

HEAT PENETRATION INTO PRECOOKED FROZEN CRAB CAKES

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Heat penetration into commercially prepared precooked frozen crab cakes was determined. Split samples were used to determine heat penetration into cakes following wrapper directions and under conditions encountered in homes. In both cases probable inadequate heating was obtained.

Pre-cooked frozen foods have found a ready market with the American populace. Apparently, these "items of convenience" fit our changing patterns of living since these new foods are replacing, in large part, similar items normally prepared and cooked at home.

Straka and Stokes (2) have reported that "the dangers of excessive microbial contamination in pre-cooked frozen foods are real". Thus, a potential health hazard may be a distinct possibility. To further complicate the problem adequate cooking procedures for frozen items generally have not been advanced.



Figure 1. Copper-constantin (24-gauge) thermocouple wires inserted into crab cakes. The terminal ends are connected to a Brown Portable Potentiometer (Model 126 W3).



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The recent report *Public Health Aspects of Frozen Foods*, by the Committee on Frozen Food Sanitation (1) came to grips with this problem and pointed out areas of potential health hazard. Their recommendations touched upon an area recently investigated in our laboratory.

In the course of studying antibiotic residues in breaded and fried crab and oyster cakes, temperature determinations at the approximate center of these cakes were made. When it was found that heat penetration was slow and did not arrive at values reportedly sufficient to kill pathogens at completion of cooking, we speculated on the degree of heat penetration into pre-cooked frozen crab cakes. To assuage our curiosity a small scale study was undertaken. This paper reports the results obtained.

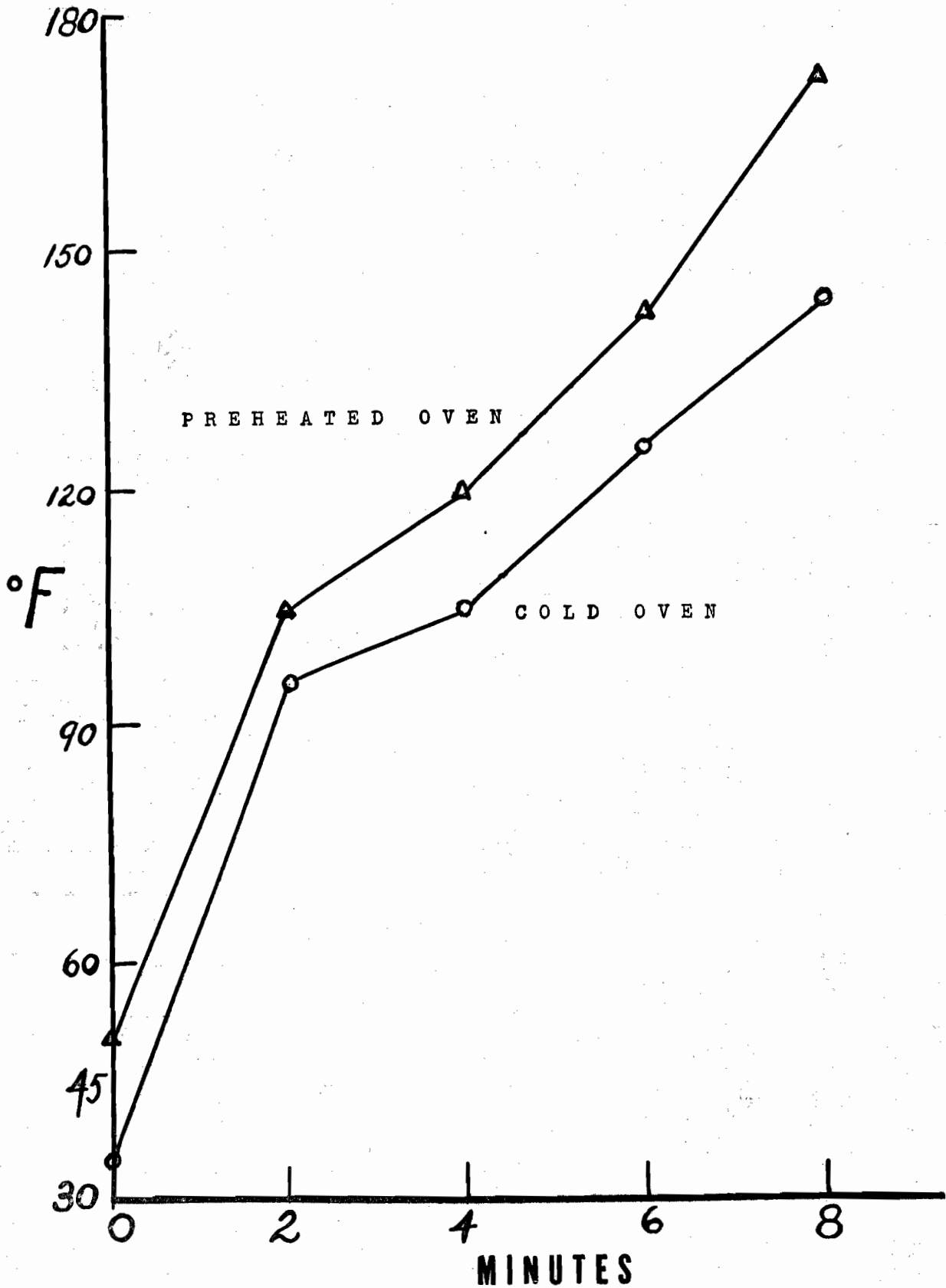


Figure 2. Heat penetration into precooked frozen crab cakes ($2\frac{1}{2} \times \frac{3}{4}$ - approximately 140 g.) in preheated and cold oven. Oven temperature was 300° F. during heating period.

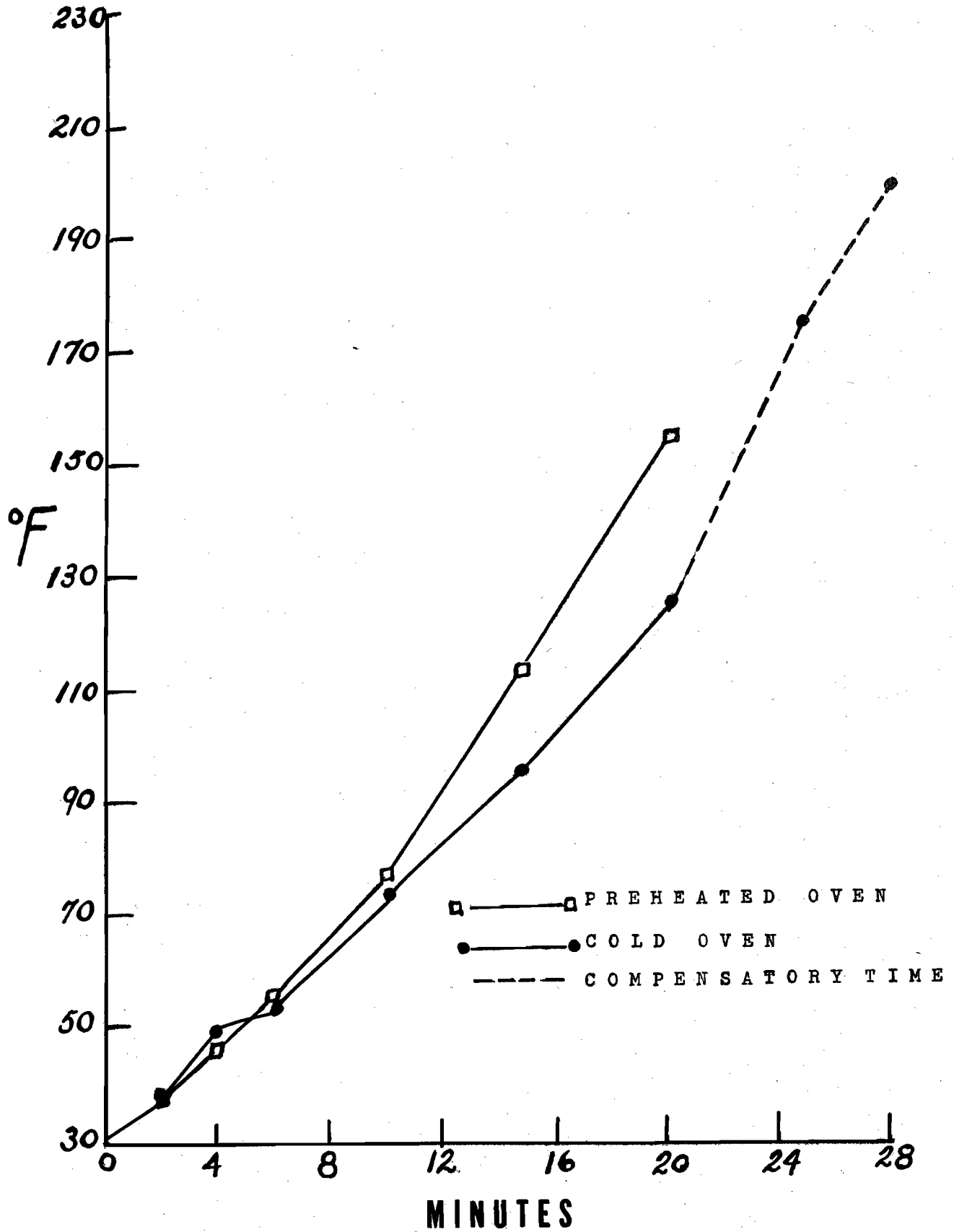


Figure 3. Heat penetration into precooked frozen deviled crab cakes (2½ x 1½ in. - approximately 170 gm.) in preheated and cold oven. Oven temperature 400° F. during heating period.

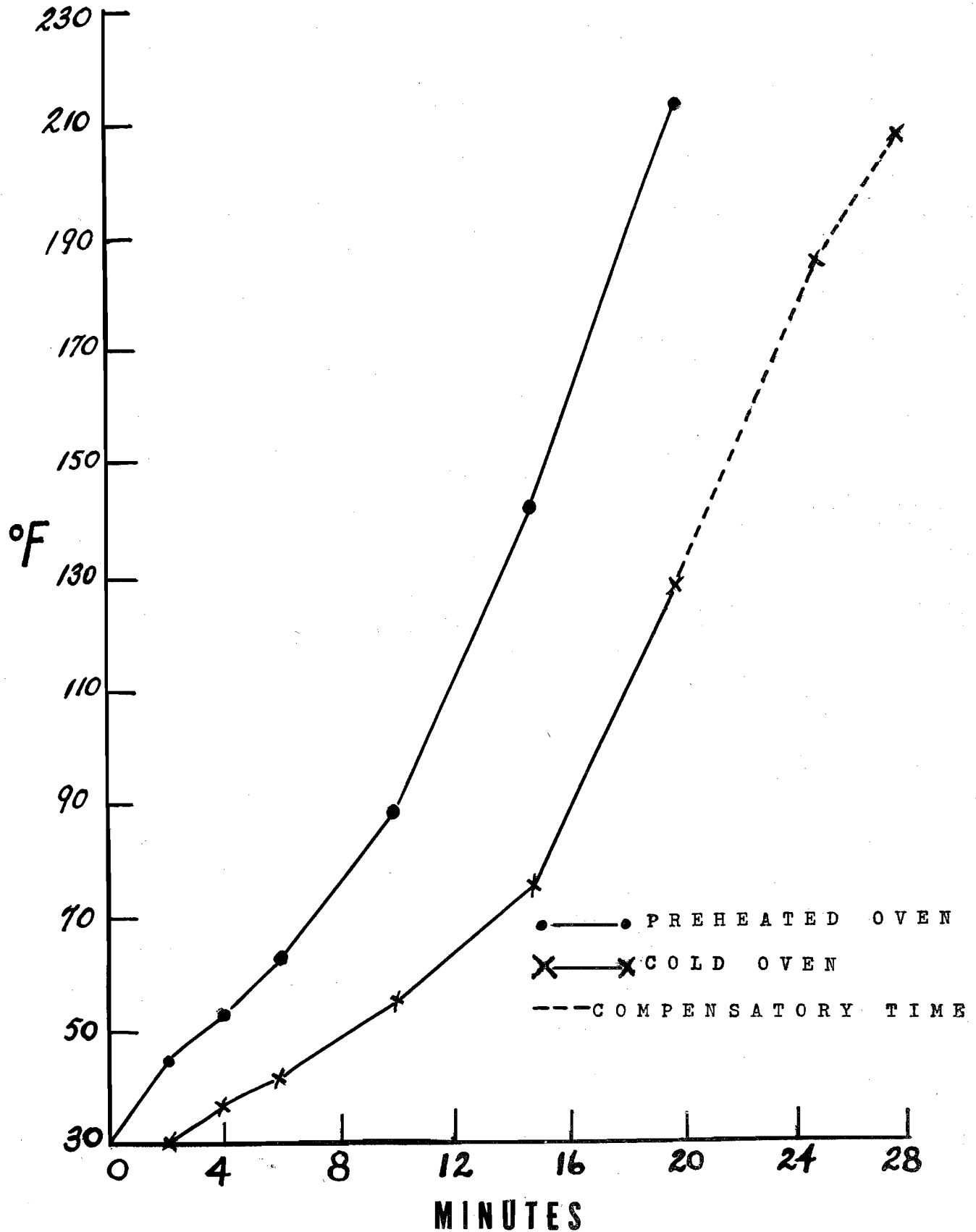


Figure 4. Heat penetration into precooked frozen deviled crab cakes ($2\frac{1}{4} \times 1\frac{1}{4}$ in. - approx. 150 gm.) in preheated and cold oven. Oven temperature was 400° F. during heating period.

EXPERIMENTAL PROCEDURES

Several varieties of frozen crab cakes were obtained from retail stores in our area. Since many housewives often save additional minutes in preparing pre-cooked frozen items by placing them in cold ovens, and then bringing to suggested temperature, the samples were split; one-half placed in an oven pre-heated according to label instructions and the second half in a cold oven. It was interesting to note that different companies recommended different cooking times at the specified temperature. Temperature readings were obtained by inserting 24-gauge copper-constantin thermocouple wires into the approximate center of the cakes and the terminal ends connected to a Brown Portable Potentiometer (Model 126 W3). The apparatus in use is shown in Figure 1.

RESULTS AND DISCUSSION

Before the heat penetration determinations were made, the surface and internal temperatures of the cakes were obtained. Readings of 32-35° F. were obtained at the surfaces and 19-23° F. internally.

Figures 2, 3, and 4 show typical results of the heat penetration study. As shown in Figure 2, eight minutes represented the suggested cooking time of 300° F. as given on the wrapper. It would appear that the cold oven treatment was insufficient. The pre-heated oven treatment, although it provided for a higher final temperature at the end of 8 min., might not provide adequate heat treatment in view of the protective effects of many of the colloidal materials contained in the crab cake mix.

Figure 3 shows the heat penetration curves for another crab cake of different size and with a different set of cooking directions, namely, 400° F. for 20 minutes after the oven has arrived at 400° F. After 20 minutes in the cold oven, 126° F. was recorded at the center of the cake while 150° F. was attained by the cakes in the pre-heated oven. The broken line, labelled compensatory time, was an additional cooking period given the sample in the cold oven to equal the time the oven normally required to become pre-heated to the specified cooking temperature. It may be observed that an additional eight minutes would carry the temperature to probable safe levels.

The curves shown in Figure 4 indicate results similar to those shown in Figure 3, although in this instance the pre-heated oven treatment did indicate a probable safe internal temperature after the suggested cooking interval (400° F. for 20 min. after the oven has reached a temperature of 400° F.).

Our findings indicated that present wrapper directions for home heating of pre-cooked frozen crab cakes leave much to be desired in providing an adequate heat treatment from a public health standpoint especially if heating is done in an unpreheated oven.

ACKNOWLEDGEMENT

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2. Straka, R. P. and Strokes, J. L., *Microbiological Hazards of Pre-Cooked Frozen Foods*. *Quick Frozen Foods*, 18: 182-185. 1956.