Hypothetical examples of FSO-derived Microbiological Criteria *Campylobacter* and *Salmonella* in raw poultry

Marcel Zwietering
Laboratory of Food Microbiology

AGROTECHNOLOGY & FOOD SCIENCES GROUP
WAGENINGEN UR

Contents

ALOP/FSO/MC
Dose-response
MC for prevalence
preventing the extremes ?

AGROTECHNOLOGY & FOOD SCIENCES GROUP
WAGENINGEN UR

number of cases (ALOP)

$$\#\text{ of cases} = P \cdot C \cdot M \cdot S \cdot r$$

P: Prevalence
C: not log *C* !
M: mass per serving
S: amount of servings/ year
r: virulence, state

FSO based on *P* and *C*
also compliance ?

AGROTECHNOLOGY & FOOD SCIENCES GROUP WAGENINGEN UR

Dose response: *Salmonella*

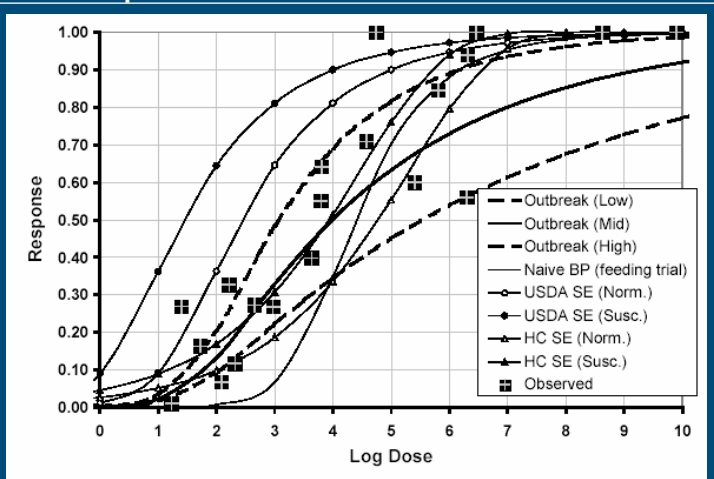


Figure 3.19. Comparison of all dose-response models with reported outbreak data.

AGROTECHNOLOGY & FOOD SCIENCES GROUP WAGENINGEN UR

Dose response: *Salmonella*

Risk assessments of Salmonella *in eggs and broiler chickens* 89

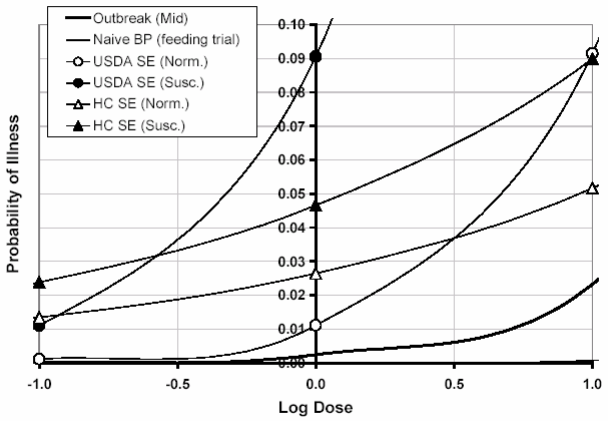


Figure 3.21. Comparison of alternative dose-response models in the -1.0 to 1.0 mean log dose interval.

AGROTECHNOLOGY & FOOD SCIENCES GROUP WAGENINGEN UR

Dose response *Campylobacter*

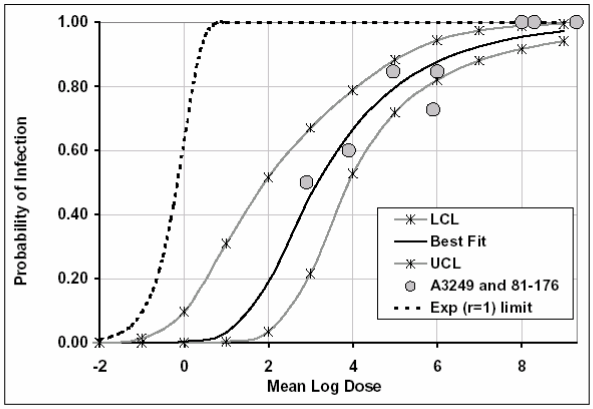


FIGURE 5.1 Beta-Poisson dose-response relationship for the probability of infection for *C. jejuni* based on human feeding trial data and two strains (A3249 and 81-176) and (model parameters, $\alpha = 0.21$, $\beta = 59.95$)
LCL - Lower confidence limit UCL - Upper confidence limit

AGROTECHNOLOGY & FOOD SCIENCES GROUP WAGENINGEN UR

Dose response

Large uncertainty (“impossible” to gather real data)

Often relative risk can be estimated more accurately

P from 10% to 5%: factor 2 reduction in illness
C from 2 logs to 1 log: in certain cases 90% reduction of illness, sometimes less

AGROTECHNOLOGY & FOOD SCIENCES GROUP WAGENINGEN UR

From FSO to PO

P/C at slaughter

storage
transport
storage
preparation

survivor of (inadequate) cooking
recontamination (hands, tools, surfaces)

AGROTECHNOLOGY & FOOD SCIENCES GROUP WAGENINGEN UR

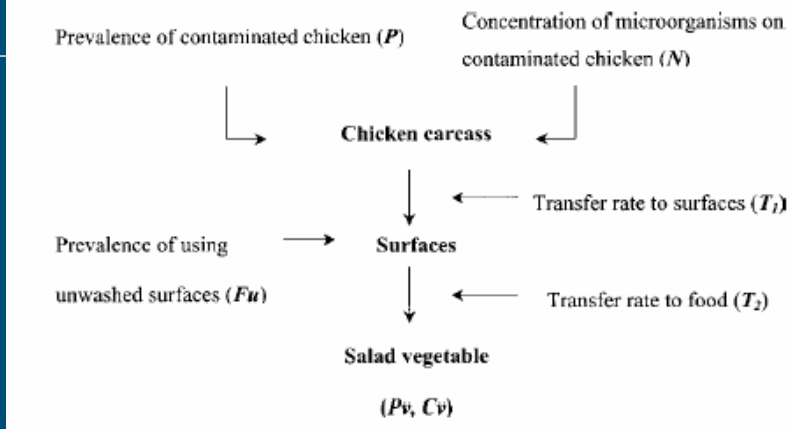
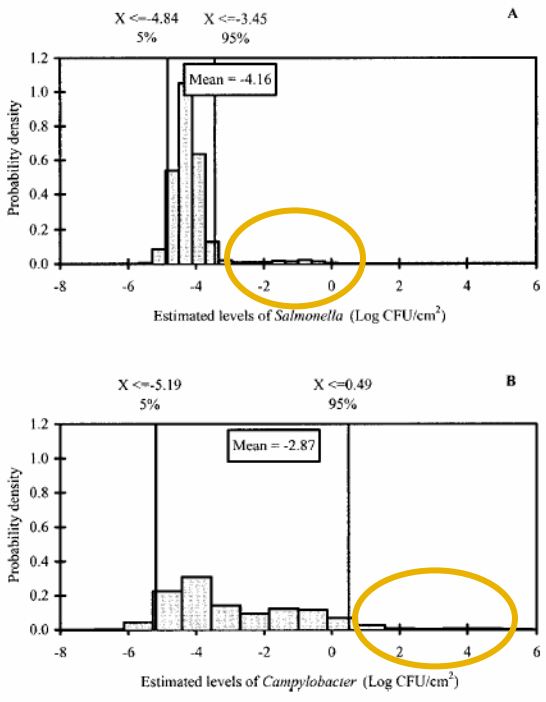


FIGURE 1. *Model of cross-contamination from contaminated retail chicken carcasses to salad vegetables via unwashed surfaces.*

Journal of Food Protection, Vol. 67, No. 9, 2004, Pages 1892–1903

A Quantitative Analysis of Cross-Contamination of *Salmonella* and *Campylobacter* spp. Via Domestic Kitchen Surfaces

H. D. KUSUMANINGRUM, E. D. VAN ASSELT, R. R. BEUMER,* AND M. H. ZWIETERING

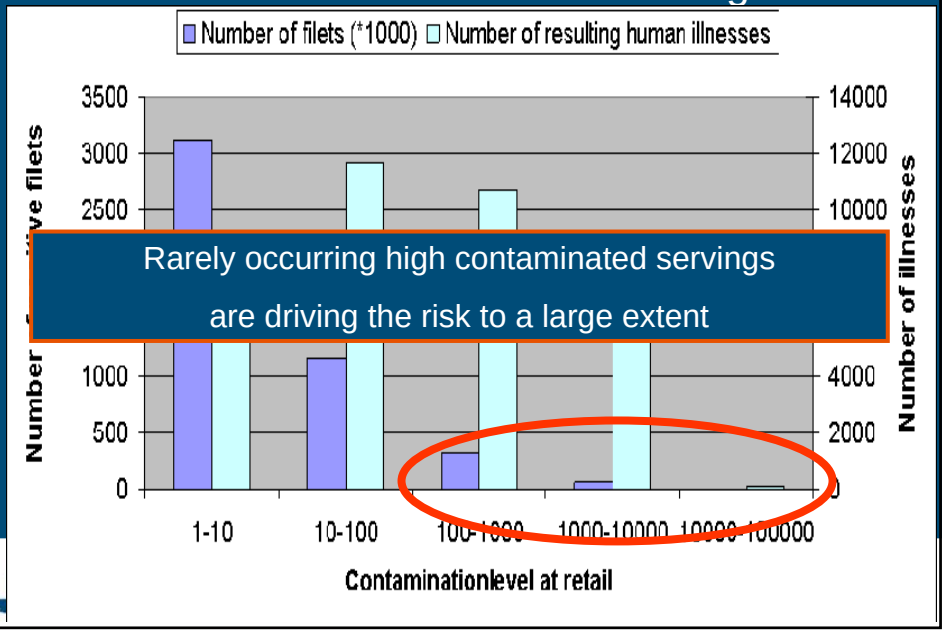


Difficult to relate FSO/PO (growth, cross contamination inactivation

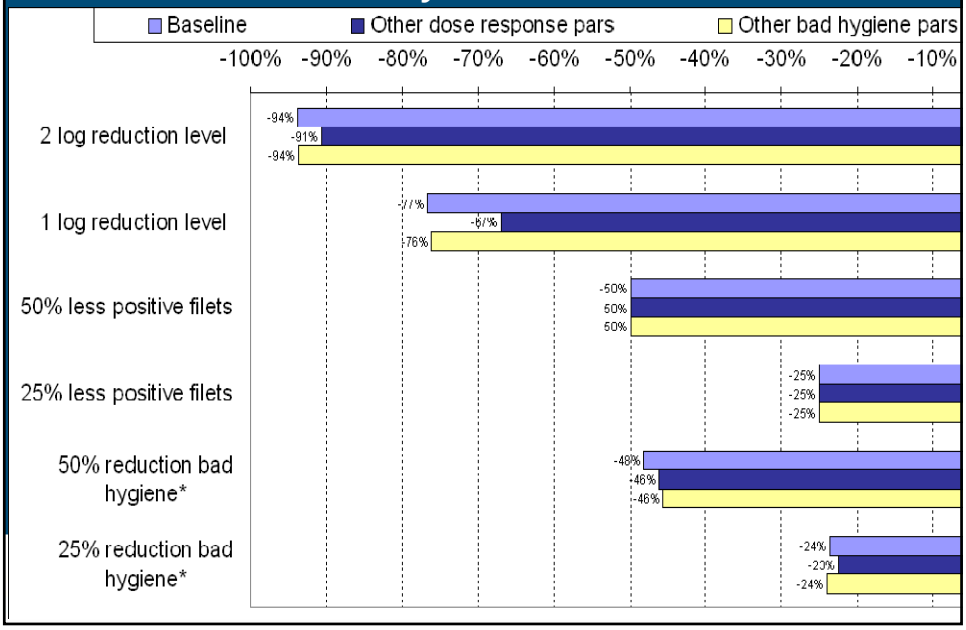
default: Proportional effect of C and P

P from 10% to 5%

Relation number at retail and resulting illness



Does the uncertainty effect the decision?



From PO to MC ?

Objective that must (100%?) be reached
Standardised Method
Measurement inaccuracy
Sampling frequency: false positives/false negatives

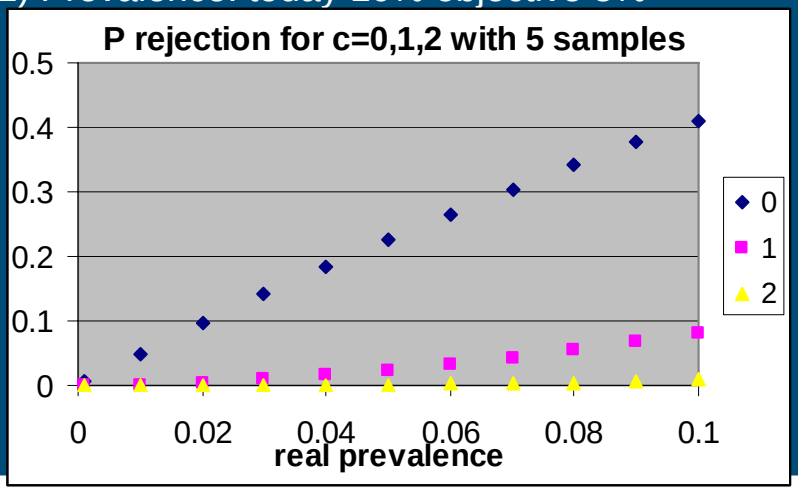
- fresh product, only way to make “virtually” Salmonella- or Campylobacter-free is heating and irradiation

- decontamination might have relevant effect

AGROTECHNOLOGY & FOOD SCIENCES GROUP WAGENINGEN UR

Criteria: presence/absence in 25 g

1) Prevalence: today 10% objective 5%



AGROTECHNOLOGY & FOOD SCIENCES GROUP WAGENINGEN UR

What would be the result of c=0

C=0:
real P=0.05 OK: Preject=0.23 (1-0.95^5)
real P=0.10 not OK: Paccept= 0.59 (0.9^5)

test is not discriminative
even with 20 samples 12% of not detecting P=0.1 !

Better to focus on record of safety ?

Force by ratio Pdetection/costs

AGROTECHNOLOGY & FOOD SCIENCES GROUP WAGENINGEN UR

How are criteria related to interventions

Pdetection
fine:

- 100€	100€
- rework batch	1.000€
- destroy batch	10.000€
- blame and shame	100.000€
- out of business	10.000.000€

It is not the sampling scheme as such that determines policy and intentions producers

AGROTECHNOLOGY & FOOD SCIENCES GROUP WAGENINGEN UR

Approach

1) Set level for P
2) If more known about effects P/C set combined level P/C

1) method to prove compliance
2) method to reject highly contaminated batches

1) For example record of safety P=0.05 (yearly basis)
2) Batch where >100 cfu/g is rejected

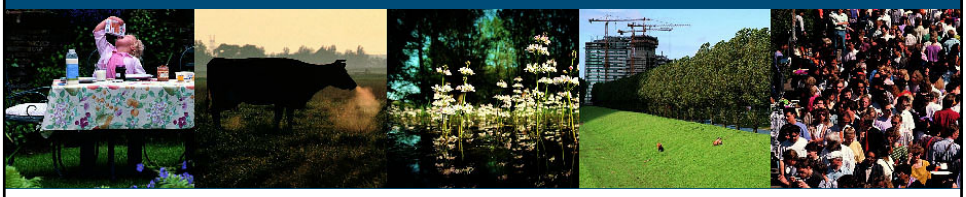
AGROTECHNOLOGY & FOOD SCIENCES GROUP WAGENINGEN UR

Conclusions

Difficult to structurally relate ALOP/FSO/MC for fresh products where the main route is by mishandling /recontamination

RA can give clues for relative effects of interventions

record of safety / batch sampling only to detect/reject extremes



AGROTECHNOLOGY & FOOD SCIENCES GROUP WAGENINGEN UR