Control measures at slaughter

• 100% risk reduction by reduction of carcass concentration by > 6 log10 units
  • Which can be achieved by irradiation/cooking
• More than 90% risk reduction by reduction of carcass concentrations by > 2 log10 units,
  • which can be achieved by freezing for 2-3 weeks or reduction of the concentration in intestines at slaughter by > 3 log units;
• 50-90% risk reduction by reduction of carcass concentrations by 1-2 log10 units,
  • which can be achieved by freezing for 2-3 days, hot water or chemical carcass decontamination with lactic acid, acidified sodium chlorite or trisodium phosphate
Risk factors

*Positive flock results 30x more probable in a positive carcase*

Positive flock results in higher contamination of carcase

Contamination risk differs within MSs and slaughterhouses
Food safety criterion

• Purpose: to define the acceptability of a product or a batch of foodstuff applicable to products placed on the market;
• Point in the food chain: e.g. products placed on the market during their shelf-life
• Matrix: e.g. fresh poultry meat
Process hygiene criterion

• Purpose: to indicate the acceptable functioning of the production process and to set an indicative contamination value above which corrective actions are required.

• Point in the food chain – e.g. broiler chicken carcasses after chilling

• Matrix: e.g. neck skin (used for *Salmonella*)
## Example of a possible PHC

<table>
<thead>
<tr>
<th>Food category</th>
<th>Microorganisms</th>
<th>n</th>
<th>c</th>
<th>m</th>
<th>M</th>
<th>Analytical reference method</th>
<th>Stage where the criterion applies</th>
<th>Action in case of unsatisfactory results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poultry carcases of broilers</td>
<td>Campylobacter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ISO/TS 10272-2 (for enumeration)</td>
<td>Carcases after chilling</td>
<td>Improvements in slaughter hygiene and review of process controls, origin of animals and biosecurity measures in the farms of origin</td>
</tr>
</tbody>
</table>
• **Two class sampling plan:**
  - m cfu / g is the critical limit
  - n samples
  - c acceptance number
  - n=5, c=0, m=1 000 means: "we sample each batch, take five samples, none of these may exceed 1 000 cfu/g"

• **Three class sampling plan**
  - M cfu/g is the second critical limit
  - n=5, c=3, M=10 000, m=1 000 means: "we sample each batch, take five samples, none of these may exceed 10 000 cfu/g and up to three may exceed 1 000 cfu/g"
Barplot of the distribution of Campylobacter counts on broiler carcasses, by country
- excluding counts <10 cfu/g neck and breast skin:
- five categories; 10-39; 40-99; 100-999; 1,000-9,999; >10,000 cfu/g neck and breast skin
Impact of microbiological criteria

< 1000 resp. < 500 cfu/g skin

= 

>50% resp. >90% risk reduction

EU-wide 15 / 45% of all slaughter batches would not conform (refers to data from baseline study)
National example

• National evaluation of a PHC with a model
• Prof. Dr. Arie Havelaar (*Microbiological criteria as a decision tool for controlling Campylobacter in the broiler meat chain. RIVM Letter Report 330331008/2013*)
Evaluation of PHC with $m = 1,000 \text{ cfu/g}; n=5; c=0$

<table>
<thead>
<tr>
<th>Year</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>BNMC overall</td>
<td>32%</td>
<td>37%</td>
<td>29%</td>
<td>27%</td>
</tr>
<tr>
<td>per plant</td>
<td>10-62%</td>
<td>14-54%</td>
<td>11-52%</td>
<td>3-46%</td>
</tr>
<tr>
<td>PF overall</td>
<td>67%</td>
<td>72%</td>
<td>72%</td>
<td>73%</td>
</tr>
<tr>
<td>per plant</td>
<td>32-89%</td>
<td>38-90%</td>
<td>29-86%</td>
<td>11-89%</td>
</tr>
</tbody>
</table>

BNMC: Batches Not Meeting the Criterion
PF: Preventable Fraction
# Efficiency of a PHC for Campylobacter on Dutch broiler meat

<table>
<thead>
<tr>
<th></th>
<th>All human cases</th>
<th>All broiler meat</th>
<th>Dutch broiler meat</th>
<th>Impact of PHC$^*$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fraction</strong></td>
<td>100%</td>
<td>28%</td>
<td>56%</td>
<td>70%</td>
</tr>
<tr>
<td><strong>Incidence (2011)</strong></td>
<td>108,000</td>
<td>30,000</td>
<td>17,000</td>
<td>12,000</td>
</tr>
<tr>
<td><strong>Disease burden (DALY)</strong></td>
<td>3,250</td>
<td>910</td>
<td>509</td>
<td>360</td>
</tr>
<tr>
<td><strong>Cost-of-illness (M€)</strong></td>
<td>76</td>
<td>21</td>
<td>12</td>
<td>8.4</td>
</tr>
<tr>
<td><strong>Intervention costs (M€)</strong></td>
<td></td>
<td></td>
<td></td>
<td>1.7</td>
</tr>
<tr>
<td><strong>Cost-utility ratio (€ / DALY)</strong></td>
<td></td>
<td></td>
<td></td>
<td>-18,000</td>
</tr>
</tbody>
</table>

*$^*$ Discounted at 1.5%

$^*$ Discounted at 4%

$m = 1,000 \text{ cfu/g}; n=5; c=0$
EURL Campylobacter

- EURL Campylobacter at SVA in Uppsala/SE
- Annual proficiency tests on detection and species identification
- Annual proficiency tests on detection and enumeration of Campylobacter
- Annual workshops and specific trainings provided
- NRLs performance improved considerably
- More focus on molecular methods in the future
Thank you very much for your attention!

DG Health & Consumers

Europe working for healthier, safer, more confident citizens

Public Health  Food safety  Consumer Affairs