Listeria, the Law and What Good Control Looks Like

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Chilled Food Association
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Listeria monocytogenes (Lm)

- One of 20 Listeria species
- Lm is the only species legislated for - pathogenic
- Widespread in environment: soil, water, animal faeces, vegetation
- Carried by ~10% of people
- Long incubation period: up to 90 days before symptoms appear
- Grows at refrigerator temperatures (-1.4°C)
- Survives freezing (-18°C)
- Relatively heat resistant (70°C/2 mins for 6-log reduction)
- Grows in low O₂ environments, e.g. vacuum packed foods
- Highly salt tolerant (A_w 0.92): survives and grows even in cured foods
- Min pH for growth 4.2-4.3
- Forms persistent biofilms on surfaces
  - Resistant to cleaning and disinfection
  - Creates reservoir of contamination
  - Must enforce rigorous hygiene schedules to manage
- Vulnerable groups are particularly susceptible
- Transmission from infected food, the environment, mother to foetus
- Main cause of death from foodborne illness in the EU

Major transmission route into humans is through contaminated foodstuffs
## 2018 European Top 5 Foodborne Diseases

### Morbidity & Mortality

<table>
<thead>
<tr>
<th>Disease</th>
<th>No. confirmed human cases</th>
<th>Status available (%)</th>
<th>Number of reporting countries</th>
<th>Reported hospitalised cases</th>
<th>Proportion hospitalised (%)</th>
<th>Hospitalisations</th>
<th>Outcome available (%)</th>
<th>No. reporting MS</th>
<th>Reported Deaths</th>
<th>Case Fatality (%)</th>
<th>Fatality Rate cf Lm</th>
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<tbody>
<tr>
<td>Campylobacteriosis</td>
<td>246,571</td>
<td>27.7</td>
<td>18</td>
<td>20,848</td>
<td>30.6</td>
<td>72.7</td>
<td>16</td>
<td>60</td>
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<td>Salmonellosis</td>
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<td>43.2</td>
<td>15</td>
<td>16,556</td>
<td>41.7</td>
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<td>17</td>
<td>119</td>
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<tr>
<td>STEC infections</td>
<td>8,161</td>
<td>37.3</td>
<td>18</td>
<td>1,151</td>
<td>37.8</td>
<td>60.4</td>
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<td>Yersiniosis</td>
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<td>3</td>
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<tr>
<td>Listeriosis</td>
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<td>42.4</td>
<td>17</td>
<td>1,049</td>
<td>97.0</td>
<td>57.6</td>
<td>19</td>
<td>229</td>
<td>15.6</td>
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* 2017: Listeriosis death rate 345x Campylobacteriosis, 28x STEC
** 2016: Listeriosis death rate 540x Campylobacteriosis, 60x STEC
*** 2015: Listeriosis death rate 590x Campylobacteriosis, 74x STEC


### L. monocytogenes EU Legislation

#### EU Microbiological Criteria for Foodstuffs 2073/2005

<table>
<thead>
<tr>
<th>Criterion number</th>
<th>Food category</th>
<th>Sampling plan</th>
<th>Limits</th>
<th>Analytical reference method</th>
<th>Stage where the criterion applies</th>
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</thead>
<tbody>
<tr>
<td>1.2 (a and b)</td>
<td>Ready-to-eat foods able to support the growth of <em>L. monocytogenes</em>, other than those intended for <em>infants and for special medical purposes</em></td>
<td>5 0</td>
<td>100 cfu/g: applies if the manufacturer is able to demonstrate, to the satisfaction of the competent authority, that the product will not exceed the limit 100 cfu/g throughout the shelf-life. The FBO may fix intermediate limits during the process that must be low enough to guarantee that the limit of 100 cfu/g is not exceeded at the end of shelf-life</td>
<td>EN/ISO 11290-2</td>
<td>Products placed on the market during their shelf-life</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 0</td>
<td>Not detected in 25g: applies before products have left the immediate control of the producing FBO when he is NOT able to demonstrate to the satisfaction of the competent authority that the product will not exceed the limit of 100 cfu/g throughout the shelf life</td>
<td>EN/ISO 11290-1</td>
<td>Before the food has left the immediate control of the food business operator, who has produced it</td>
</tr>
<tr>
<td>1.3</td>
<td>Ready-to-eat foods <em>unable</em> to support the growth of <em>L. monocytogenes</em>, other than those intended for <strong>infants and for special medical purposes</strong></td>
<td>5 0</td>
<td>100 cfu/g</td>
<td>EN/ISO 11290-2</td>
<td>Products placed on the market during their shelf-life</td>
</tr>
</tbody>
</table>

* Shelf life <5 days (P+4): food 'automatically considered' not to support growth. NB: P=0 (EU Lm Ref Lab Shelf Life Guidance)
** EU Reg 609/2013 on Food for Specific Groups (FSG), i.e. food for infants and young children (infant formula, follow-on formula and weaning foods), food for specific medical purposes, and total diet replacement for weight control. Limit of 0 cfu/g in 25g sample, n=10, c=0

EU Regulation 2073/2005
Environmental Sampling

• Art 3.2 of 2073/2005:

• Samples shall be taken from processing areas and equipment used in food production, when such sampling is necessary for ensuring that the criteria are met. In that sampling the ISO standard 18593 shall be used as a reference method. Food business operators manufacturing ready-to-eat foods, which may pose a *Listeria monocytogenes* risk for public health, shall sample the processing areas and equipment for *Listeria monocytogenes* as part of their sampling scheme.
Trending Sampling Results

• Recital 25 of 2073/2005 – generally applicable:

• Trends in test results should be analysed, as they are able to reveal unwanted developments in the manufacturing process enabling the FBO to take corrective actions before the process is out of control.
What Good Control Looks Like (UK Chill):
Validation & Monitoring

• Regular environmental swabbing and food sampling
  • Target environmental sampling: try to find Lm, address with hygiene
  • Trend results (EU Reg 2073/2005) and act on adverse trends (hygiene)

• Environmental swabbing (presence/absence)
  • Validate cleaning method efficacy
  • Verify ongoing efficacy

• Food sampling
  • Day of Production (DOP)    hygiene indicator
  • End of Life (EOL)         shelf life appropriateness
What Good Control Looks Like: UK Chilled Food Industry Lm Data (2008-2019)

- RTE food prevalence (909054 samples):
  - ~0.7% Lm at any point during shelf life, of which
  - 0.0002% present at quantifiable levels, i.e. >20 cfu/g LOQ

- Production environment prevalence (1592459 samples):
  - Food contact surfaces <0.4% Lm (~774k samples)
  - Non-Food contact surfaces ~2% Lm (~818k samples)
### Comparing European Countries’ Listeriosis Rates 2014-2018

All rates per 100k population

**Sentinel systems:**
- **Belgium:** 2015-18 covers 80% population
- **Spain:** 2015-17 no coverage info

**Non-EU rates:**
- **South Africa:** 1.84 (2017-18 )
- **USA:** 0.3
- **Australia:** 0.3*
- **NZ:** 0.6

* incomplete data

**US rate data:**
- [https://www.cdc.gov/listeria/technical.html](https://www.cdc.gov/listeria/technical.html)

**Australia:**

**NZ:**

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<td>Switzerland + Liechtenstein</td>
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Conclusions

• 100 cfu/g as the legal limit, when enforced commercially, drives compliance with best practice and achievement of high standards, as evidenced by epidemiology

• High Care/Risk Area regimes are a demonstrably effective control strategy, i.e. application of GMP + HACCP

• DOP and EOL trending and analysis works as a means of demonstrating control and shelf life appropriateness

• Current UK industry and EU hygiene, shelf life and microbiological rules are effective when implemented and enforced commercially