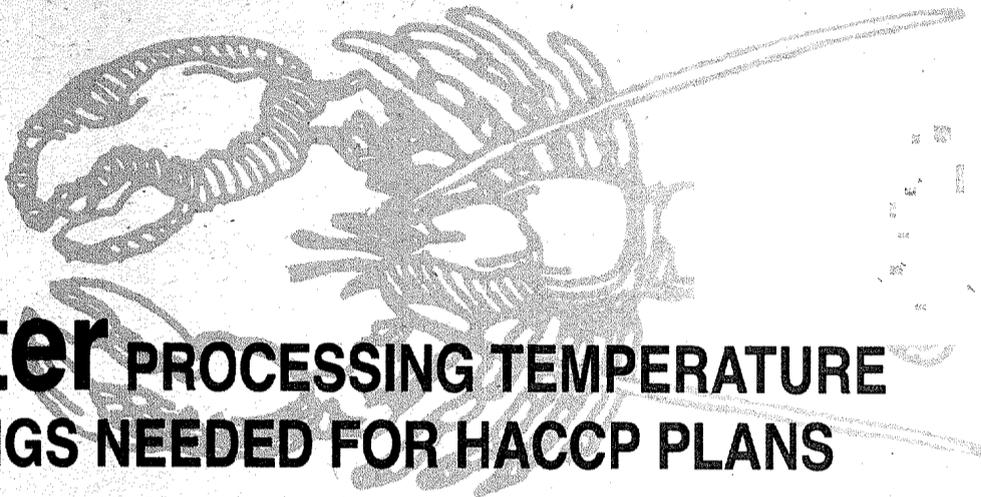


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# Lobster PROCESSING TEMPERATURE RECORDINGS NEEDED FOR HACCP PLANS

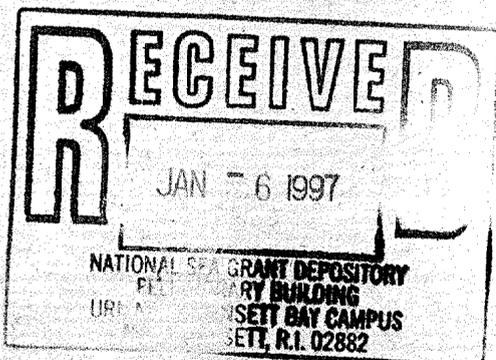


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# Lobster PROCESSING TEMPERATURE RECORDINGS NEEDED FOR HACCP PLANS

## Introduction

Since seafood processors will be required to have a Hazard Analysis Critical Control Point (HACCP) plan in place by December 1997, lobster processors need to have data which demonstrates the cooking time required to produce a fully cooked whole lobster. A lobster is judged to be fully cooked when the body cavity temperature is high enough to kill all vegetative bacterial cells.

It is commonly recommended that lobsters be boiled for 12-15 minutes, but there is no readily available data which shows the internal temperatures of the claw and tail meat or the body cavity under these cooking conditions. The University of Maine's Department of Food Science and Human Nutrition conducted studies to generate the temperature data that could be used in establishing a HACCP plan for fully cooked, whole lobster.

## Methods & Materials

Four lobsters, each weighing approximately 1-1/4 pounds, were obtained from a lobster dealer. The lobsters were transported on ice to the Food Science and Human Nutrition Department's laboratory where the processing study was performed. A thermocouple was inserted into each lobster's crusher claw by punching a small hole in the top of its claw, and inserted into its tail through the first joint in the carapace. These two areas have the thickest muscle mass. Rubber bands were used to hold the thermocouples in place.

Researchers recorded claw and tail temperatures, and then placed lobsters with attached thermocouples in stainless steel pots containing 3-4 liters of boiling tap water. They recorded the change in temperature in the claw and tail meat every two minutes through a 15-minute cooking cycle. Following cooking, researchers measured temperatures in the lobsters' body cavities to compare with readings from claws and tails.

## Results & Discussion

Following are the results of the cooking studies:

*(Temperature changes in claw and tail muscle with cooking time temperatures recorded from the time water returns to boil.)*

| Time (min) | LOBSTER 1 |     |           |     | LOBSTER 2 |     |           |     |
|------------|-----------|-----|-----------|-----|-----------|-----|-----------|-----|
|            | Tail Temp |     | Claw Temp |     | Tail Temp |     | Claw Temp |     |
|            | °C        | °F  | °C        | °F  | °C        | °F  | °C        | °F  |
| 0          | 11.9      | 53  | 12.7      | 55  | 14.7      | 59  | 16.7      | 68  |
| 2          | 54.9      | 131 | 55.4      | 132 | 52.1      | 126 | 67.2      | 153 |
| 4          | 86.4      | 188 | 81.7      | 179 | 67.7      | 154 | 79.4      | 175 |
| 6          | 94.2      | 202 | 97.4      | 207 | 84.2      | 184 | 88.2      | 191 |
| 8          | 95.9      | 205 | 100.5     | 213 | 91.2      | 196 | 93.6      | 201 |
| 10         | 97.0      | 207 | 103.7     | 219 | 94.6      | 202 | 98.1      | 209 |
| 12         | 98.2      | 209 | 105.1     | 221 | 95.5      | 204 | 100.5     | 213 |
| 14         | 98.8      | 210 | 105.6     | 222 | 96.7      | 206 | 101.4     | 215 |
| 15         | 99.3      | 211 | 105.7     | 222 | 98.1      | 209 | 101.7     | 215 |

| Time (min) | LOBSTER 3, |       |           |     | LOBSTER 4 |     |           |     |
|------------|------------|-------|-----------|-----|-----------|-----|-----------|-----|
|            | Tail Temp  |       | Claw Temp |     | Tail Temp |     | Claw Temp |     |
|            | °C         | °F    | °C        | °F  | °C        | °F  | °C        | °F  |
| 0          | 17.1       | 63    | 19.5      | 67  | 16.6      | 62  | 17.1      | 63  |
| 2          | 61.5       | 143   | 60.3      | 141 | 53.3      | 128 | 69.1      | 156 |
| 4          | 78.6       | 174   | 84.3      | 184 | 62.9      | 145 | 79.9      | 176 |
| 6          | 90.3       | 194.5 | 94.9      | 203 | 70.5      | 159 | 97.4      | 207 |
| 8          | 95.5       | 204   | 100.0     | 212 | 88.7      | 192 | 101.5     | 215 |
| 10         | 97.4       | 207   | 102.2     | 216 | 94.4      | 202 | 104.4     | 220 |
| 12         | 99.6       | 211   | 103.1     | 218 | 96.7      | 206 | 105.7     | 222 |
| 14         | 100.4      | 213   | 103.4     | 218 | 97.8      | 208 | 106.1     | 223 |
| 15         | 100.8      | 213   | 103.4     | 218 | 98.5      | 209 | 106.2     | 223 |

With **Lobster-1**, temperature changes were monitored from the time the lobster was placed in the boiling water. For **Lobsters 2, 3, and 4**, researchers began to monitor temperatures when the pot began to boil a second time, after they placed the lobsters in the pot. Temperatures higher than 82°C (180°F) are sufficient to kill disease-causing bacteria. From the results shown in the table, it is evident that a 12-15 minute cooking time is adequate to insure a fully cooked product. Microbiological food safety should not be a problem as long as post-processing procedures follow a well established HACCP plan.

Following cooking, a thermocouple was used to monitor the temperature in the body cavities of two of the lobsters. The lowest temperature recorded was 84°C (183°F) while the highest temperature was (206°F). These temperatures are sufficient to kill all vegetative bacterial cells.

Cooking times may need to be increased when processing lobsters weighing more than 1-1/2 pounds. To confirm this, further studies with larger lobsters need to be performed.