

# Chilling Fish Fillets In 10 to 25 Pound Containers

---

## Introduction

Seafood processors use a variety of containers for distributing fresh fish fillets. These include polyethylene plastic (poly) bags, rectangular high density polyethylene (HDPE) plastic containers, rectangular tin-free steel containers, and poly bags inside of rectangular wax-coated cardboard containers. Containers generally hold 10 or 20 lbs. of fillets, but the shape and depth of the containers vary greatly. This study was conducted to compare the cooling rates of fresh fish fillets in several sizes of commercially used containers for fish fillets.

## Experimental

Fresh rockfish (*Sebastes* spp.) fillets were warmed to 55°F (12.7°C) in fresh water and drained. Containers were filled with fillets to the capacity stated by the manufacturer.

Ten lbs. of fillets were packed into 2.75-4.5 inch (7-11.4 cm) deep plastic containers, 2.56 inch (6.5 cm) deep steel containers, poly bags (5.5 inches or 14 cm thick when filled), and into poly bags placed into 2.875 inch (7.3 cm) deep wax-coated cardboard containers.

Twenty lbs. of fillets were packed into 4.25 inch (10.8 cm) deep metal containers, and poly bags (7 inches or 17.8 cm thick when filled).

Twenty-five lbs. of fillets were packed into 5.25 inch (13.3 cm) deep plastic containers.

Two thermocouples were inserted into fillets in the center of each container and connected to a recorder. The containers were placed into bottom-iced 100 lb. wax-coated cardboard "wetlock" shipping boxes. The containers were surrounded by at least one inch of ice. The 100-lb. boxes were held at 40°F (4.4°C). Fillet temperatures were monitored every 10 minutes until the centers of the containers reached 35°F (1.7°C). Two containers of each size were included in the tests.

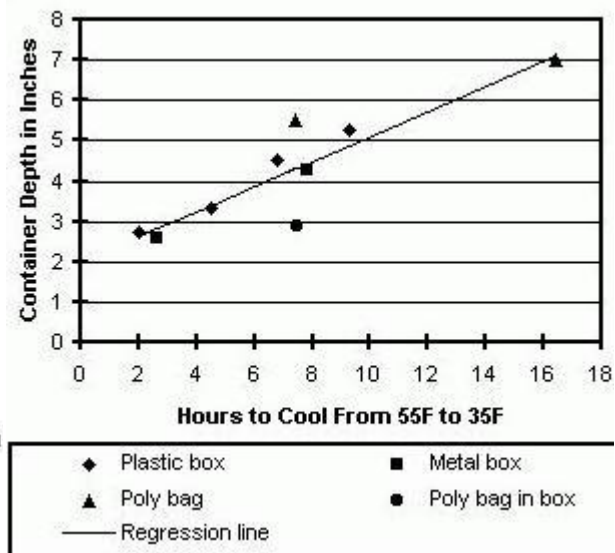
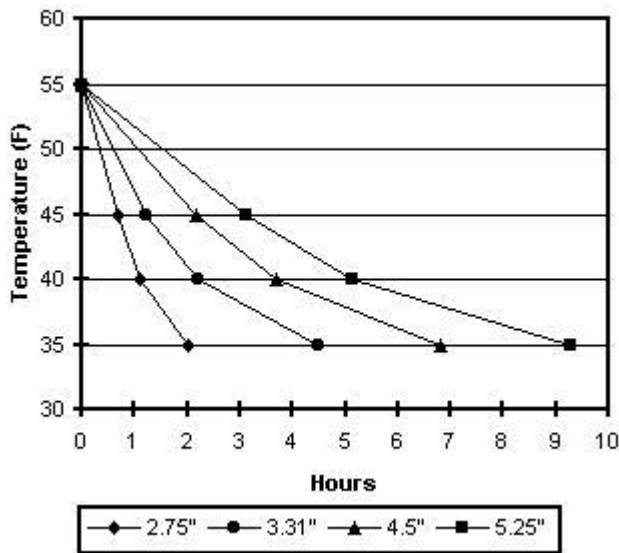
## Chilling Times

Figure 1 gives cooling curves for fish fillets in plastic containers of different depths. As expected, the fillets in deeper containers took longer to cool than fillets in shallower containers.

Chilling times were directly related to container depth with two exceptions (Figure 2). Poly bags containing 10 lbs. of fillets appear to have cooled more rapidly than other containers of the same depth. These poly bags may have settled and flattened after the height of the bag was initially measured and ice was added.

**Figure 1.** Chilling curves for fresh fish fillets iced in plastic containers 2.75, 3.31, 4.5, and 5.5 inches deep.

**Figure 2.** Container cooling rates vs. container depth for poly bags and HDPE plastic, metal, and bag-in-box containers.



The other exception was the 10 lb. poly bag of fillets inside of a waxed cardboard carton. The fillets in this container cooled more slowly than in containers of similar depth. In this case, the outer cardboard container probably insulated the fillets from the surrounding ice, causing the fillets to cool more slowly.

## Chilling Times and Shelf Life

The slower fillets cool, the more high quality shelf life is lost during the chilling process. For example, 20 lbs. of fillets in poly bags (7 inches thick) took over 16 hours to cool from 55F (12.7C) to 35F (1.7C) (Figure 2). The equivalent of over 1 days of shelf life at 32F (0C) was lost during the slow cooling.

Similarly, fillets chilled in a poly bag inside a wax-coated cardboard container lost over day of shelf life during chilling.

Fillets chilled in 2 inch deep rectangular plastic containers, however, lost only about 3 hours of shelf life during the chilling process.

## Recommendations

Plastic and metal containers have advantages over plastic bags for shipping and distributing fresh fish fillets. They are sturdier than poly bags and do not leak if properly sealed. Plastic and metal containers are also reusable after being cleaned and sanitized, as long as there are no cracks or punctures in the container. Shallow plastic and metal containers allow fillets to cool quickly and little shelf life is lost during the chilling process.

Waxed cardboard have the disadvantage of insulating the fish fillets from the surrounding ice and causing the fillets to cool slowly. These containers could be acceptable if the fillets were prechilled to 35°F (1.7°C) before packaging.

Poly bags become almost round when filled and iced. Ten and 20 lb. poly bags of fish fillets are thicker than most plastic and metal containers. This additional thickness results in slow chilling of the fillets. Poly bags could be acceptable if the fillets were prechilled to 35°F (1.7°C) before bagging.

Plastic and metal containers are available in a range of lengths, widths, and depths. Because cooling rates are proportional to container depth, containers for fish fillets should be relatively shallow. A maximum depth of 3 inches is recommended for containers used for fresh fish fillets. These shallow containers allow the fish fillets to cool quickly.

Some plastic container dealers promote the use of a "bubble wrap" pad in the bottom of the containers to separate the fillets from any liquid in the container. These pads insulate the fish fillets and should be used only when the fillets are prechilled before packaging.

---

Robert J. Price, Extension Specialist, Seafood Products, and Pamela D. Tom, Program Representative  
Food Science & Technology, University of California, Davis, CA 95616-8598

UCSGEP 96-3

May 1996

This work is sponsored in part by NOAA, National Sea Grant College Program, Department of Commerce, under grant number NA36RG0537, project number A/EA-1, through the California Sea Grant College Program, and in part by the California State Resources Agency. The U.S. Government is authorized to reproduce and distribute reprints for governmental purposes.