

I very much appreciate that a culinary innovator of Nathan Myrsvold's stature has allowed me to include the following charts from his groundbreaking book *Modernist Cuisine*. These particular charts provide an excellent tool for predicting the thermal conductivity of various shapes and sizes of protein portions in water. The cooking times are similar to those predicted in the PolyScience Sous Vide Toolbox application.

SUGGESTED TIMES FOR COOKING MEAT AND SEAFOOD SOUS VIDE

Sous vide cooking has many benefits, but it can be hard to estimate how long it will take. We used mathematical models, calibrated by experiments in our research kitchen, to produce the tables below. They offer estimated cooking times for foods of various shapes with the water bath set 1 °C / 2 °F

higher than the core temperature you want the food to achieve (see page 246). The times are calculated for food having thermal properties typical of most meat and seafood, but they should be roughly accurate for most plant foods as well. Note that the times are approximate—because many variables are involved in

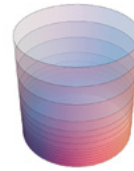


Table 1. Cooking times for cylinder-shaped meats having a diameter of 15 cm / 6 in

ΔT (°C)	Thickness (cm)														ΔT (°F)
	0.5	1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0	7.5	10.0	12.5	15.0		
5	3m 25s	8m 06s	14m 04s	21m 20s	29m 51s	39m 30s	1h 01m	1h 24m	1h 47m	2h 19m	3h 05m	3h 40m	4h 07m	9	
10	4m 33s	10m 41s	18m 29s	27m 55s	38m 53s	51m 10s	1h 18m	1h 46m	2h 14m	2h 53m	3h 50m	4h 34m	5h 08m	18	
15	5m 13s	12m 15s	21m 11s	31m 57s	44m 23s	58m 14s	1h 28m	1h 59m	2h 30m	3h 14m	4h 18m	5h 07m	5h 45m	27	
20	5m 44s	13m 25s	23m 09s	34m 54s	48m 22s	1h 03m	1h 35m	2h 09m	2h 42m	3h 30m	4h 38m	5h 31m	6h 11m	36	
25	6m 07s	14m 20s	24m 42s	37m 13s	51m 29s	1h 07m	1h 41m	2h 16m	2h 51m	3h 41m	4h 54m	5h 50m	6h 33m	45	
30	6m 26s	15m 04s	25m 59s	39m 05s	54m 01s	1h 10m	1h 46m	2h 22m	2h 59m	3h 52m	5h 07m	6h 06m	6h 50m	54	
35	6m 43s	15m 42s	27m 03s	40m 44s	56m 08s	1h 13m	1h 49m	2h 28m	3h 06m	4h 00m	5h 17m	6h 18m	7h 05m	63	
40	6m 57s	16m 15s	27m 57s	42m 01s	57m 56s	1h 16m	1h 53m	2h 32m	3h 11m	4h 06m	5h 27m	6h 31m	7h 18m	72	
45	7m 10s	16m 46s	28m 55s	43m 17s	59m 53s	1h 18m	1h 56m	2h 36m	3h 17m	4h 14m	5h 36m	6h 41m	7h 29m	81	
50	7m 22s	17m 12s	29m 34s	44m 22s	1h 01m	1h 19m	1h 59m	2h 40m	3h 21m	4h 20m	5h 43m	6h 49m	7h 39m	90	
55	7m 34s	17m 35s	30m 12s	45m 18s	1h 03m	1h 21m	2h 01m	2h 43m	3h 25m	4h 24m	5h 51m	6h 57m	7h 48m	99	
60	7m 40s	17m 51s	30m 52s	46m 18s	1h 04m	1h 23m	2h 04m	2h 46m	3h 29m	4h 29m	5h 55m	7h 04m	7h 56m	108	
65	7m 45s	18m 16s	31m 31s	47m 07s	1h 05m	1h 24m	2h 05m	2h 49m	3h 32m	4h 32m	6h 02m	7h 11m	8h 03m	117	
70	7m 59s	18m 34s	32m 02s	48m 10s	1h 06m	1h 25m	2h 08m	2h 51m	3h 35m	4h 37m	6h 07m	7h 18m	8h 11m	126	
75	8m 06s	18m 54s	32m 20s	48m 25s	1h 07m	1h 27m	2h 09m	2h 53m	3h 38m	4h 41m	6h 12m	7h 24m	8h 16m	135	
80	8m 15s	19m 04s	32m 49s	49m 10s	1h 08m	1h 27m	2h 11m	2h 55m	3h 40m	4h 44m	6h 17m	7h 30m	8h 29m	144	
85	8m 17s	19m 23s	33m 24s	49m 46s	1h 08m	1h 29m	2h 12m	2h 57m	3h 43m	4h 47m	6h 22m	7h 37m	8h 29m	153	
90	8m 25s	19m 35s	33m 37s	50m 12s	1h 09m	1h 29m	2h 14m	3h 00m	3h 45m	4h 52m	6h 28m	7h 39m	8h 35m	162	
95	8m 31s	19m 45s	33m 57s	50m 43s	1h 10m	1h 31m	2h 15m	3h 01m	3h 48m	4h 56m	6h 29m	7h 44m	8h 41m	171	
100	8m 33s	19m 56s	34m 13s	51m 02s	1h 11m	1h 32m	2h 16m	3h 04m	3h 51m	4h 57m	6h 30m	7h 49m	8h 48m	180	
105	8m 41s	20m 09s	34m 34s	52m 05s	1h 11m	1h 32m	2h 18m	3h 06m	3h 51m	4h 59m	6h 37m	7h 54m	8h 52m	189	
110	8m 45s	20m 14s	35m 11s	52m 24s	1h 12m	1h 33m	2h 18m	3h 06m	3h 54m	5h 02m	6h 42m	7h 58m	8h 56m	198	
115	8m 49s	20m 33s	35m 29s	53m 06s	1h 12m	1h 34m	2h 20m	3h 08m	3h 56m	5h 05m	6h 43m	8h 02m	9h 01m	207	
120	8m 55s	20m 47s	35m 47s	53m 21s	1h 13m	1h 35m	2h 21m	3h 09m	3h 58m	5h 08m	6h 47m	8h 07m	9h 07m	216	
125	9m 01s	20m 56s	35m 52s	53m 43s	1h 14m	1h 36m	2h 22m	3h 10m	4h 00m	5h 09m	6h 52m	8h 10m	9h 10m	225	
130	9m 10s	21m 06s	36m 09s	54m 33s	1h 15m	1h 36m	2h 23m	3h 12m	4h 02m	5h 11m	6h 55m	8h 14m	9h 14m	234	
	⅜	½	¾	1	1 ¼	1 ½	2	2 ½	3	4	5	6			
	Thickness (in)														

3 Look up the cooking time given for the ΔT you calculated and the relevant dimension of the food.

4 Cook the food in a water bath set to 1 °C / 1.8 °F above the desired final temperature, for the time given. If you want to pasteurize, you must look up pasteurization time for the desired final temperature and add this to the cooking time listed in the table.

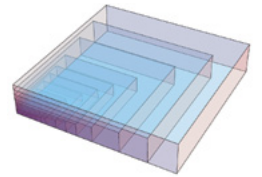


Table 4. Cooking times for slabs of meat whose width and length is at least five times the thickness

ΔT (°C)	Thickness (cm)														ΔT (°F)
	0.5	1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0	7.5	10.0	12.5	15.0		
5	40s	2m 38s	5m 56s	10m 33s	16m 30s	23m 45s	42m 13s	1h 06m	1h 35m	2h 28m	4h 24m	6h 52m	9h 54m	9	
10	51s	3m 26s	7m 42s	13m 42s	21m 24s	30m 49s	54m 47s	1h 26m	2h 03m	3h 13m	5h 42m	8h 55m	12h 50m	18	
15	59s	3m 55s	8m 48s	15m 39s	24m 26s	35m 14s	1h 03m	1h 38m	2h 21m	3h 40m	6h 31m	10h 12m	14h 41m	27	
20	1m 04s	4m 16s	9m 35s	17m 03s	26m 38s	38m 21s	1h 08m	1h 47m	2h 33m	4h 00m	7h 06m	11h 06m	15h 59m	36	
25	1m 08s	4m 33s	10m 13s	18m 09s	28m 21s	40m 49s	1h 13m	1h 53m	2h 43m	4h 15m	7h 34m	11h 49m	17h 01m	45	
30	1m 12s	4m 46s	10m 44s	19m 04s	29m 48s	43m 01s	1h 16m	1h 59m	2h 52m	4h 29m	7h 58m	12h 27m	17h 56m	54	
35	1m 14s	4m 58s	11m 09s	19m 49s	31m 05s	44m 47s	1h 20m	2h 04m	2h 59m	4h 40m	8h 18m	12h 57m	18h 39m	63	
40	1m 17s	5m 07s	11m 32s	20m 34s	32m 08s	46m 15s	1h 22m	2h 08m	3h 05m	4h 49m	8h 34m	13h 23m	19h 16m	72	
45	1m 19s	5m 16s	11m 52s	21m 05s	32m 56s	47m 26s	1h 24m	2h 12m	3h 10m	4h 56m	8h 47m	13h 44m	19h 46m	81	
50	1m 21s	5m 25s	12m 12s	21m 42s	33m 56s	48m 49s	1h 27m	2h 16m	3h 15m	5h 05m	9h 03m	14h 08m	20h 21m	90	
55	1m 23s	5m 31s	12m 27s	22m 06s	34m 31s	49m 45s	1h 28m	2h 18m	3h 19m	5h 11m	9h 12m	14h 23m	20h 44m	99	
60	1m 25s	5m 38s	12m 40s	22m 31s	35m 10s	50m 38s	1h 30m	2h 21m	3h 23m	5h 17m	9h 23m	14h 40m	21h 06m	108	
65	1m 26s	5m 45s	12m 56s	22m 58s	35m 54s	51m 40s	1h 32m	2h 23m	3h 27m	5h 23m	9h 34m	14h 57m	21h 31m	117	
70	1m 28s	5m 49s	13m 11s	23m 25s	36m 35s	52m 38s	1h 34m	2h 26m	3h 31m	5h 29m	9h 45m	15h 14m	21h 56m	126	
75	1m 29s	5m 56s	13m 21s	23m 42s	37m 00s	53m 15s	1h 35m	2h 28m	3h 33m	5h 34m	9h 53m	15h 27m	22h 14m	135	
80	1m 30s	6m 01s	13m 33s	24m 05s	37m 37s	54m 11s	1h 36m	2h 31m	3h 37m	5h 39m	10h 03m	15h 42m	22h 34m	144	
85	1m 31s	6m 06s	13m 44s	24m 25s	38m 12s	55m 02s	1h 38m	2h 33m	3h 40m	5h 44m	10h 12m	15h 54m	22h 54m	153	
90	1m 32s	6m 10s	13m 53s	24m 39s	38m 34s	55m 29s	1h 39m	2h 34m	3h 42m	5h 47m	10h 16m	16h 05m	23h 08m	162	
95	1m 33s	6m 13s	13m 58s	24m 50s	38m 42s	55m 41s	1h 39m	2h 35m	3h 43m	5h 48m	10h 19m	16h 08m	23h 13m	171	
100	1m 35s	6m 16s	14m 08s	25m 05s	39m 10s	56m 25s	1h 40m	2h 36m	3h 46m	5h 53m	10h 26m	16h 20m	23h 29m	180	
105	1m 35s	6m 21s	14m 18s	25m 22s	39m 38s	57m 06s	1h 42m	2h 39m	3h 49m	5h 57m	10h 35m	16h 31m	23h 48m	189	
110	1m 36s	6m 26s	14m 30s	25m 43s	40m 12s	57m 57s	1h 43m	2h 41m	3h 52m	6h 02m	10h 43m	16h 45m	24h 07m	198	
115	1m 37s	6m 28s	14m 28s	25m 42s	40m 14s	57m 56s	1h 43m	2h 41m	3h 52m	6h 02m	10h 43m	16h 46m	24h 06m	207	
120	1m 38s	6m 31s	14m 38s	25m 57s	40m 36s	58m 20s	1h 44m	2h 42m	3h 54m	6h 05m	10h 48m	16h 53m	24h 19m	216	
125	1m 39s	6m 34s	14m 48s	26m 14s	41m 00s	59m 09s	1h 45m	2h 44m	3h 56m	6h 09m	10h 57m	17h 07m	24h 36m	225	
130	1m 40s	6m 37s	14m 55s	26m 27s	41m 23s	59m 30s	1h 46m	2h 45m	3h 58m	6h 11m	11h 02m	17h 12m	24h 47m	234	
	⅜	½	¾	1	1 ¼	1 ½	2	2 ½	3	4	5	6			
	Thickness (in)														

SUGGESTED TIMES FOR COOKING MEAT AND SEAFOOD SOUS VIDE

continued

HOW TO Use the Sous Vide Tables

1 Calculate ΔT by subtracting the starting temperature of the food from the desired final temperature.

2 Choose the table that best fits the shape of the food.

For disc-like foods that are roughly circular and about 15 cm / 6 in. in diameter, use table 1. For long, cylindrical foods (like sausages) that are 15 cm / 6 in or longer, use table 2. For cubes, spheres, or squat cylinders, use table 3. For slabs much longer than they are thick, use table 4.

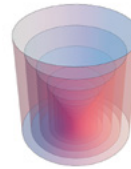


Table 3. Cooking times for cylinder-shaped meats having thickness roughly equal to their diameter

ΔT (°C)	Thickness and diameter (cm)													ΔT (°F)
	0.5	1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0	7.5	10.0	12.5	15.0	
5	15s	0m 58s	2m 11s	3m 53s	6m 04s	8m 45s	15m 33s	24m 17s	34m 59s	54m 39s	1h 37m	2h 32m	3h 39m	9
10	18s	1m 12s	2m 43s	4m 50s	7m 33s	10m 52s	19m 19s	30m 10s	43m 27s	1h 08m	2h 01m	3h 09m	4h 32m	18
15	20s	1m 21s	3m 03s	5m 24s	8m 27s	12m 10s	21m 38s	33m 48s	48m 40s	1h 16m	2h 15m	3h 31m	5h 04m	27
20	22s	1m 28s	3m 17s	5m 50s	9m 07s	13m 07s	23m 19s	36m 26s	52m 28s	1h 22m	2h 26m	3h 48m	5h 28m	36
25	23s	1m 33s	3m 28s	6m 10s	9m 38s	13m 53s	24m 40s	38m 32s	55m 30s	1h 27m	2h 34m	4h 01m	5h 47m	45
30	24s	1m 37s	3m 37s	6m 26s	10m 03s	14m 28s	25m 47s	40m 13s	57m 55s	1h 30m	2h 41m	4h 11m	6h 02m	54
35	25s	1m 40s	3m 45s	6m 39s	10m 24s	14m 57s	26m 38s	41m 37s	59m 56s	1h 34m	2h 46m	4h 20m	6h 15m	63
40	26s	1m 43s	3m 52s	6m 52s	10m 43s	15m 26s	27m 26s	42m 52s	1h 02m	1h 36m	2h 51m	4h 28m	6h 26m	72
45	27s	1m 46s	3m 58s	7m 03s	11m 00s	15m 51s	28m 10s	44m 02s	1h 03m	1h 39m	2h 56m	4h 35m	6h 36m	81
50	27s	1m 48s	4m 03s	7m 12s	11m 14s	16m 11s	28m 40s	44m 47s	1h 04m	1h 41m	2h 59m	4h 40m	6h 43m	90
55	28s	1m 50s	4m 08s	7m 20s	11m 28s	16m 30s	29m 23s	45m 53s	1h 06m	1h 43m	3h 04m	4h 47m	6h 53m	99
60	28s	1m 52s	4m 12s	7m 28s	11m 40s	16m 47s	29m 48s	46m 39s	1h 07m	1h 45m	3h 07m	4h 52m	7h 00m	108
65	29s	1m 54s	4m 17s	7m 37s	11m 54s	17m 07s	30m 27s	47m 33s	1h 08m	1h 48m	3h 10m	4h 57m	7h 08m	117
70	29s	1m 56s	4m 21s	7m 43s	12m 04s	17m 23s	30m 51s	48m 09s	1h 09m	1h 48m	3h 13m	5h 01m	7h 14m	126
75	29s	1m 57s	4m 24s	7m 50s	12m 13s	17m 37s	31m 21s	48m 57s	1h 10m	1h 50m	3h 16m	5h 06m	7h 20m	135
80	30s	1m 59s	4m 28s	7m 56s	12m 24s	17m 52s	31m 41s	49m 35s	1h 11m	1h 52m	3h 18m	5h 10m	7h 26m	144
85	30s	2m 00s	4m 30s	8m 00s	12m 29s	17m 59s	31m 56s	50m 04s	1h 12m	1h 53m	3h 20m	5h 12m	7h 29m	153
90	30s	2m 02s	4m 32s	8m 06s	12m 39s	18m 14s	32m 24s	50m 39s	1h 13m	1h 54m	3h 22m	5h 16m	7h 35m	162
95	31s	1m 59s	4m 36s	8m 12s	12m 48s	18m 27s	32m 44s	51m 14s	1h 14m	1h 55m	3h 25m	5h 20m	7h 41m	171
100	31s	2m 00s	4m 39s	8m 15s	12m 55s	18m 36s	33m 06s	51m 42s	1h 15m	1h 56m	3h 27m	5h 23m	7h 45m	180
105	31s	2m 05s	4m 44s	8m 22s	13m 03s	18m 51s	33m 33s	52m 24s	1h 16m	1h 58m	3h 29m	5h 27m	7h 51m	189
110	32s	2m 07s	4m 45s	8m 26s	13m 11s	18m 59s	33m 46s	52m 46s	1h 16m	1h 59m	3h 31m	5h 29m	7h 55m	198
115	32s	2m 07s	4m 46s	8m 27s	13m 14s	19m 01s	33m 50s	52m 47s	1h 16m	1h 59m	3h 31m	5h 30m	7h 55m	207
120	32s	2m 08s	4m 48s	8m 32s	13m 19s	19m 09s	34m 03s	53m 05s	1h 16m	1h 59m	3h 32m	5h 32m	7h 58m	216
125	32s	2m 09s	4m 50s	8m 37s	13m 29s	19m 21s	34m 24s	53m 47s	1h 17m	2h 01m	3h 35m	5h 36m	8h 04m	225
130	33s	2m 10s	4m 52s	8m 38s	13m 29s	19m 26s	34m 32s	53m 51s	1h 17m	2h 01m	3h 36m	5h 37m	8h 06m	234
	⅓	⅓	⅓	⅓	1	1⅓	1⅓	2	2⅓	3	4	5	6	
	Thickness and diameter (in)													

the calculations, this is not an exact guide and should not be relied upon for critical situations. A temperature probe provides more reliable information on how close the food is to being done, but the tables can be helpful in planning. For irregularly shaped foods, use the dimensions of the thickest part.

These tables were produced using a thermal diffusivity value of 0.13 mm²/s and a heat transfer coefficient of 100W/m² · K. For more on these important thermodynamic parameters, see page 1-279 in *Modernist Cuisine*.

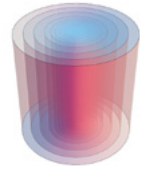


Table 2. Cooking times for cylinder-shaped meats having a length of 15 cm / 6 in

ΔT (°C)	Diameter (cm)													ΔT (°F)
	1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0	7.5	10.0	12.5	15.0		
5	3m 57s	6m 50s	10m 18s	14m 24s	19m 07s	30m 23s	44m 04s	59m 53s	1h 27m	2h 18m	3h 12m	4h 07m	9	
10	5m 10s	8m 51s	13m 17s	18m 29s	24m 29s	38m 46s	56m 00s	1h 16m	1h 49m	2h 52m	3h 59m	5h 08m	18	
15	5m 54s	10m 06s	15m 08s	21m 03s	27m 50s	43m 57s	1h 03m	1h 25m	2h 03m	3h 13m	4h 28m	5h 45m	27	
20	6m 27s	11m 00s	16m 28s	22m 53s	30m 15s	47m 43s	1h 09m	1h 32m	2h 13m	3h 28m	4h 49m	6h 11m	36	
25	6m 52s	11m 43s	17m 31s	24m 20s	32m 08s	50m 38s	1h 13m	1h 38m	2h 20m	3h 40m	5h 05m	6h 33m	45	
30	7m 13s	12m 17s	18m 23s	25m 30s	33m 40s	53m 12s	1h 16m	1h 43m	2h 27m	3h 50m	5h 19m	6h 50m	54	
35	7m 32s	12m 47s	19m 09s	26m 35s	35m 07s	55m 05s	1h 19m	1h 46m	2h 32m	3h 58m	5h 30m	7h 05m	63	
40	7m 46s	13m 16s	19m 45s	27m 24s	36m 08s	56m 50s	1h 21m	1h 50m	2h 37m	4h 06m	5h 41m	7h 18m	72	
45	7m 58s	13m 37s	20m 19s	28m 10s	37m 14s	58m 35s	1h 24m	1h 53m	2h 41m	4h 13m	5h 49m	7h 29m	81	
50	8m 13s	13m 59s	20m 53s	28m 57s	38m 11s	1h 00m	1h 26m	1h 55m	2h 44m	4h 17m	5h 57m	7h 39m	90	
55	8m 26s	14m 18s	21m 16s	29m 30s	38m 54s	1h 01m	1h 27m	1h 57m	2h 48m	4h 23m	6h 04m	7h 48m	99	
60	8m 34s	14m 32s	21m 42s	30m 04s	39m 47s	1h 02m	1h 29m	1h 59m	2h 50m	4h 28m	6h 11m	7h 56m	108	
65	8m 43s	14m 47s	22m 06s	30m 33s	40m 07s	1h 03m	1h 30m	2h 01m	2h 54m	4h 31m	6h 17m	8h 03m	117	
70	8m 48s	15m 01s	22m 25s	30m 59s	40m 44s	1h 04m	1h 32m	2h 03m	2h 56m	4h 36m	6h 24m	8h 11m	126	
75	8m 59s	15m 13s	22m 45s	31m 30s	41m 32s	1h 05m	1h 33m	2h 05m	2h 59m	4h 39m	6h 28m	8h 16m	135	
80	9m 06s	15m 28s	23m 07s	31m 57s	42m 11s	1h 06m	1h 35m	2h 07m	3h 01m	4h 42m	6h 35m	8h 29m	144	
85	9m 15s	15m 42s	23m 30s	32m 31s	42m 43s	1h 07m	1h 36m	2h 08m	3h 03m	4h 48m	6h 39m	8h 29m	153	
90	9m 22s	15m 50s	23m 38s	32m 46s	43m 15s	1h 07m	1h 36m	2h 10m	3h 06m	4h 49m	6h 41m	8h 35m	162	
95	9m 27s	16m 05s	23m 52s	33m 07s	43m 53s	1h 09m	1h 38m	2h 11m	3h 07m	4h 52m	6h 45m	8h 41m	171	
100	9m 32s	16m 18s	24m 16s	33m 36s	44m 17s	1h 09m	1h 38m	2h 12m	3h 08m	4h 55m	6h 50m	8h 48m	180	
105	9m 42s	16m 19s	24m 25s	33m 47s	44m 27s	1h 10m	1h 39m	2h 13m	3h 10m	4h 58m	6h 55m	8h 52m	189	
110	9m 44s	16m 30s	24m 31s	34m 03s	44m 53s	1h 10m	1h 40m	2h 15m	3h 13m	5h 00m	6h 57m	8h 56m	198	
115	9m 49s	16m 36s	24m 47s	34m 06s	45m 15s	1h 11m	1h 41m	2h 16m	3h 13m	5h 03m	7h 01m	9h 01m	207	
120	9m 52s	16m 47s	25m 03s	34m 42s	45m 43s	1h 12m	1h 43m	2h 17m	3h 15m	5h 07m	7h 04m	9h 07m	216	
125	10m 00s	16m 57s	25m 20s	35m 04s	46m 17s	1h 12m	1h 43m	2h 18m	3h 18m	5h 09m	7h 08m	9h 10m	225	
130	10m 06s	17m 06s	25m 23s	35m 07s	46m 27s	1h 13m	1h 44m	2h 19m	3h 19m	5h 10m	7h 11m	9h 14m	234	
	⅓	⅓	⅓	1	1⅓	1⅓	2	2⅓	3	4	5	6		
	Diameter (in)													