Raw Product Critical Limit Table

The **University of Wisconsin-Madison Raw Products Critical Limits table** is used for setting Critical Limits at Critical Control Points (CCPs) or for guiding SOPs that support meat and poultry HACCP plans.

The table is used with **raw product** that is held outside of temperature control (refrigeration). Depending on the process, meat may warm up and then cool to a safe temperature more than once; or temperature may fluctuate across a series of steps before meat returns to temperature control (refrigeration) or a lethality step begins. **In all cases, product is intended to be fully cooked by the consumer or processor.**

The hazards controlled by employing these Critical Limits are:

- **Pork and Sausage**: *Salmonella* and *Staphylococcus aureus* [*Note:* Sausage (pork bratwurst mix) contains salt but does not contain nitrite.[1]]
- **Beef and Seasoned Beef**: *Salmonella*, *Escherichia coli* O157:H7, *Staphylococcus aureus* [*Note:* Seasoned beef is a product which contains phosphate, salt, and spices, but no nitrite.[1]]
- **Poultry**: *Salmonella* and *Staphylococcus aureus*

[1]The table **may be used** for nitrite-containing products and builds an extra margin of safety into decision-making for these products.

How to use the table:

1) Determine which **column** to use: pork, beef, poultry, seasoned beef or sausage
2) Establish **temperature** for decision making.
   a. If **room temperature is monitored**, use the warmest temperature of the room where product will be handled. You should gather data to show that product temperature does not exceed room temperature.
   b. If **product temperature is monitored**, choose the warmest temperature the product might reach, accounting for steps such as grinding that may heat the product.
3) From the **table**, note the **Critical Limit** (in hours and minutes) for the temperature you established.
   a. If **room temperature is monitored**, it is the time from when the product is placed into a room 50°F or warmer until the product is returned to a cooler at 41°F or lower.
   b. If **product temperature is monitored**, it is the time from when the product temperature exceeds 45°F until the product returns to 41°F or lower. For hot-boned meat, this is time from the completion of slaughter and dressing until the meat reaches 41°F or lower.

Critical Limit (hours : minutes)#

Temperature (°F)	Pork	Beef	Poultry	Seasoned Beef	Sausage
50	54:45	27:00	22:30	13:15^	8:30*
55	17:00	9:00	14:45	13:15^	8:30*
60	8:30	6:00	13:45	13:15	8:30*
65	8:15	3:45	8:15	5:00	8:30
70	5:45	3:30	4:45	5:00	6:00
75	4:15	2:30	3:00	3:00	5:15
80	4:15	2:00	3:00	3:00	3:15
85	1:30	1:30	2:00	2:00	2:30
90	1:30	1:30	2:00	2:00	2:30
95	1:30	1:15	2:00	1:30	1:45
100	1:30	1:15	1:30	1:30	1:45
105	1:00	1:00	0:45	1:00	1:45
110	1:00	1:00	0:45	1:00	2:15

Continued on page 2

%Based on scientifically supported information on setting low-temperature critical limits (Tompkin paper).

#Critical Limits are based on research done at the University of Wisconsin-Madison. Each value is the **shortest lag phase** (in hours and minutes) among the target pathogens for each product. References for the research are noted below.

^No experiments done at this temperature. Must use Critical Limit for 60°F.

*No experiments done at this temperature. Must use Critical Limit for 65°F.

References:

Pork (Table 3): Ingham, S.C., M.A. Fanslau, G.M. Burnham, B.H. Ingham, J.P. Norback, and D.W. Schaffner. 2007. Predicting pathogen growth during short-term temperature abuse of raw pork, beef, and poultry products: use of an isothermal-based predictive tool. *Journal of Food Protection* 70(6): 1445-1456.

Beef (Table 4): Ingham, S.C., M.A. Fanslau, G.M. Burnham, B.H. Ingham, J.P. Norback, and D.W. Schaffner. 2007. Predicting pathogen growth during short-term temperature abuse of raw pork, beef, and poultry products: use of an isothermal-based predictive tool. *Journal of Food Protection* 70(6): 1445-1456.

Poultry (Table 5): Ingham, S.C., M.A. Fanslau, G.M. Burnham, B.H. Ingham, J.P. Norback, and D.W. Schaffner. 2007. Predicting pathogen growth during short-term temperature abuse of raw pork, beef, and poultry products: use of an isothermal-based predictive tool. *Journal of Food Protection* 70(6): 1445-1456.

Seasoned Beef. University of Wisconsin-Madison Center for Meat Process Validation. (internal study; unpublished).

Sausage (Table 3): Ingham, S.C., B.H. Ingham, D. Borneman, E. Jaussaud, E.L. Schoeller, N. Hoftiezer, L. Schwartzburg, G.M. Burnham, and J.P. Norback. 2009. Predicting pathogen growth during short-term temperature abuse of raw sausage. *Journal of Food Protection* 72(1): 75-84.

Tompkin, R.B. 1996. The significance of time-temperature growth of foodborne pathogens during refrigeration at 40-50°F. Presented during the Joint FSIS/FDA Conference on Time/Temperature. November 18, Washington, DC.

NOTE: All published manuscripts are available in the Reference section of the website: https://foodsafety.wisc.edu under the Meat HACCP tab.

THE UNIVERSITY of WISCONSIN MADISON