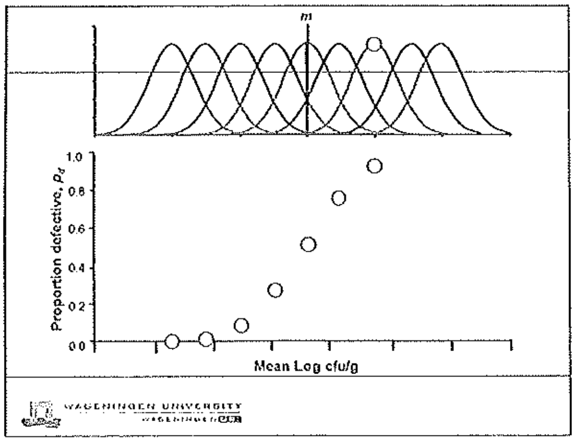
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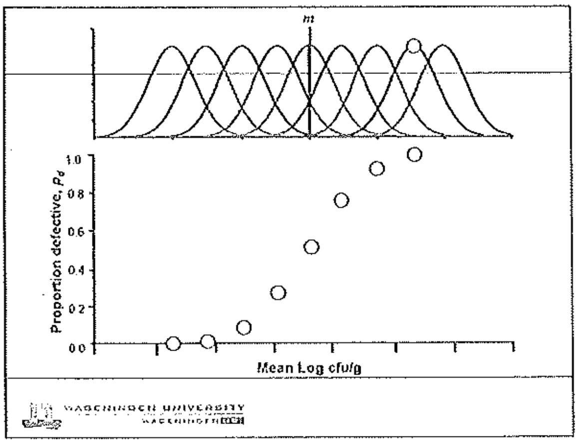
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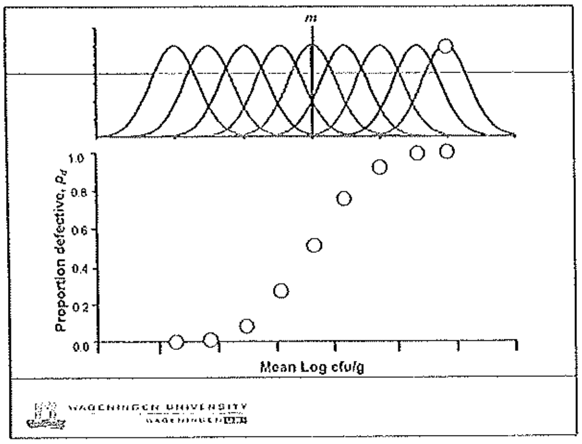
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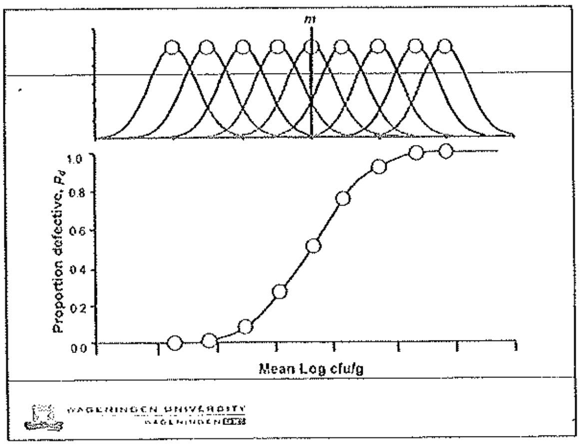
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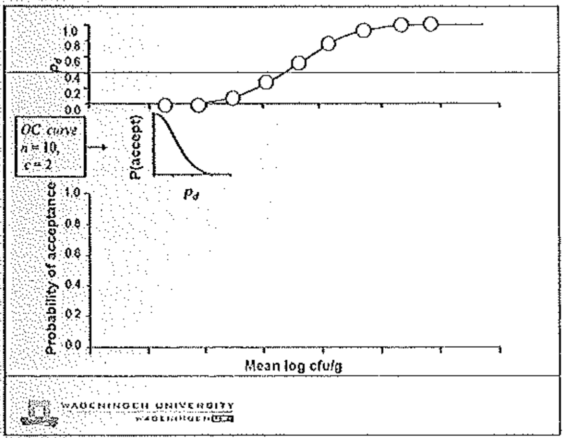

p_d
OC curve
n = 10,
c = 2
P(accept)
p_d
Probability of acceptance
Mean log cfu/g
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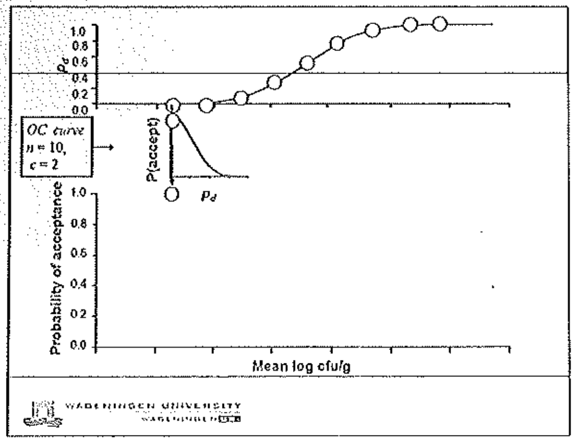

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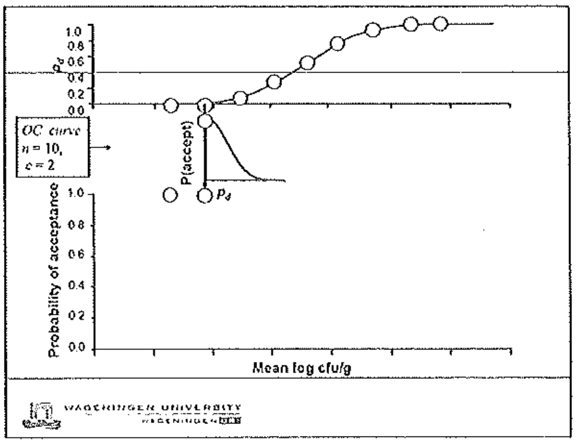

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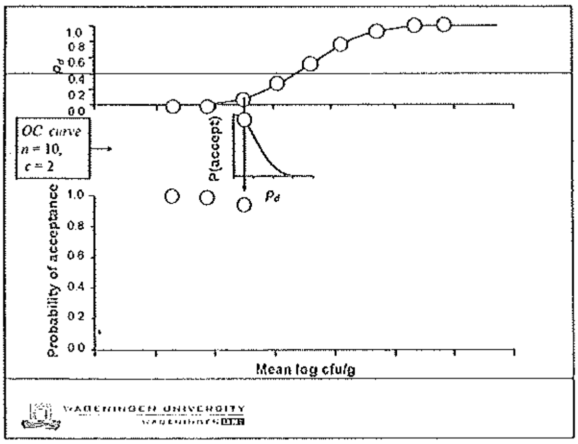

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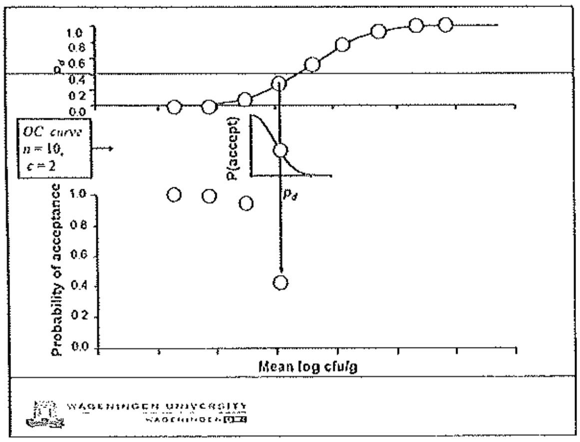

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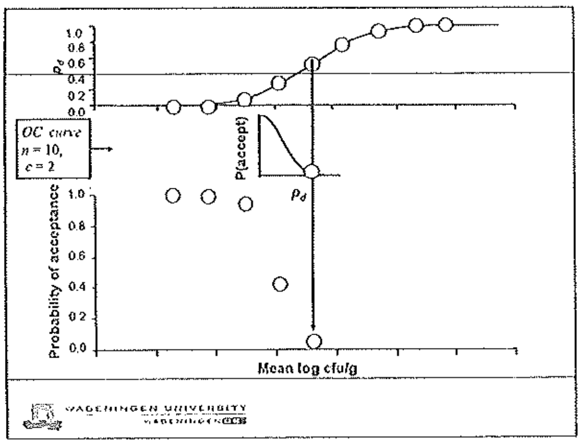

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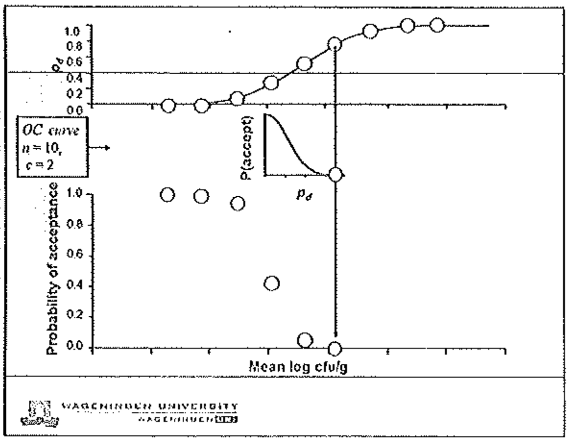
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pd
OC curve
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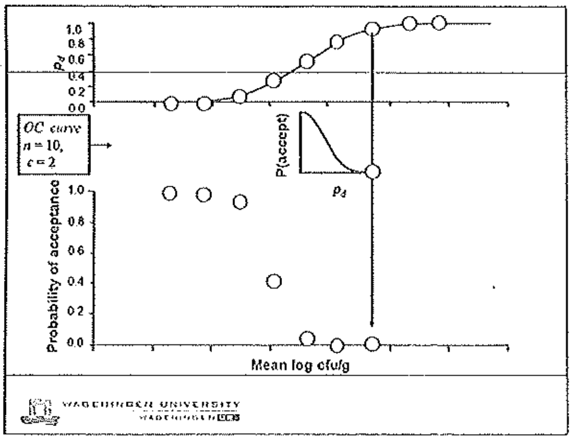
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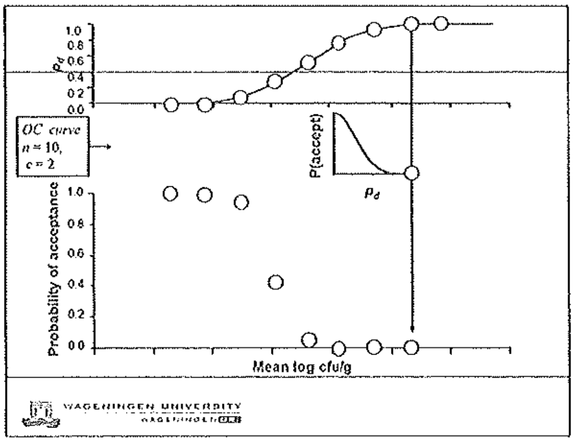
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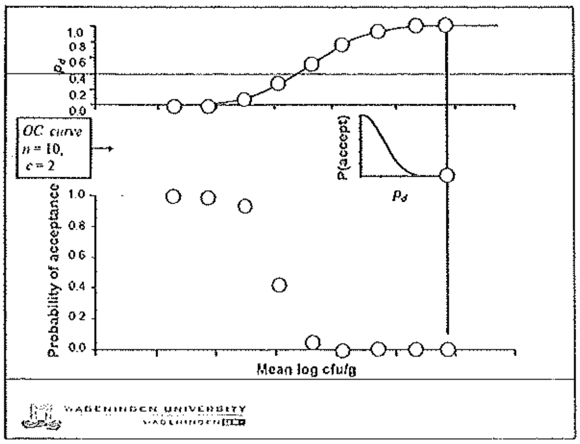

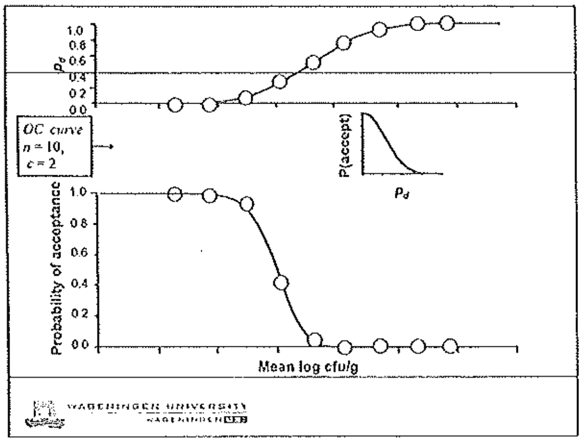

Procedure

- Lognormal distribution $(\mu,\sigma)>m$: proportion defective P_d
- With n, c: P_a of the lot
- Performance of a plan depends on n, c, m, sample size
- .... but also on σ

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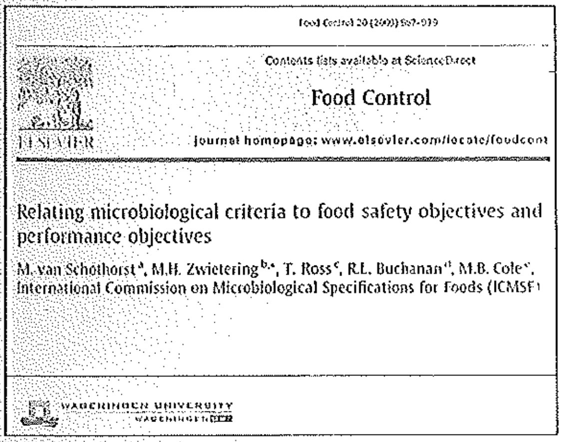
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International Commission on Microbiological Specifications for Foods (ICMSF)
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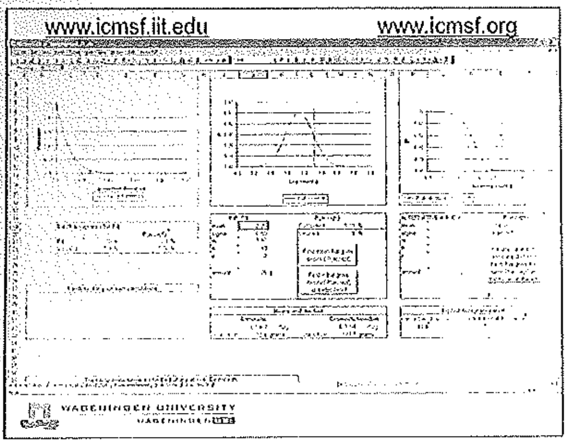
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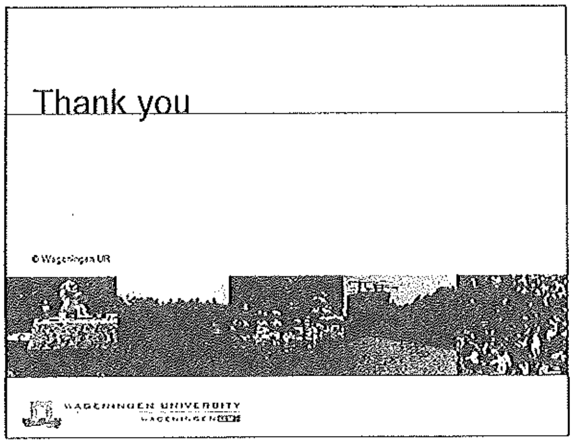
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