**Date:** _____

**Organism:** ***Salmonella***

**Product name:** **Meat Patty**

# PROCESS LETHALITY DETERMINATION

**User Must:**

**1.** Identify organism and product of concern
**2.** Provide at least 20 time/temp data points

**Instructions:**

**1.** Select the organism and product of concern and identify corresponding T ref, z, and D values in the table. These values should be obtained from your own companies challenge study data, from scientific literature, or other reliable sources. These values need to be relevant and appropriate for the type of product and the organism of concern.
**2.** Enter the T ref, z, and D values into the appropriate labeled cells below the table that contains the lethality data from literature.
**3.** Clear and enter at least 20 time/temp data points into the data table.
**4.** Once the table is completed, a cumulative F value will be given as the very last number in the right hand column of the data table. This number adds up the lethality values for each time interval and calculates an approximation of the area under the lethal rate curve.
**5.** After the data is entered, a core temperature and lethality curve are produced.
**6.** The total log reduction of the process is automatically determined by dividing the cumulative F value by the D value that was entered into the appropriate labeled cell. The resulting value equals the total log reduction of the process.
**7.** By using these estimates, you or a process authority should determine if the process meets regulatory requirements as safe. Additional documents, such as Appendix A, which discuss desired log reductions should also be considered when evaluating a lethality process.

| **EXAMPLE: Lethality Data from Literature** | | **Microbial Heat Tolerance** | | |
|---|---|---|---|---|
| | | **T ref** | **z** | **D** |
| **Organism** | **Product** | **( ºF)** | **( ºF)** | **(min)** |
| *Salmonella* | Meat Patty (Scott and Weddig, 1998) | 150 | 10 | 0.172 |
| | Gr. Beef (25% fat) (Juneja, 2003) | 140 | 46.51 | 19.31 |
| *E. coli* O157:H7 | Lean Gr. Beef (2% fat) (Line et al., 1991) | 145 | 8.3 | 0.30 |
| | Gr. Beef (25% fat) (Juneja, 2003) | 140 | 43.39 | 20.90 |
| | Lean Gr. Turkey (Juneja and Marmer, 1999) | 149 | 43.7 | 1.45 |
| | Lean Gr. Lamb (Juneja and Marmer, 1999) | 149 | 44.4 | 1.90 |
| | Lean Gr. Pork (Juneja and Marmer, 1999) | 149 | 43.7 | 1.60 |
| *Listeria monocytogenes* | Lean Gr. Beef (2% fat) (Fain, et al., 1991) | 145 | 9.3 | 0.6 |
| | Gr. Beef (25% fat) (Juneja, 2003) | 140 | 42.98 | 27.7 |
| | Hot Dog Batter (30% fat) (Mazzotta and Gombas, 2001) | 160 | 11 | 0.5 |

**Note**: This model is a tool for calculating F-values. To ensure correct results, the proper z, T-ref, and D-values for each product and organism must be used.

**z =** 10 ºF **T ref=** 150 ºF

**D =** 0.172 min

**Log Reduction of Process =** 5.14

**Data Table**

| Time (min) | Core Temp (ºF) | F-value (min) |
|---|---|---|
| 0 | 40 | 0.000 |
| 0.5 | 64 | 0.000 |
| 1 | 82 | 0.000 |
| 1.5 | 97 | 0.000 |
| 2 | 113 | 0.000 |
| 2.5 | 128 | 0.002 |
| 3 | 138 | 0.019 |
| 3.5 | 142 | 0.074 |
| 4 | 145 | 0.193 |
| 4.5 | 148 | 0.430 |
| 5 | 145 | 0.667 |
| 5.5 | 140 | 0.771 |
| 6 | 137 | 0.808 |
| 6.5 | 136 | 0.831 |
| 7 | 135 | 0.849 |
| 7.5 | 134 | 0.863 |
| 8 | 133 | 0.874 |
| 8.5 | 129 | 0.881 |
| 9 | 120 | 0.883 |
| 9.5 | 112 | 0.884 |
| 10 | 104 | 0.884 |