FROZEN FISHERY PRODUCTS STORAGE LIFE EXTENDED BY GLUCOSE-SALT BRINE GLAZE

Studies on a carbohydrate-base glazing liquid have shown such materials may become of potentially great value in the prevention of freezer-burn (desiccation) and rusting (oxidative discoloration) in frozen fishery products during extended storage. The moisture-retaining property of the carbohydrate film glaze is considered to be responsible for the protection of the stored food product. These studies were conducted by the Bureau of Commercial Fisheries' Seattle Technological Laboratory.

Freezer-burn and rusting are two of the most important causes of loss of quality in stored frozen foods. Many attempts have been made to develop an edible liquid which, when frozen on the surface of the product, would prevent loss of moisture from, and accessibility of oxygen to, the product. Most such liquids when studied were themselves vaporized and became permeable to oxygen. Continued reglazings were necessary, a procedure not always commercially feasible.

It became obvious that a potentially successful glaze must be of such a nature as to undergo only minimum vaporization. This principle was exploited in the Service's developmental freezing-fish-at-sea investigations at the Boston Technological Laboratory. Fish frozen in a refrigerated glucose-salt brine evidenced a lasting crack-free glaze which protected the fish during its subsequent cold storage. This work has since been successfully applied to the freezing of shrimp on board vessels at sea. At last report, five commerical vessels had installed such glucose-brine immersion freezing machinery to preserve their catch during long voyages at sea and during subsequent storage in refrigerated warehouses.

A commercial glucose-based product, submitted by a local industry member to the Seattle Laboratory for testing, appears also to fulfill this requirement. Samples of treated salmon steaks, usually particularly susceptible to discoloration, were compared after an extended storage period with salmon steaks which had been glazed with water. The treated steaks were, in all cases, of marketable quality, while the water-glazed steaks had deteriorated to such an extent as to be considered inedible.

NUCLEAR RADIATIONS FOR PRESERVATION OF FISH

The "Atoms for Peace Program" and the new atomic age with its potentially revolutionary effect on food processing has been brought home to the fishing industry through a nationwide study on the use of nuclear radiations for the preservation of fish. The study was inaugurated by the United States Fish and Wildlife Service Bureau of Commercial Fisheries with funds provided by the Saltonstall-Kennedy Act of 1954.

Two processing techniques, "radio-pasteurization" and "cold-sterilization," born of studies in atomic energy and promising possible enhancement of the iced-storage life of fish, are under study at the Bureau's five technological laboratories. The Technological Section also has contract research work on this problem under way at the Massachusetts Institute of Technology, Oregon State College, Food Chemical Research Laboratories, Florida State University, and Maryland State College.

The present study is primarily a screening operation designed to select, for possible initial commercial utilization, those of the edible species of fish and shellfish that are most adaptable to the proposed new processing methods. High intense levels (1 to 3 million rep.) of electromagnetic (gamma) radiations and of ionizing (electron) radiations are being used to study the feasibility of "cold-sterilizing" the fishery product, that is to kill all bacteria and spores without recourse to the steam sterilization processes commonly used in present-day operations. Lower levels (100,000 to 1,000,000 rep.) of both types of radiation are being used to kill the great majority of the active bacteria and thus to extend the possible iced-storage life of the product over that normally attained through the use of ice alone. The relative efficiencies of the two types of radiation and the two types of processing will be compared and evaluated in terms of commercial utilization.

Radio-pasteurization, the low-level radiation technique which kills a majority of the bacteria in a product, appears to be the most promising process and is being emphasized in these studies. Coupled with other processing methods such as refrigeration and prepackaging, this technique may revolutionize the present methods of marketing, making available for the first time to our inland population fresh unfrozen fish of a quality equivalent to that enjoyed by our coast and lake-shore dwellers.

NOTE: "REP." MEANS ROENTGEN EQUIVALENT, PHYSICAL=AMOUNT OF RADIATION ABSORBED EQUAL TO 93 ERGS PER/GRAM IN UNIT DENSITY MATERIAL.

QUALITY STANDARDS

FROZEN RAW BREADED SHRIMP QUALITY STANDARDS GETTING TRY-OUT

Quality standards for frozen raw breaded shrimp may be in the offing for the United States consumer, the Assistant Secretary for Fish and Wildlife announced May 22.

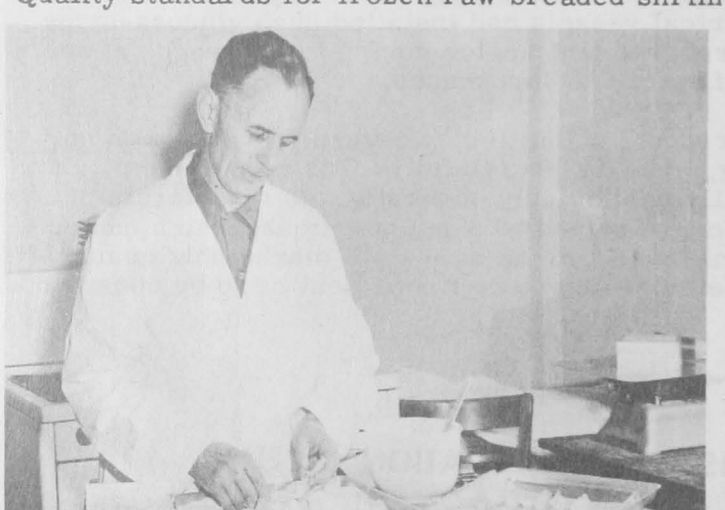

FIG. 1 - PREPARATION OF FROZEN RAW BREADED SHRIMP OF KNOWN BREADING CONTENT.

The proposed standards are the result of the Department of the Interior's cooperative efforts with the breaded shrimp industry, the National Fisheries Institute, and the Department of Agriculture.

A 60-day trial period is now in effect to give processors, buyers, distributors, and other interested parties an opportunity to try out the standards and to send their observations to the Department of Agriculture which has the legal responsibility for promulgating such standards. If there is substantial agreement on the proposed standards, a notice of final rule making will be published at the end of the 60-day period.

Because these standards employ a new approach to the grading of food products the Department of the Interior urges all interested groups to critically evaluate the standards under commercial conditions.

The research and development of the standards, up to this point, have been the responsibility of the Bureau of Commercial Fisheries of the United States Fish and Wildlife Service. Funds for the project were made available by the Saltonstall-Kennedy Act of 1954 for the betterment of the domestic fishing industry.

The National Fisheries Institute, acting as the contract research agency for the Service, has supplied the liaison with the breaded shrimp industry essential to the standards program, and has supplied consulting services at meetings and conferences. A committee of industry technologists and representatives of the breaded shrimp producers and distributors actively supported the Service's scientific staff in the studies of the product and the processing procedures necessary to insure development of realistic standards.

The proposed standards apply to clean, wholesome, headed, peeled, and deveined shrimp which have been breaded and frozen. The grades include "U. S. Grade A" and "U. S. Grade B." Quality below these grades would be classified as substandard.

When the standards become effective the Department of Agriculture will offer an inspection and certification service on a fee basis. The standards do not include labeling, since labeling regulations are the responsibility of the Food and Drug Administration, Department of Health, Education and Welfare.

NOTE: SEE COMMERCIAL FISHERIES REVIEW, JUNE 1957, PP. 65-67 FOR THE PROPOSED STANDARDS.

TECHNICAL NOTE NO. 39 - FROZEN TUNA SAMPLER

PREFATORY ABSTRACT

A MOTOR-DRIVEN DEVICE, USED FOR SAMPLING FROZEN TUNA (FOR SUBSEQUENT DETERMINATION OF SALT CONTENT), IS DESCRIBED. THE DEVICE CONSISTS ESSENTIALLY OF A HOLLOW TUBE AND AN ARBOR. ONE END OF THE TUBE IS SERRATED AND SHARPENED TO DRILL EASILY INTO THE MEAT OF THE TUNA; THE OTHER END FITS INTO THE ARBOR, WHICH IN TURN FITS INTO THE CHUCK OF AN ELECTRIC-DRILL MOTOR. THE TUBE IS QUICKLY DETACHABLE FROM THE ARBOR FOR EASY REMOVAL OF THE CORE OF TUNA MEAT.

BACKGROUND

Americans are becoming increasingly conscious of the possible undesirable effects of excessive salt in the diet. The processors of canned tuna, being aware of this fact, strive to maintain a uniform salt content in their products. The excessive content of salt in some lots of brine-frozen tuna, however, make it difficult to maintain the desired level.

In view of the large number of tuna unloaded from a fishing vessel at one time, the considerable variability of salt content from one individual tuna to another, and the need for minimizing the destruction of the tuna meat simply for sampling purposes, a study was made of possible sampling techniques. This study pointed to a coring device as being the logical tool.

CONSTRUCTION

The sampler finally devised is shown in figures 1 and 2. This device, which is powered by an electric-drill motor, consists of two parts: a core-drill tube and an arbor.

The core-drill tube (A) is of thin-wall steel tubing, with a $\frac{3}{4}$-inch inside diameter and a length of $7\frac{1}{2}$ inches, but it can be altered in dimensions to produce any

size core desired. The tubing is made of steel in order that the teeth may be case hardened. Tubing with a wall $\frac{1}{32}$-inch thick works best; it cuts a narrow kerf and enters the frozen meat readily. Teeth are filed on one end of the tubing in such a manner that the cutting edge of the teeth face in the direction that the electric drill

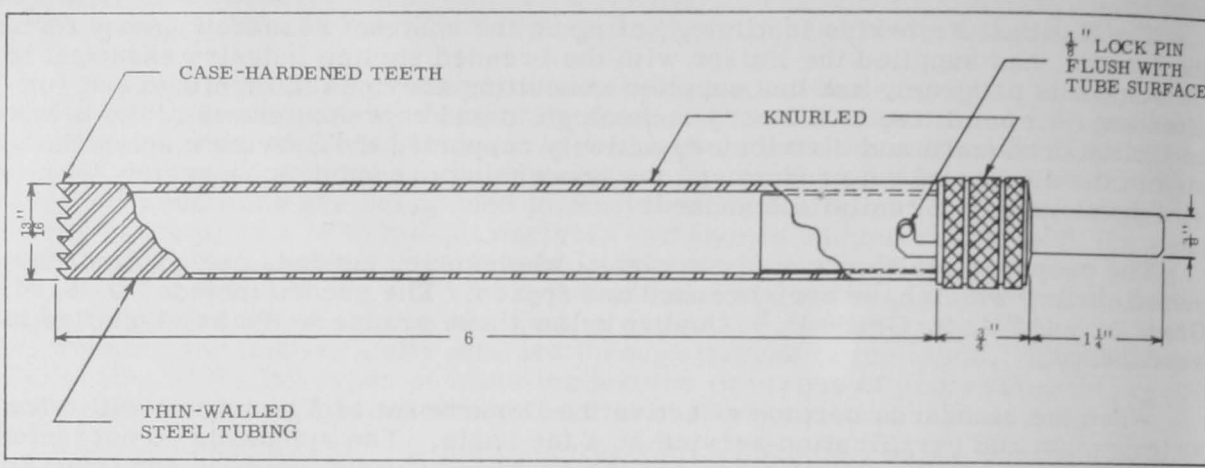

FIG. 1 - FROZEN TUNA SAMPLER.

rotates. Each alternate tooth is set slightly inward to cut a core smaller than the inner diameter of the core drill. The remaining teeth are set slightly outward to clear a path for the tubing. Several bands are rolled onto the body of the tube with a knurling tool to provide a hand grip.

The core drill is held in the electric drill by means of an arbor (B), which has a $\frac{3}{8}$-inch shank on one end to fit into the chuck of the electric drill and has a pilot turned on the opposite end to carry the core drill. This pilot must fit snugly into the tubing, to eliminate any slack. A loose fit will cause the core drill to whip and run off center, making the drill difficult to start into the frozen fish. A knurled collar is turned on the arbor, back of the pilot, to provide a hand grip for removing the core drill from the arbor. A pin is fitted through the pilot and, projecting just the thickness of the tubing on each side of the pilot, provides a quick on-and-off locking device. The tubing is slotted to fit over the pin so that an eighth of a turn of the tubing will allow the core drill to be withdrawn from the pilot.

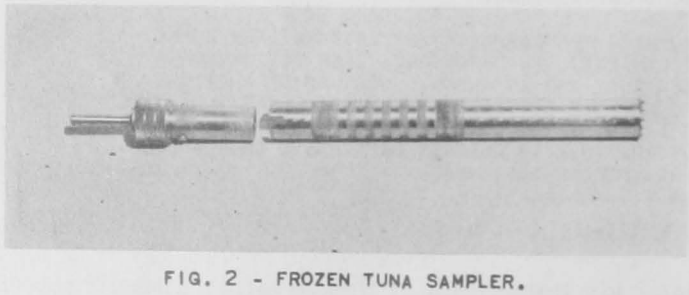

FIG. 2 - FROZEN TUNA SAMPLER.

OPERATION

The core drill has been used with air-frozen as well as the brine-frozen tuna; however, considerably more pressure is required with frozen tuna taken directly from a storage room or freezer at 0° F. or colder than with brine-frozen tuna sampled during the unloading at the cannery. The brine-frozen tuna are normally unloaded from the fishing vessel when the temperature of the tuna is at 20°-to 24° F., at which temperature the tuna meat is rigid but not hard.

The drill must be held firmly when a core is taken and should be pushed smoothly as it enters the meat. When the desired depth of core is reached, the drill is held stationary, and the friction between the inner wall of the tube and the core is sufficient to hold the core while it is broken loose and removed. Dipping the core

drill into hot water for a moment permits the core to be shaken out of the tube, or pushed out by means of a small piece of wood used as a plunger.

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THREADFIN SHAD SHOWS PROMISE AS FORAGE FISH IN COLORADO RIVER AND LAKES

The threadfin shad, a small prolific forage fish of Tennessee and other southeastern States, has moved west--and fishing in Lake Mead, Havasu, and Mojave and at other places along the Colorado River is getting better, according to reports reaching the U. S. Fish and Wildlife Service.

As a result, prospects are bright for the three States bordering these waters--Nevada, Arizona, and California--to develop a sport fishery of national popularity.

Fishery biologists of the three States are not yet definitely linking the improved fishing results with the establishment of the threadfin, but they report that anglers in Lake Havasu who fish in the proximity of shad schools catch the most bass. Other facts which are either coincidental with the establishment of threadfin shad in the Colorado River waters or directly attributable to it include: the average growth of bass has increased over two inches a year; there is a greater survival of bass spawn; bass are biting better and biting earlier in the season; crappie fishing in Lakes Mead and Havasu is improving and the individual fish are bigger. There are also indications that when threadfin shad are available for trout, the trout are using it as forage.

Nevada became interested in threadfin shad after investigating reports of consistently poor fishing in Lake Mead. As a result of a Federal aid project started in 1951, Nevada decided that because of the fluctuating level of Lake Mead, shallow-water vegetation, vital as cover for small bass, did not have a chance to develop. This had the effect of leaving the small bass exposed to the predations of the larger fish and the natural stocking of the lake virtually stopped. The threadfin shad seemed to offer a solution; it has a high reproductive rate, is the right size for predators, and does not compete with bass for food.

Nevada made its first effort to establish threadfin shad in its waters in 1954 when it secured nearly 2,600 young fish from Tennessee. Unseasonable cold winter weather killed the entire shipment. California had also obtained threadfin shad from Tennessee and had a good survival. California contributed 125 shad to Nevada's program. The shad spawned and respawned to become thousands and formed the basis for Nevada's shad program. In the meantime Arizona obtained a stock from the Fish and Wildlife Service hatchery in New Mexico and began its part of the planting program.

Nevada planted some of its threadfin shad in Lake Mead and some in Lake Mojave. The fish "took hold" at once and in a short time schools of thousands of these shad were noticed in Lake Mead. There was similar success in Lake Mojave. Plantings in Havasu and the Colorado River itself were equally successful. Now the threadfin shad, although of no value in itself as a food fish, is providing needed forage for trout, bass, and crappies.

The threadfin shad is a small relative of both the American shad--the well-known table delicacy and angler favorite--and the common gizzard shad. (The latter sometimes is a nuisance fish, becoming overly populous and growing so large that mature individuals cannot be eaten by bass and other game fishes.) Seldom does the threadfin shad exceed six inches in length and therefore is a food source for gamefish throughout its life. Because it feeds in areas not frequented by small bass and feeds on items young bass ignore, there is no competition for food.