MFR PAPER 1061

Two types of fish trays are compared for cooling rates and effect on shelf life.

Polyethylene Trays for Flounder Fillets

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INTRODUCTION

Recently introduced polyethylene containers appear to be well suited for distribution of fish. They are light in weight, nest together when empty (consequently requiring less storage space than the usual container), are not subject to corrosion, and the cover is heat-sealed to the container to make them leakproof. They are also considerably less expensive than the customary metal containers.

Acceptance of plastic containers has been slow because there have been claims that plastic containers are responsible for shortening the shelf life of fish fillets; in addition, although it is known that heat transfer through plastic is slower than through metal, the cooling rate of fillets in these containers is not known. Therefore, we decided to determine the shelf life and the cooling rates of flounder fillets packed in the conventional metal can and the new plastic container.

PROCEDURE

Arrangements were made to obtain fish samples packed in both rectangular plastic 20 pound capacity trays with heat-sealed covers and standard round metal 20 pound capacity cans.

Four sets of 2-day-old flounder fillet samples were obtained for tests. Two sets of samples were packed in round cans while the remaining two sets of samples were packed in the rectangular plastic trays. All the fish were at 58°F when packed. All the containers were flooded with 60°F (16 percent sodium chloride) brine. The cans were then covered with a tight fitting metal lid, and the plastic trays were covered with polyethylene sheets heat-sealed to the trays.

All of the trays and cans were then packed in insulated containers and transported to the Center for cooling and storage tests. The cans were stacked one on top of the other in ice, but with no ice between them. The plastic containers were similarly packed, except that the top container was turned bottom up so that the top surfaces of the containers were face to face.

At the Center, thermocouples were placed in the containers so that the temperature gradient through the containers could be determined. Figure 1 shows the location of each of the thermocouples. The trays and cans were then repacked in ice in the same order as they were originally, except a large open top fiberboard box was substituted for the insulated containers. They were then stored for 48 hours to obtain cooling rates for the fillets in the two different containers. After 48 hours, temperature monitoring was discontinued and a series of organoleptic tests were started.

Cooling rates of the fillets packed in the plastic trays and in the metal cans are shown in Figure 2.

Samples were removed for organoleptic evaluation after the 48 hour cooling test and thereafter on the 5th, 7th, 9th, and 12th days, at which time tests were discontinued as the fish were rated unacceptable.

OBSERVATIONS

Comparison of cooling rates showed nearly identical curves for both sets

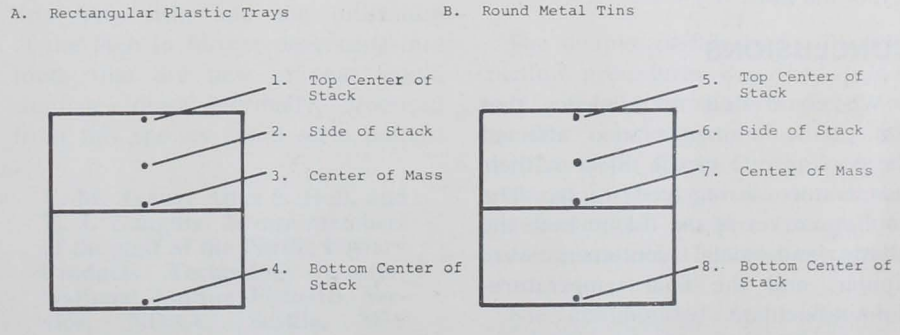

Figure 1.—Thermocouple locations in trays and tins containing flounder fillets.

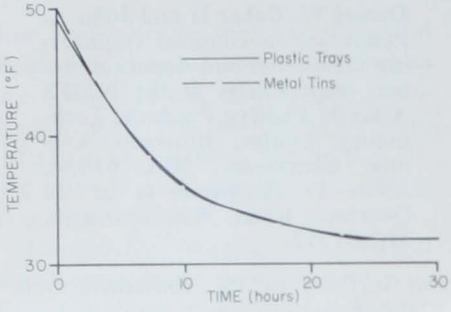

Figure 2.—Comparison of cooling rates in the center of the mass of flounder fillets.

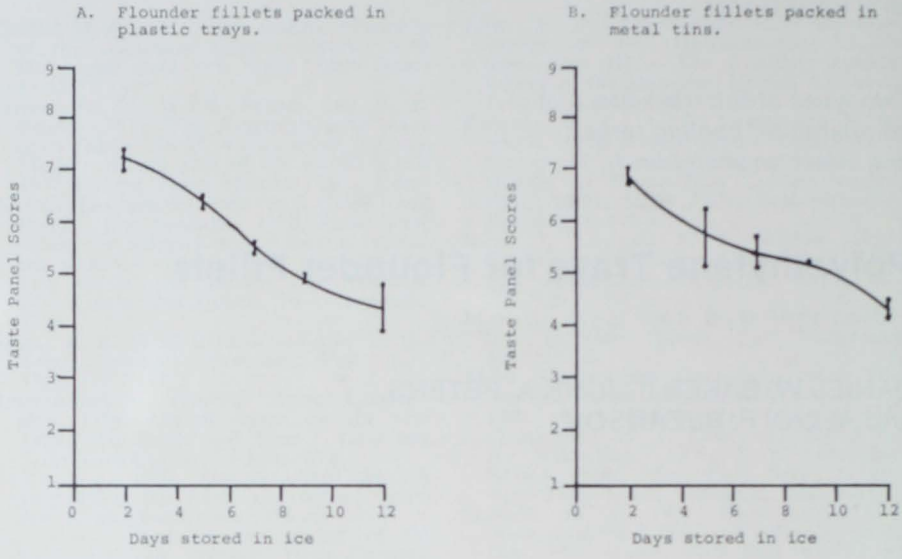

Figure 3.—Averages of taste panel scores for odor, flavor, texture, and appearance. Vertical lines indicate range of averages for the various samples at each test.

of samples. Initial temperatures of each set of samples varied from about 35°F on the surface to 50°F in the center. This was owing to initial cooling of samples, mostly surface, during the transit period to the Center. The center temperatures are plotted in Figure 2. It can be seen that the curves are almost identical.

Taste panel scores of the samples packed in plastic trays and of the samples packed in metal tins are shown in Figure 3. Here, again, the curves of both sets of samples are similar. A statistical analysis of the data showed no significant difference in the spoilage rates between the samples.

The taste panel observed that after only 2 days of storage the fillets had a slimy surface, were exceptionally salty in flavor, and had a rather mushy texture. This is not consistent with the panel's experience with flounder fillets of this age. It was further observed that ammonia odors became noticeable after 5 days of storage and increased through the rest of the test.

CONCLUSIONS

We could find no evidence that the plastic container used affected the cooling rate of the fillets or their temperature during iced storage. The cooling curves of the fish in both the plastic and metal containers were similar, and the final temperatures did not fluctuate.

Although we have no proof of any advantages or disadvantages resulting from the practice of brine packing, our experience and the comments of our expert taste panel leaves us with considerable doubt as to the desirability of its continued use by industry. In fact, we believe that further investigation of this practice should be made to determine its effect on the storage life of fillets.

MFR Paper 1061. From Marine Fisheries Review, *Vol. 36, No. 5, May 1974. Copies of this paper, in limited numbers, are available from D83, Technical Information Division, Environmental Science Information Center, NOAA, Washington, DC 20235.*