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Title

Quantifying the effect of natural microflora on growth of Salmonella Typhimurium DT104 and Salmonella Derby in fresh pork

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Objective

To build predictive growth rate models for Salmonella Typhimurium DT104 and Salmonella Derby in fresh pork in the temperature area between 4 and 20°C using

• sterile meat (irradiated at 5 kGy for 523 min)
• meat with a natural microflora

Conclusion

• Temperature abuse of fresh pork, in the chilled temperature area, induced critical Salmonella growth before spoilage occurred (Result I).
• At temperatures below 20°C, the natural background flora in pork slowed down growth of Salmonella Typhimurium DT104 and Salmonella Derby (Result II).

Experimental set up

Result I

Salmonella increase before unacceptable sensory changes

<table>
<thead>
<tr>
<th>Incubation temperature (°C)</th>
<th>Shelf-life (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9°C</td>
<td>0.5</td>
</tr>
<tr>
<td>10.5°C</td>
<td>1.0</td>
</tr>
<tr>
<td>12°C</td>
<td>1.5</td>
</tr>
<tr>
<td>15°C</td>
<td>2.0</td>
</tr>
<tr>
<td>20°C</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Sensory

- odour
- colour
- appearance

Microbial

- psychrotrophes
- S. Typhimurium
- S. Derby

Result II

Models

PRIMARY: Baranyi and Roberts model (DMFit web edition)
SECONDARY: \[ \sqrt{\mu_{\text{max}}} = b \cdot (T - T_{\text{min}}) \]

where \( b \) is a constant, \( T \) is the temperature in °C and \( T_{\text{min}} \) is the intercept between the model and the temperature axis.

Estimates

<table>
<thead>
<tr>
<th></th>
<th>Pork</th>
<th>( b )</th>
<th>( T_{\text{min}} )</th>
<th>( R^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. Derby</td>
<td>Sterile</td>
<td>0.036</td>
<td>2.84</td>
<td>0.974</td>
</tr>
<tr>
<td></td>
<td>Natural flora</td>
<td>0.043</td>
<td>6.86</td>
<td>0.978</td>
</tr>
<tr>
<td>S. Typhimurium DT104</td>
<td>Sterile</td>
<td>0.038</td>
<td>3.70</td>
<td>0.979</td>
</tr>
<tr>
<td></td>
<td>Natural flora</td>
<td>0.045</td>
<td>7.34</td>
<td>0.990</td>
</tr>
</tbody>
</table>