



## FISHERY PRODUCTS PRESERVATION BY RADIATION

A study of the irradiation-pasteurization of fishery products is being conducted by the Bureau of Commercial Fisheries Technological Laboratory in Boston. Pasteurization by irradiation achieves partial sterilization of the product treated, with almost all the decay-causing bacteria being destroyed. This new method of preservation may offer a potential means of storing fresh fish for indefinite periods at refrigerator (45° F.) or room temperature storage conditions.

Work to date has included a determination of acceptability of irradiated fish products. Both fresh and blanched fillets of cod, pollock, whiting, and butterfish have been irradiated at the Materials Testing Reactor, Idaho Falls, Idaho. Portions of the fillets were blanched (heated in steam) in order to deactivate enzymes that would deteriorate fish meat during long periods of storage. All samples were irradiated at six different levels (0.125, 0.250, 0.50, 0.75, 1.0 and 2.0 megareps.) with gamma rays.

Taste tests conducted at the East Boston Technological Laboratory have indicated that fish fillets irradiated at certain levels may be acceptable products. Bacteriological studies on these irradiated products, made after two weeks of storage at 35° F., have shown almost no bacteria present. Normally, these fish would be very heavily contaminated with bacteria after this storage period.

Experimental packs of fresh and blanched fish are now being prepared. These packs will be irradiated and stored at ice temperatures over an extended period of time in order to determine the storage characteristics of irradiated fishery products.



## FLUOROSCOPIC X-RAYS FOR FISH-BONE DETECTION

Small fish bones, long a problem in the fishing industry, can be detected in fishery products by the use of fluoroscopic X-ray equipment. Research conducted at the U. S. Bureau of Commercial Fisheries East Boston Technological Laboratory, using this method, has shown very good results in the detection of bones.

Several hundred packages of fish sticks (a total of 3,300 frozen fried fish sticks) were obtained for this test from several commercial producers, and were viewed under a fluoroscopic screen. Bones were seen in 128 of the fish sticks. Later, all of the fish sticks were crushed and shredded by hand to feel for bones. By this method, bones were found in 130 of the fish sticks. Use of the fluoroscopic method thus resulted in an error of only 1.5 percent.

When the crushing method is used, the fish sticks must be thawed and then destroyed. On the other hand, the fluoroscopic method not only is quicker, but it also allows the fish sticks to be returned to the packaging line for further processing after examination.

Further tests using this method will be carried out to determine its applicability for the detection of bones in frozen and fresh fishery products on a continuous-belt production line.



## PROVISIONAL DRAFT OF STANDARDS FOR FROZEN FISH BLOCKS PREPARED

A provisional draft of the proposed United States standards for grades of frozen fish blocks is currently being distributed to the fishing industry for comment. The new draft reflects certain industry comments from the first public meetings held to review the preliminary draft for the standards and the results of additional data collected during the interim period. A new format was adopted consistent with the recommendations of the industry. With this new style, the general, and sometimes ambiguous requirements, of the preliminary draft of the standards are eliminated and factor ratings are clearly and specifically defined. The lot certification tolerances have been changed to correspond to the Regulations Governing Inspection and Certification of Processed Fruits and Vegetables and Related Products (USDA, SRA-AMS 155), effective July 1, 1957.



## SALT-WATER ICE TESTED ON HADDOCK

One method that has been proposed for protecting the quality of fish stored in ice is to use a salt-water ice. The basis for this assumption is that since salt-water ice melts at a lower temperature than fresh-water ice, the former may offer advantages in increased storage life of fish. An experiment was conducted to compare, under parallel conditions, salt-water ice with fresh-water ice.

Equal quantities of salt-water and fresh-water ice were used to ice representative lots of eviscerated haddock aboard the Service's exploratory fishing vessel Delaware. The cooling rates, storage temperatures, and keeping quality of the fish were determined.

The fish stored in salt-water ice and in fresh-water ice were of excellent to good quality until the 9th day of iced storage, and of acceptable quality from the 9th until the 13th day of iced storage. The fish stored in salt-water ice were cooled faster and to a lower temperature than were the fish stored in fresh-water ice. However, the salt-water ice melted faster than the fresh-water ice and left the fish with less protecting ice. Therefore, the fish in salt-water ice eventually rose to a higher temperature than those stored in fresh-water ice. These results show that in order to maintain fish in salt-water ice at a temperature close to the melting point of this ice, sufficient quantities of ice must be used to compensate for the faster melting.



## STUDIES ON THE SODIUM CONTENT OF FISHERY PRODUCTS

The production of dietetic packs of fishery products have led to an increasing interest in the sodium content of fish. The low levels of sodium found in fish have made them a desirable component of diets designed to reduce body moisture levels and to aid in the relief of high blood pressures. The U. S. Bureau of Commercial Fisheries has been engaged in a long-term study to determine the sodium content of the many important species of food fishes and shellfish. Information on the work completed to date will be made available in the near future.

During the analyses of the various species of fish, it became apparent that there is a significant difference in the amount of sodium found in different sections of the edible portion of pink salmon. Samples from the light body meat, from the dark meat along the dorsal surface, from the dark meat along the lateral line, and from the belly flaps were analyzed separately for their sodium content, and the values obtained were compared. The light meat and the dark meat along the lateral lines were found to contain considerably less sodium than did the belly flaps or the dark meat from the dorsal section. In the 15 salmon analyzed, the samples from the pink meat and from the lateral line had a sodium content ranging from 47-79 milligrams per 100 grams of fish, whereas the samples from the belly flaps and the dorsal region ranged in sodium content from 67-198 milligrams per 100 grams.

It is possible that this information will prove to be of value to the canners of dietetic salmon. Canned meats are considered satisfactory for sodium-restricted diets if the sodium content is below 100 milligrams per 100 grams of meat. Dietetic canned salmon generally contains less than 60 milligrams of sodium per 100 grams. By using only the parts of the salmon known to contain a minimum of sodium, the canners may be able to produce a product containing an even lower content of sodium.



### EVERYBODY ENJOYS FLOUNDER.

In discussing the merits of their favorite fish food, a westerner may praise his rockfish, an easterner his shad, and a southerner his pompano, but all will agree that flounder is a nationwide favorite. Flounder is nationally known because it is caught in nearly all of our coastal waters. It is not only sold fresh, but is also filleted, frozen, and shipped to all parts of the country.



It ranges in size from 1 to 15 pounds, is white-meated, and has a sweet-rich flavor. Fishermen recognize the qualities of flounder and know that it does not need to masquerade under a fancy trade name. Although "fillet of sole" appears often on menus, it is not related to the renowned English sole but is usually one of the species of flounder taken in United States waters.

Flounder fillets may be prepared by any of the basic cooking methods of frying, baking, broiling, boiling, or in an endless variety of combination dishes. The home economists of the U. S. Fish and Wildlife Service recommend "Baked Fillets of Flounder" as part of an easy oven dinner.

#### BAKED FILLETS OF FLOUNDER

2 POUNDS FLOUNDER FILLETS

1 TEASPOON SALT

DASH PEPPER

$\frac{1}{4}$  CUP BUTTER OR OTHER FAT, MELTED

2 TABLESPOONS LEMON JUICE

1 TEASPOON GRATED ONION

DASH PAPRIKA

Thaw frozen fillets. Sprinkle fillets with salt and pepper. Place in a single layer in a well-greased baking pan. Combine butter, lemon juice, onion, and paprika. Pour sauce over fish. Bake in a moderate oven, 350° F., for 20 to 25 minutes or until fish flakes easily when tested with a fork.