Regulating to Risk During Special Events
What’s going on in this picture?
Risk Factors for Foodborne Illness

- Poor employee health and hygiene
- Food from unsafe sources
- Contaminated equipment
- Inadequate cooking
- Improper holding temperatures (Cooling)
But, I wash my hands...

Guaranteed Foodborne Illness

Ill Employee + Bare Hand Contact = Foodborne Outbreak
Microbial Death Explained

![Microbial Death Curve](image)

<table>
<thead>
<tr>
<th>Time (min)</th>
<th>Number of cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$10^{10}$</td>
</tr>
<tr>
<td>5</td>
<td>$10^9$</td>
</tr>
<tr>
<td>10</td>
<td>$10^8$</td>
</tr>
<tr>
<td>15</td>
<td>$10^7$</td>
</tr>
<tr>
<td>20</td>
<td>$10^6$</td>
</tr>
<tr>
<td>25</td>
<td>$10^5$</td>
</tr>
<tr>
<td>30</td>
<td>$10^4$</td>
</tr>
<tr>
<td>35</td>
<td>$10^3$</td>
</tr>
<tr>
<td>40</td>
<td>$10^2$</td>
</tr>
<tr>
<td>45</td>
<td>$10^1$</td>
</tr>
<tr>
<td>50</td>
<td>$10^0$</td>
</tr>
</tbody>
</table>

D-Value vs. Z-Value

https://www.intechopen.com/books/heat-transfer-phenomena-and-applications/computer-simulation-of-thermal-processing-for-food
D-Value vs. Z-Value

• D-Value: Amount of time to reduce population by 90% (1 log) at a given temperature

• Z-Value: Number of degrees the temperature has to be increased to 90% (1 log) reduction in the D-value

Therefore, as we increase the temperature, we decrease the D-Value, which means we increase the rate of microbial death
Heating and Cooling

http://s-l-a-m-chemnotes.blogspot.com/2010_10_01_archive.html
Inadequate Cooking

• Heating food (cooking) is dynamic, not static
• Microbes are killed by a combination of time and temperature
• Population of pathogens can be reduced the same amount using different temperatures and different times (Food Code chart)
• Food Code cook temperatures are based on a certain log reduction for a set time (15 seconds at the cook temperature), but that is not what really happens
Inadequate Cooking

Food Code cook temperatures are based on a certain log reduction of a certain pathogen at a *set time* (15 seconds) at the final cook temperature...

But...

...that is not what really happens when you cook food!
Modeling Cooking

### Example Cooking

<table>
<thead>
<tr>
<th>Time in hours (min)</th>
<th>Temperature (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>136°F</td>
</tr>
<tr>
<td>0.01 (0.6)</td>
<td>137°F</td>
</tr>
<tr>
<td>0.02 (1.2)</td>
<td>138°F</td>
</tr>
<tr>
<td>0.03 (1.8)</td>
<td>139°F</td>
</tr>
<tr>
<td>0.04 (2.4)</td>
<td>140°F</td>
</tr>
<tr>
<td>0.05 (3.0)</td>
<td>141°F</td>
</tr>
<tr>
<td>0.06 (3.6)</td>
<td>142°F</td>
</tr>
<tr>
<td>0.10 (6)</td>
<td>143°F</td>
</tr>
<tr>
<td>0.15 (9)</td>
<td>145°F</td>
</tr>
</tbody>
</table>
Example Cooking
TDT for Salmonella

What about Cooling?

• “Danger Zone”
• 135°F – 41°F
• ...or is it???
• Few organisms grow at 130°F... and most die
• Most grow very slowly below 70°F ... several hours
Realistic Danger Zone?

Figure 2. Effects of time-temperature exposures on vegetative bacteria in moist foods, including “danger zones.”

www.fda.gov
Realistic Danger Zone?

Figure 3. Effects of time-temperature exposures on vegetative bacteria in moist foods, including "danger zones."
Before the Event

• Invest time before the event
• Gather as much information as possible
• Understand food flow/process
• Follow-up repeatedly
• Gain trust
• Develop plan
Information

• Who, what, where, when, how...
• Questionnaire available, send request
  Larry.Stringer@FDA.HHS.GOV
Key Officials

• Planning Committee
• Operations
• Security Liaison/Site Agent
• Credentialing
• Chef or PIC
Use of ICS

• Why Use ICS
  – Defines Clear Roles and Responsibilities
  – Keeps Communications Clear
  – Allows for Flexibility

• Major Considerations
  – Structure of IMT
  – Roles within IMT
  – Location of IMT
FEMA Training

Free ICS Training Available online at...

https://training.fema.gov/nims/
Murphy’s Law

• Communicate!
• Get Data!
  – What do you know?
  – What don’t you know?
• Don’t freak-out!
• Use your best judgment.
...and finally

Do the best you can with what you have.
That’s all anyone can ask of you.
Questions?

larry.stringer@fda.hhs.gov