The challenge of tackling *Campylobacter* in Belgium

May 7th 2014
DG SANCO workshop on the control of *Campylobacter* in poultry
Isabel De Boosere
Content

- Background
- National risk assessment
- National legislation on microbiological criteria for *Campylobacter*
- Further research
- Future perspectives
Background

- *Campylobacter* is most commonly reported gastrointestinal bacterial pathogen in humans in Belgium since 2005.
- Monitored by the FASFC since 2000. The incidence of positive poultry samples is high and remains stable.

Trends & Sources
2010-2011, FASFC

*Number of Campylobacter infections in humans by year (1986-2011). Source: Sentinel Laboratory Network.*
Background

Number of reported human cases of the 3 most important food bacterial pathogens (source: IPH)

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>S. Enteritidis</td>
<td>6.075</td>
<td>2.226</td>
<td>1.052</td>
<td>987</td>
<td>824</td>
<td>587</td>
<td>823</td>
<td>481</td>
<td>662</td>
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<tr>
<td>S. Typhimurium</td>
<td>2.459</td>
<td>1.659</td>
<td>1.826</td>
<td>2.233</td>
<td>2.279</td>
<td>1.622</td>
<td>1.969</td>
<td>2.030</td>
<td>1.699</td>
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<tr>
<td>Andere Salmonella</td>
<td>1.009</td>
<td>1.031</td>
<td>815</td>
<td>755</td>
<td>841</td>
<td>759</td>
<td>868</td>
<td>720</td>
<td>803</td>
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<tr>
<td>Campylobacter</td>
<td>6.454</td>
<td>6.324</td>
<td>5.711</td>
<td>5.876</td>
<td>5.034</td>
<td>4.597</td>
<td>5.170</td>
<td>6.850</td>
<td>7.332</td>
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<tr>
<td>Listeria monocytogenes</td>
<td>68</td>
<td>40</td>
<td>55</td>
<td>52</td>
<td>53</td>
<td>64</td>
<td>43</td>
<td>103</td>
<td>65</td>
</tr>
</tbody>
</table>

Annual report FASFC, 2012
Background

European legislation

- General Food Law, R 178/2002

Belgian legislation

- Law of 24 Jan 1977 concerning the health protection of consumers regarding food and other products
  
  Art. 5 obligation of risk assessment by Superior health Council before setting legislation on contaminants
Contribution to a risk assessment - Campylobacter spp. in meat preparations on the basis of poultry minced meat in Belgium

National risk assessment

Why MC at retail level?

Primary production
Biosecurity on farms: no guarantee, difficult to maintain during long period
Vaccination, probiotics: no options

Slaughter
Drastic reduction is not possible, only limited reduction

Retail
Often contaminated (67%). Contamination levels are mostly unknown. Estimated that 9% is contaminated with > 100 cfu/g
National risk assessment

Preliminary probabilistic approach

6 scenario’s, e.g.

Scenario 1 (estimated current situation)
9 % > 100/g, 24 % > 1/25 g & 67 % < 1/25 g

Scenario 3
0 % > 100/g, 9% > 10/g, 24 % > 1/25 g and < 10/g, & 67 % < 1/25g

Scenario 5
0 % > 10/g, 9% > 1/g, 24 % > 1/25 g and <1/g, & 67 % < 1/25g
## Preliminary probabilistic approach

<table>
<thead>
<tr>
<th>Normal distribution of the contamination level (%)</th>
<th>Maximal probability of infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 1/g</td>
<td>&gt;10/g</td>
</tr>
<tr>
<td>Scenario 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>19.99</td>
</tr>
<tr>
<td>Scenario 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11.47</td>
</tr>
<tr>
<td>Scenario 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6.3</td>
</tr>
</tbody>
</table>
National risk assessment

Quantitative risk assessment of *Campylobacter* spp. in poultry based meat preparations as one of the factors to support the development of risk-based microbiological criteria in Belgium

M. Uyttendaele a,⁎, K. Baert a, Y. Ghafir b, G. Daube b, L. De Zutter c, L. Herman d, K. Dierick e, D. Pierard f, J.J. Dubois g, B. Horion h, J. Debevere a

a Laboratory of Food Microbiology and Food Preservation, Faculty of Bioscience Engineering, Ghent University, Coupure links 653, B-9000 Ghent, Belgium

b Department of Food Sciences — Microbiology, Faculty of Veterinary Medicine, University of Liège, Liège, Belgium

c Department of Veterinary Public Health and Food Safety, Faculty of Veterinary Medicine, Ghent University, Ghent, Belgian

d Department of Animal Product Quality, Agricultural Research Centre, Ministry of the Flemish Community, Meise, Belgium

⁎ Laboratory of Food Microbiology, Bacteriology Section, Institute of Public Health, Ministry of Public Health, Safety of the Food Chain and Environment, Brussels, Belgium

f Laboratory of Microbiology, Academic Hospital of the Vrije Universiteit Brussel, Brussels, Belgium

g Belgian Health Council, Brussels, Belgium

h Federal Public Service (FPS) Health, Food Chain Safety and Environment, Brussels, Belgium

Received 28 September 2005; received in revised form 6 March 2006; accepted 12 May 2006
### National risk assessment

**Table 5**

Overview of the results (exposure, probability of infection, % infected) for the different tested situations

<table>
<thead>
<tr>
<th>Situation</th>
<th>Exposure (cfu per 100 g serving)</th>
<th>Approach 2 (probability of infection)</th>
<th>Approach 3 (% infected)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>95% percentile</td>
<td>100% percentile</td>
</tr>
<tr>
<td>1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.02E+07</td>
<td>7.75E−01</td>
<td>1.63E+13</td>
</tr>
<tr>
<td>1&lt;sup&gt;′&lt;/sup&gt; (raw)</td>
<td>1.45E+10</td>
<td>4.35E+04</td>
<td>1.30E+16</td>
</tr>
<tr>
<td></td>
<td>(sit 1 × 718)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>(sit 1 × 56180)</td>
<td>(sit 1 × 802)</td>
</tr>
<tr>
<td>2</td>
<td>1.83E+05</td>
<td>2.63E−01</td>
<td>1.35E+11</td>
</tr>
<tr>
<td></td>
<td>(sit 1:10)</td>
<td>(sit 1:3)</td>
<td>(sit 1:120)</td>
</tr>
<tr>
<td>3</td>
<td>1.77E+03</td>
<td>9.47E−02</td>
<td>1.12E+09</td>
</tr>
<tr>
<td></td>
<td>(sit 1:11390)</td>
<td>(sit 1:8)</td>
<td>(sit 1:14469)</td>
</tr>
<tr>
<td>4</td>
<td>1.98E+01</td>
<td>3.70E−02</td>
<td>9.35E+06</td>
</tr>
<tr>
<td></td>
<td>(sit 1:1.0 × 10&lt;sup&gt;6&lt;/sup&gt;)</td>
<td>(sit 1:21)</td>
<td>(sit 1:1.7 × 10&lt;sup&gt;5&lt;/sup&gt;)</td>
</tr>
<tr>
<td>5</td>
<td>3.26E−01</td>
<td>1.62E−02</td>
<td>7.77E+04</td>
</tr>
<tr>
<td></td>
<td>(sit 1:6.2 × 10&lt;sup&gt;7&lt;/sup&gt;)</td>
<td>(sit 1:48)</td>
<td>(sit 1:2.1 × 10&lt;sup&gt;8&lt;/sup&gt;)</td>
</tr>
<tr>
<td>6</td>
<td>1.23E−02</td>
<td>8.11E−03</td>
<td>6.46E+02</td>
</tr>
<tr>
<td></td>
<td>(sit 1:1.6 × 10&lt;sup&gt;5&lt;/sup&gt;)</td>
<td>(sit 1:95)</td>
<td>(sit 1:2.5 × 10&lt;sup&gt;3&lt;/sup&gt;)</td>
</tr>
<tr>
<td>7</td>
<td>1.63E−03</td>
<td>4.93E−03</td>
<td>8.67E+00</td>
</tr>
<tr>
<td></td>
<td>(sit 1:1.2 × 10&lt;sup&gt;9&lt;/sup&gt;)</td>
<td>(sit 1:157)</td>
<td>(sit 1:1.9 × 10&lt;sup&gt;2&lt;/sup&gt;)</td>
</tr>
<tr>
<td>8</td>
<td>2.02E+06</td>
<td>7.77E−02</td>
<td>1.63E+12</td>
</tr>
<tr>
<td></td>
<td>(sit 1:10)</td>
<td>(sit 1:10)</td>
<td>(sit 1:10)</td>
</tr>
<tr>
<td>9</td>
<td>1.84E+04</td>
<td>2.63E−02</td>
<td>1.36E+10</td>
</tr>
<tr>
<td></td>
<td>(sit 1:1098)</td>
<td>(sit 1:29)</td>
<td>(sit 1:1200)</td>
</tr>
<tr>
<td>10</td>
<td>1.78E+02</td>
<td>9.49E−03</td>
<td>1.13E+08</td>
</tr>
<tr>
<td></td>
<td>(sit 1:113603)</td>
<td>(sit 1:82)</td>
<td>(sit 1:144312)</td>
</tr>
</tbody>
</table>

(raw) Indicates raw consumption of the product (no effect of cross-contamination or cooking included in the model).

<sup>a</sup> Situation 1 is the original situation in Belgium with regard to the distribution of the *Campylobacter* contamination level (19.68% > 1 cfu/g; 12.44% > 10 cfu/g; 7.28 > 100 cfu/g; 5% > 1000 cfu/g).

<sup>b</sup> (sit 1 × 718) indicates that the exposure is 718 times higher for sit 1 (raw) than for sit 1.
National risk assessment

- Risk of human infection and disease decreases when level of *Campylobacter* are better controlled and presence of high contamination levels is limited

- When elimination of preparations with > 1000/g (<1 %) and reduction of > 100/g (max. 2 %) & > 10/g (max. 5 %)
  \[ \text{↔ reduction of probability of infection by a factor 6} \]

- When elimination of preparations with > 100/g (<1 %) and reduction of > 10/g (max. 2 %)
  \[ \text{↔ reduction of probability of infection by a factor 30} \]

- Communication needed to point out hazards of consumption of raw meat and necessity to heat thoroughly
National legislation on microbiological criteria for *Campylobacter*

**RD of 26 April 2009**

<table>
<thead>
<tr>
<th>Catégorie de denrées alimentaires</th>
<th>Micro-organisme/Métabolite</th>
<th>Limites (1)</th>
<th>Plan d’échantillonnage (2)</th>
<th>Point d’application du critère</th>
<th>Actions correctives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Viandes hachées de volaille et préparations de viande à base de viande de volailles, destinées à être consommées cuites (3)</td>
<td><em>Campylobacter</em> spp. thermotolérants</td>
<td>100 ufc/g</td>
<td>5</td>
<td>0</td>
<td>Fin du processus de production</td>
</tr>
</tbody>
</table>
Further research

- EFSA’s analysis of the baseline survey (2008), conclusions:
  “These findings indicate that certain slaughterhouses are more capable than others in preventing Campylobacter contamination and in controlling the contamination and/or the Campylobacter counts on the carcasses. This implies that slaughterhouse processing offers an opportunity for Campylobacter risk mitigation.”

- Analysis of Belgian data confirmed the EFSA observation

CAMPYVAR, CAMPYTRACE
Campylobacter contamination in broiler carcasses and correlation with slaughterhouses operational hygiene inspection

Ihab Habib\textsuperscript{a, h,*}, Dirk Berkvens\textsuperscript{b}, Lieven De Zutter\textsuperscript{c}, Katelijne Dierick\textsuperscript{d}, Xavier Van Huffel\textsuperscript{e}, Niko Speybroeck\textsuperscript{f}, Annemie H. Geeraerd\textsuperscript{g}, Mieke Uyttendaele\textsuperscript{a}

\textsuperscript{a} Laboratory of Food Microbiology and Food Preservation, Faculty of Bioscience Engineering, Ghent University, Coupure links 653, B-9000 Ghent, Belgium
\textsuperscript{b} Department of Animal Health, Unit of Epidemiology and Biostatistics, Institute of Tropical Medicine, Nationalestraat 155, B-2000 Antwerp, Belgium
\textsuperscript{c} Department of Veterinary Public Health and Food Safety, Faculty of Veterinary Medicine, Ghent University, Salisburylaan 133, B-9820 Merelbeke, Belgium
\textsuperscript{d} Scientific Service Food-borne pathogens, Operational Directorate for Communicable and Infectious Diseases, Institute of Public Health, Brussels, Belgium
\textsuperscript{e} Staff Direction Risk Assessment, Federal Agency for the Safety of the Food Chain (FASFC), Kruidduinlaan 55, B-1000 Brussels, Belgium
\textsuperscript{f} Institute of Health and Society, Université Catholique de Louvain, Clos Chapelle-aux-Champs 30, bte 30.05, 1200 Brussels, Belgium
\textsuperscript{g} Division of Mechatronics, Biostatistics and Sensors (MeBioS), Department of Biosystems (BIOSYST), Katholieke Universiteit Leuven, W. de Croylaan 42, B-3001 Leuven, Belgium
\textsuperscript{h} Division of Food Hygiene and Control, Department of Nutrition, High Institute of Public Health (HIPH), Alexandria University, 165 El-Horraya Avenue, Alexandria, Egypt
Some preliminary results

Slaughterhouses operate high risk raw material - almost 60% of batches are *Campylobacter* positive and usually broilers are colonised with high numbers (> 7.5 log cfu/g)

Both *Campylobacter* colonisation level in the caecal content and especially the carriage of *Campylobacter* on feathers differs between batches.

Breast skin can be highly contaminated with *Campylobacter*.

*Campylobacter* contamination on feathers and on breast skin mostly increased significantly during transport and holding time.
High variability in *Campylobacter* carcass contamination among batches, between batches in slaughterhouse, and between slaughterhouses.

High risk material - *Campylobacter* colonisation level in the caecal content and the carriage of *Campylobacter* on feathers.

Certain slaughterhouses are able to produce lower numbers of highly contaminated carcasses than others.

*Campylobacter* contamination is mainly influenced by the following processes:

- Plucking and evisceration
- Washing and chilling (combined effect) (BUT water immersion)
If only *Campylobacter* negative batches are slaughtered: non-contaminated carcasses (i.e. no enumerable levels of $>10$ cfu/g)

The slaughter of positive batches results in immediate contamination of carcasses across the slaughter line.

When only positive flocks are slaughtered, *Campylobacter* carcass contamination remains at the same level during the process day.

*Campylobacter* is transmitted from a positive to a subsequent negative batch, but the transmission is restricted and decreases quickly to non-enumerable numbers over time.

If the proceeding positive batch is colonised at a low level no carcass contamination occurs in the following negative batch.
Further research

This resulted in a change of the action limits for broiler & laying hen carcasses & fresh meat with skin at slaughterhouse, cutting & processing plants & retail to a level of 1000 cfu/g

Advice 10-2012 The evaluation of the document "Action limits for microbiological contaminants in food" (dossier Sci Com 2011/21)

http://www.favv.be/thematischepublicaties/actiegrenzenvoormicrobiologischecontaminantinenlevensmiddelen.asp (NL)
http://www.favv.be/publicationsthematiques/Limitesdactionpourlescontaminantsmicrobiologiquesdanslesdenreesalimentaires.asp (FR)
Future perspectives

Further research at primary production level

- CAMPYNNANOCURE
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www.health.belgium.be