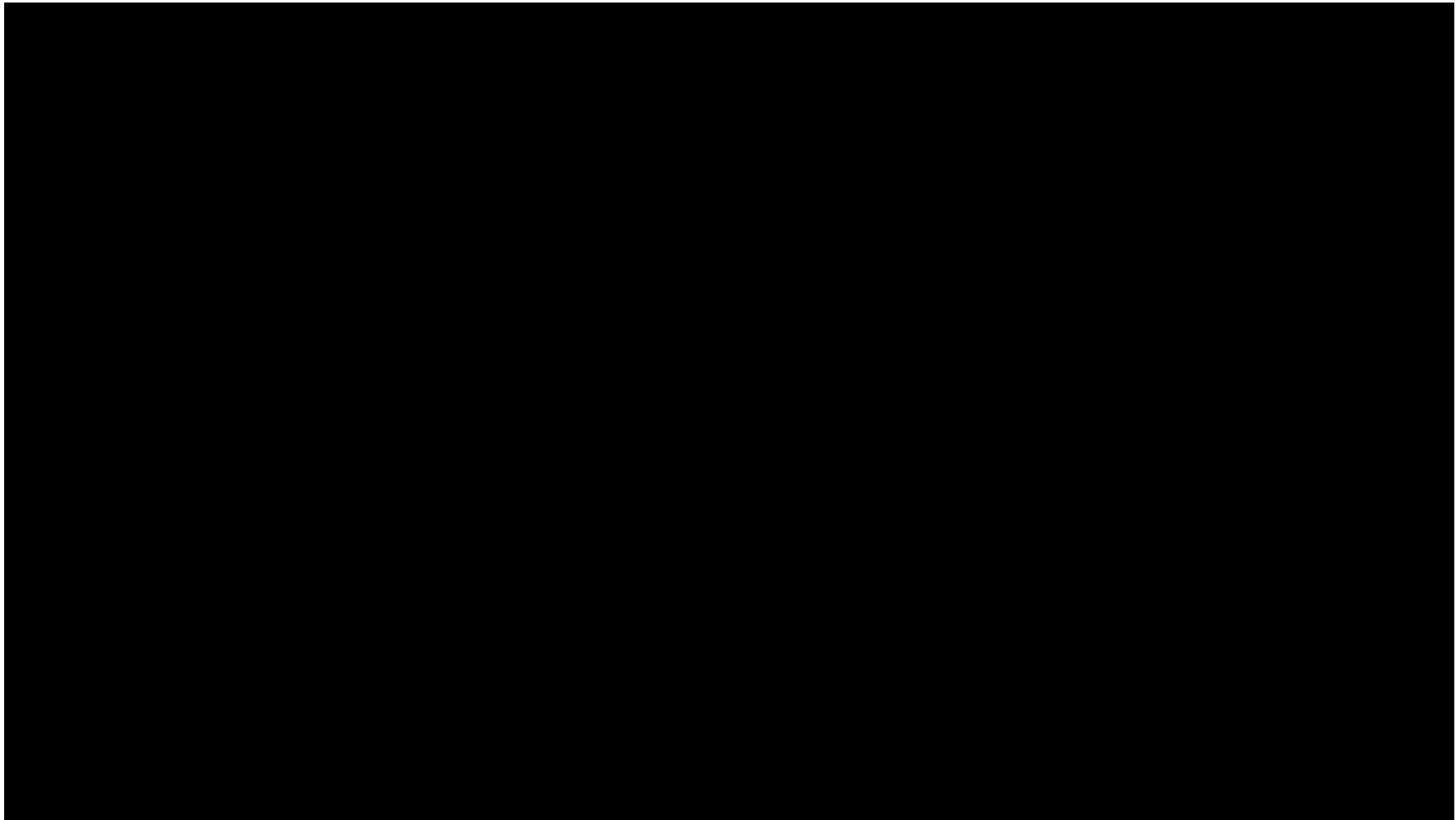


Regulating to Risk During Special Events







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

+



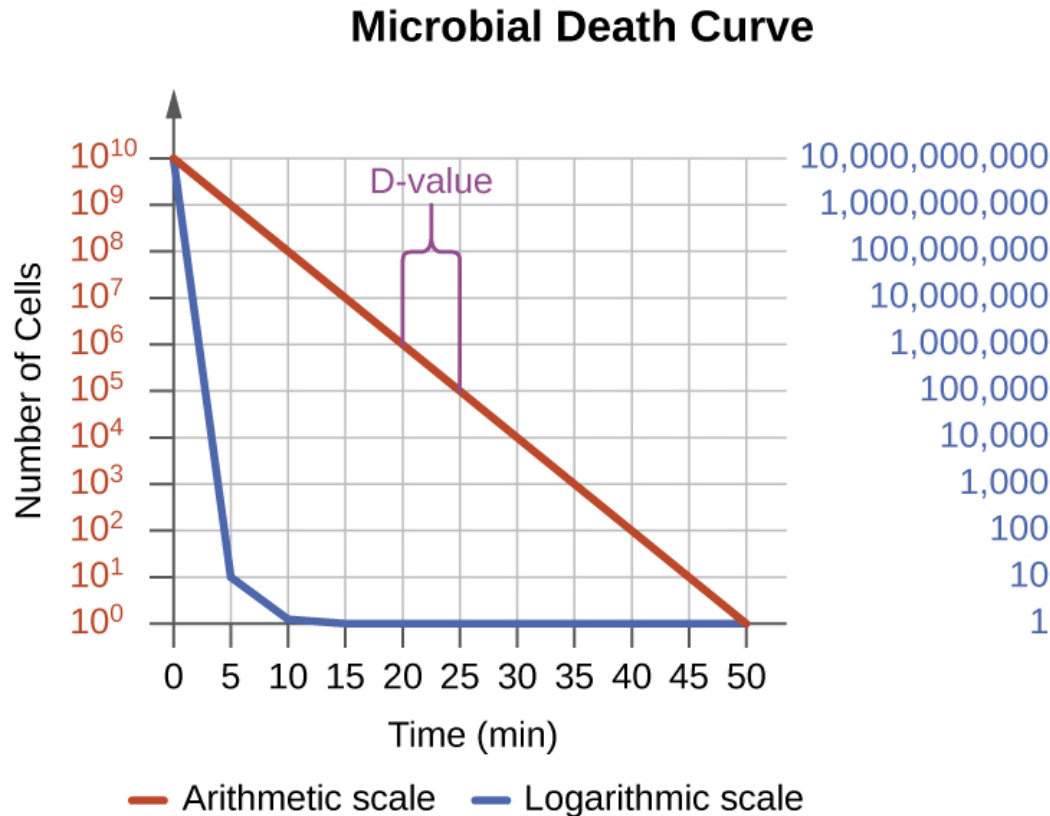
Bare Hand Contact

=



Foodborne Outbreak

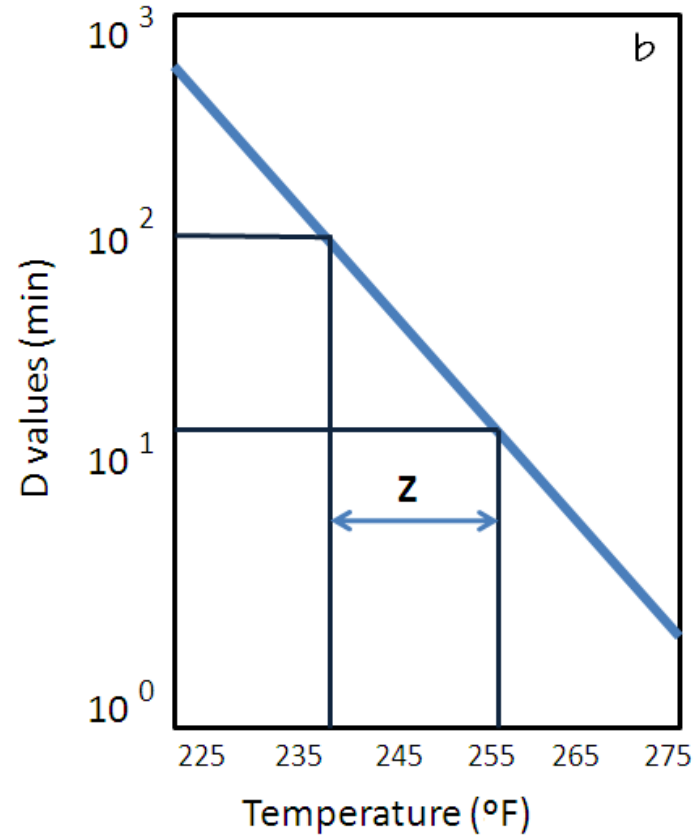
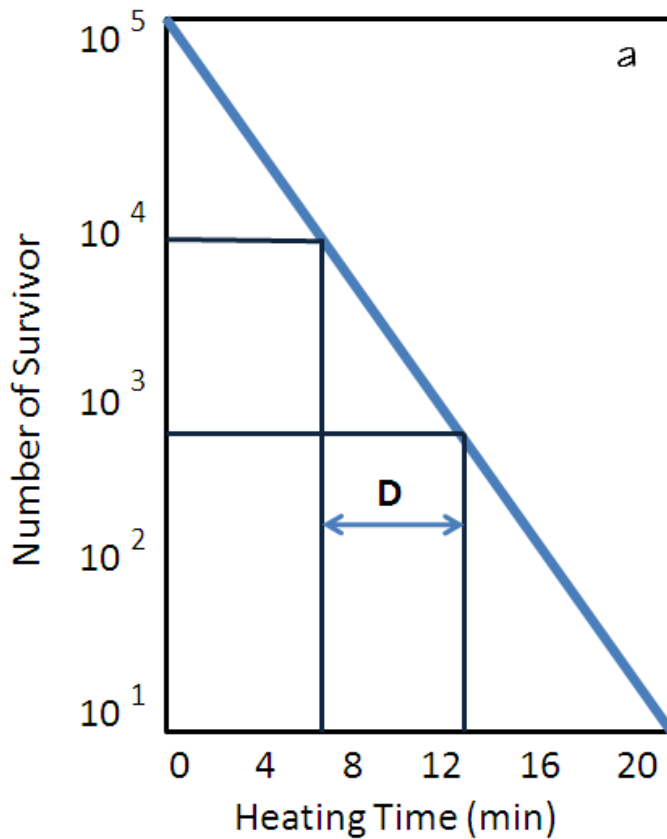
Microbial Death Explained



Time (min)	Number of cells
0	10^{10}
5	10^9
10	10^8
15	10^7
20	10^6
25	10^5
30	10^4
35	10^3
40	10^2
45	10^1
50	10^0

<http://www.alyvea.com/micro/controlling-microbial-growth.php>

D-Value vs. Z-Value



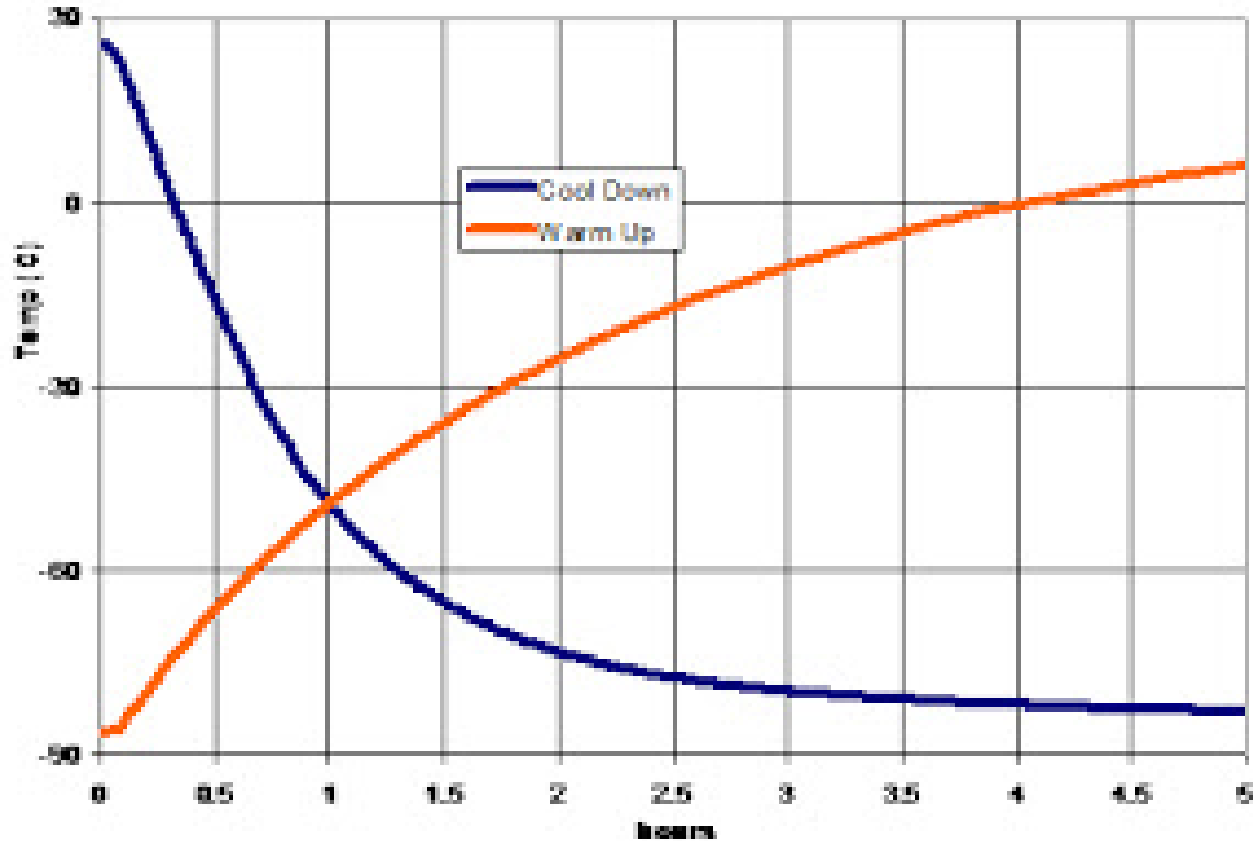
<https://www.intechopen.com/books/heat-transfer-phenomena-and-applications/computer-simulation-of-thermal-processing-for-food>

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

<https://www.combase.cc/index.php/en/>



A Web Resource for Quantitative and Predictive Food Microbiology

NEWS - DMFit Excel version and links to other predictive microbiology tools have been moved to another section of the website. They remain freely available to all registered users.

If you have already registered, simply [Login](#). If not, [Register](#) to gain access to all ComBase tools.

It includes:

- A systematically formatted database of quantified microbial responses to the food environment with more than 50,000 records
- The ComBase Predictive Models – based on ComBase data to predict the growth or inactivation of microorganisms in food

It can be used for:

- Predicting and improving the microbiological safety and quality of foods

News, Events and Jobs

Event: IAFP 2017 European Symposium on Food Safety; 29-31 March 2017, Brussels, Belgium

[Read more...](#)

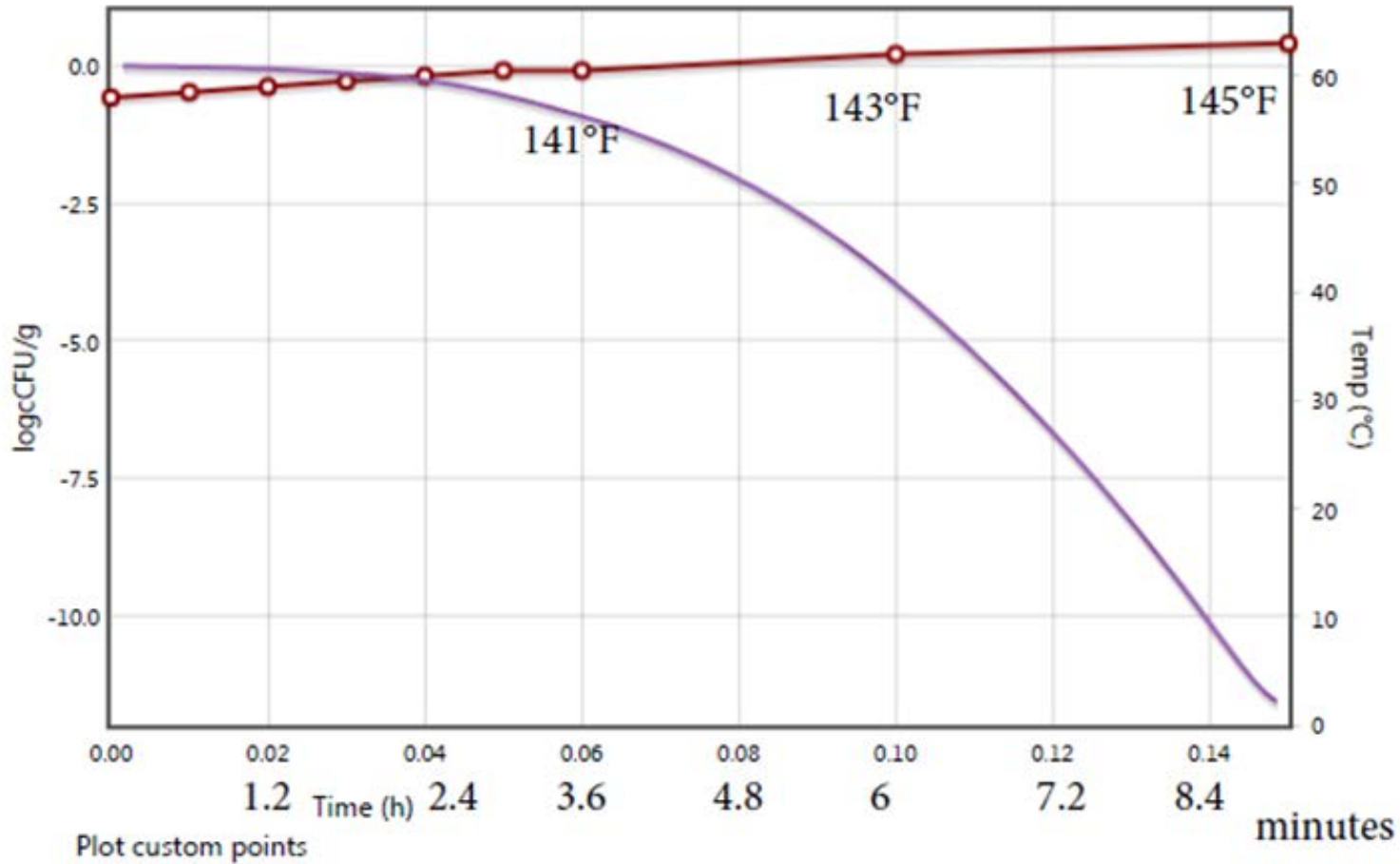
Predictive Microbiology and Risk Assessment News

- Comparative Analyses of Prediction Models for Inactivation of *Escherichia coli* in Carrot Juice by Means of Pulsed Electric Fields
- Risk Assessment of Fungal Spoilage: A Case Study of *Aspergillus niger* on Yogurt

Example Cooking

Time in hours (min)	Temperature (°F)
0	136°F
0.01 (0.6)	137°F
0.02 (1.2)	138°F
0.03 (1.8)	139°F
0.04 (2.4)	140°F
0.05 (3.0)	141°F
0.06 (3.6)	142°F
0.10 (6)	143°F
0.15 (9)	145°F

Example Cooking



TDT for Salmonella

Temperature		Reduction						
°F	°C	7D	6D	5D	4D	3D	2D	1D
125	51.7	380.1	325.8	271.5	217.2	162.9	108.6	54.3
126	52.2	301.9	258.8	215.7	172.5	129.4	86.3	43.1
127	52.8	239.8	205.6	171.3	137.0	102.8	68.5	34.3
128	53.3	190.5	163.3	136.3	108.9	81.6	54.4	27.2
129	53.9	151.3	129.7	108.1	86.5	64.9	43.2	21.6
130	54.4	120.2	103.0	85.9	68.7	51.5	34.3	17.2
131	55.0	95.5	81.8	68.2	54.6	40.9	27.3	13.6
132	55.6	75.8	65.0	54.2	43.3	32.5	21.7	10.8
133	56.1	60.2	51.6	43.0	34.4	25.8	17.2	8.6
134	56.7	47.9	41.0	34.2	27.4	20.2	13.7	6.8
135	57.2	38.0	32.6	27.2	21.7	16.3	10.9	5.4
136	57.8	30.1	25.9	21.6	17.3	12.9	8.6	4.3
137	58.3	24.0	20.6	17.1	13.7	10.3	6.9	3.4
138	58.9	19.1	16.3	13.6	10.9	8.2	5.4	2.7
139	59.4	15.1	12.9	10.8	8.7	6.5	4.3	2.2

Table 3. Thermal death time in minutes for salmonellae (mixture of six serovarieties) in beef emulsions cored in 10-lb. cuts of roast beef at temperatures from 125F (51.7C) to 139F (59.4C).²⁰

<http://www.foodsafetymagazine.com/magazine-archive1/februarymarch-2004/the-danger-zone-reevaluated/>

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?

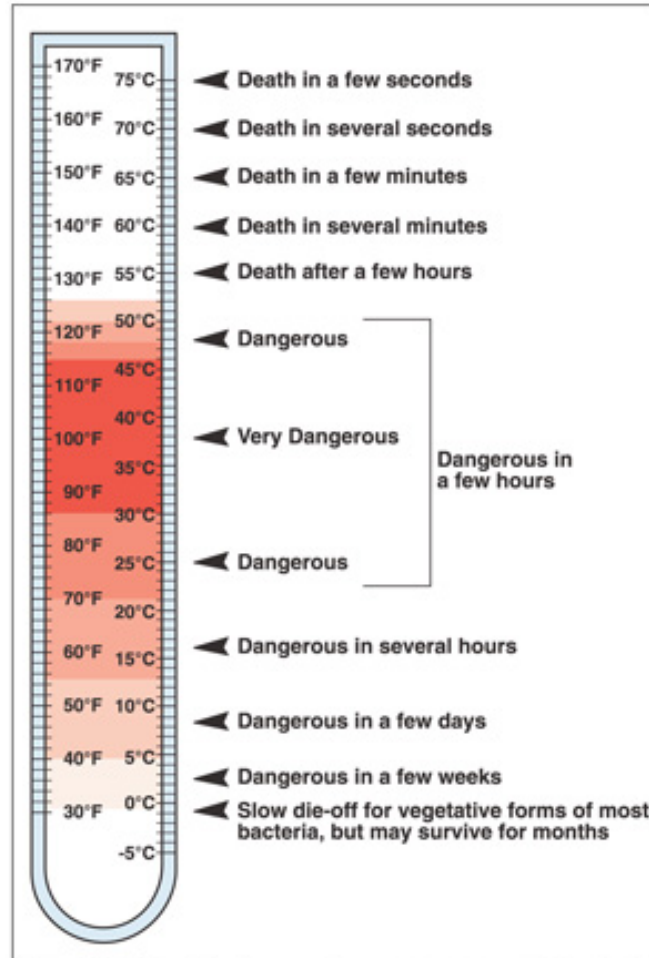


Figure 2. Effects of time-temperature exposures on vegetative bacteria in moist foods, including "danger zones."

Realistic Danger Zone?

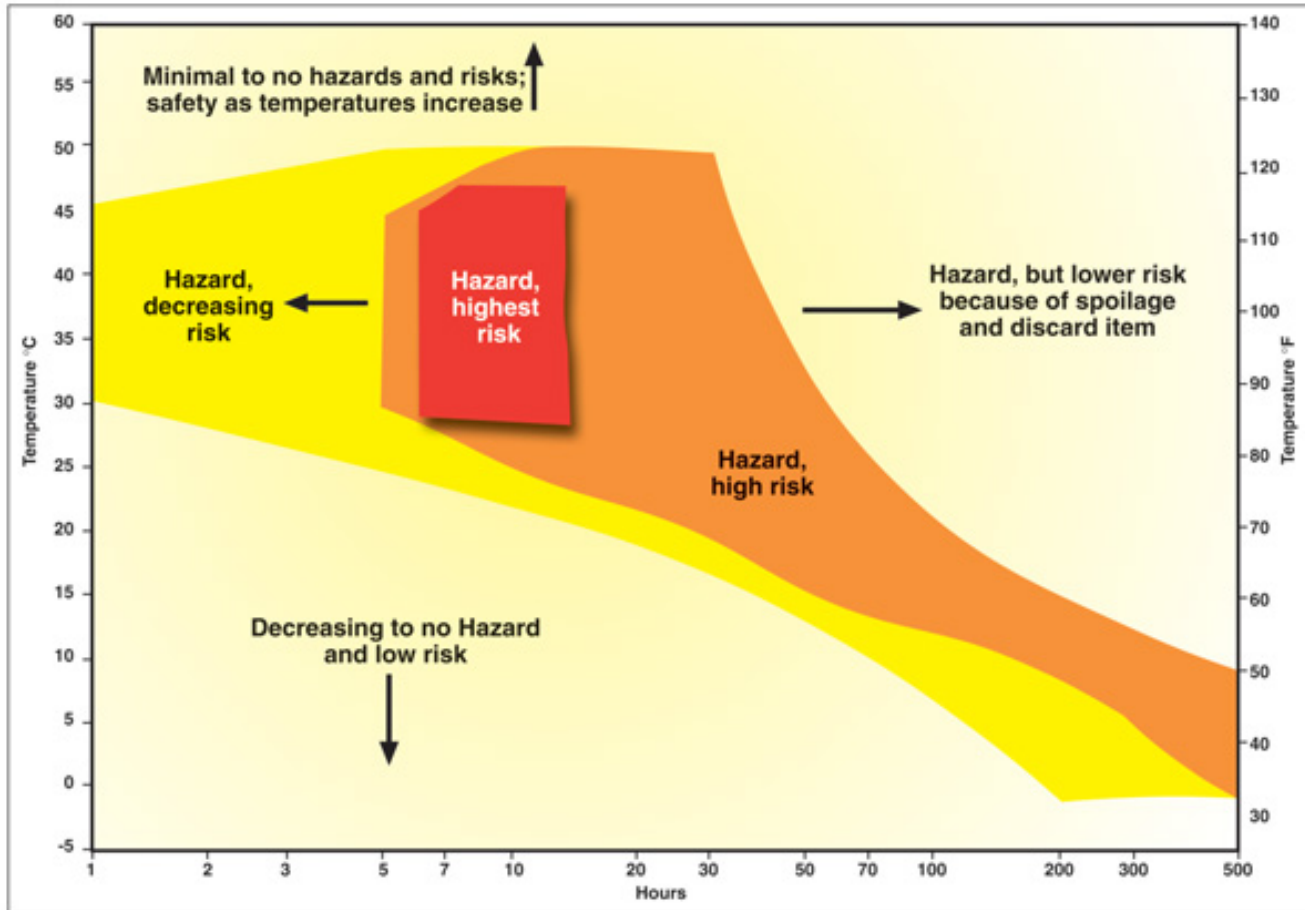


Figure 3. Effects of time-temperature exposures on vegetative bacteria in moist foods, including "danger zones."

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