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OUTLINES OF A LONG-RANGE FROZEN FISH PROGRAM FOR THE ARMED FORCES

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ABSTRACT

Technological research devoted to the improvement of frozen fish has greatly advanced in recent years. In the interest of applying the results of these advances, the following article proposes a long-range program that begins with the harvest of the marine crop and carries through to those aspects of handling and distribution that are of concern to those who wish to make greater use of frozen fish in Armed Forces feeding.

Frozen fish are a relatively commonplace civilian food item--at least one day per week--but appear to rate with the serviceman in the category with KP and teta-

Fig. 1 - Handling seine-caught mackerel at sea.

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nus "shots." This low response on the part of the serviceman consumer is by far the major factor in the neglect of fishery products by the Armed Forces. Of the total Armed Forces procurement in pounds of perishable animal products, perishable sea foods represent only about 3½%--extremely low for so desirable a product. It is true that fish is served in the messes at the rate of four times per month--usually on Fridays--but only to the extent of some 30 pounds per 100 men. Obviously, there is considerable room for an expansion of use of this nutritious product.

Why is there an "anti-fish" attitude on the part of servicemen and what can be done about it? Some clue to an answer might be found in reports from Army installations in Japan. Relatively good acceptability was indicated for fish obtained from Japanese waters, but domestic frozen fish shipped overseas for Armed Forces' consumption simply did not "go over." This fact probably points up some basic defect in handling--which is corroborated by overseas reports which continuously stress the need for better control over the "types" and the "condition" of the fish served in the messes. Careful control might well result in a greater acceptability of fishery products and in less wastage of these products at meals.

As we all know, fish will show more definitely than most products the effect of abuse during the different stages of processing, shipping, storage, thawing, and preparing. And, it must not be forgotten that the original condition of the fish is of the utmost importance. Fish, as compared to meat, appears to have an added disadvantage in that the serving of an inferior quality product on one or two occasions can discourage many persons from ever eating fish again. The flavor not only lingers; it becomes an embedded food dislike.

What can be accomplished in order to improve the acceptability of frozen fish in the Armed Forces rations? First of all, it should be admitted that the industry supplies frozen fish to the Armed Forces in accordance with the Armed Forces performance requirements. Since the acceptance response of the servicemen to the serving of frozen fish is, as mentioned, relatively low, it is obvious that the Armed Forces requirements for the procurement of frozen fish should be reexamined. The basic revisions are not difficult to suggest: a product is required that will satisfactorily withstand the conditions that inevitably prevail in military pipe lines of supply. It must be remembered that servicemen consumers are often located in areas underequipped for handling perishables. Additional knowledge is needed to determine just what are the supply-line limitations. Progressive and practical requirements for Armed Forces procurement of frozen fish products must then be written with such limitations in mind.

To improve specifications for fish and to develop a guide for availability, procurement, storage, shipment, thawing, and preparation of frozen fish, a frozen fish program would be highly useful.

ELEMENTS OF THE PROGRAM

In considering the outlines of an effective program the following tasks would seem to be of initial importance:

a. Determine relative consumer preference of various species of fish caught at different periods of the fishing season.

b. Determine storage life of acceptable species of fish when caught at different periods of the fishing season.

c. Determine a feasible method for ascertaining freshness in frozen fish.

That relative consumer preference for various species of fish differs in accordance with the different periods of the fishing season has been demonstrated. Tressler,

Lemon, Stansby, and Beard report that for both lean and fat fish there is a definite tendency toward seasonal variations in composition of fish. Definite examples can be cited for haddock, mackerel, and salmon. Haddock caught in late spring or early summer are not as thick or "meaty" as at other seasons; in fact, they have a tendency to be "watery" and lacking in flavor and taste appeal generally. Mackerel caught during the late spring are also lean and hardy as compared to those caught during the late summer and early fall. Fall-caught mackerel are considered to have the best flavor but unfortunately they also have a shorter storage life.

There can be also a considerable difference in quality between early-run and late-run salmon. As Beard points out, "There is just as much difference between the best grade of salmon and the poorest grade of salmon as there is between well-fattened young steer beef and cow or bull beef from an old animal."

SEEKING "THE BEST BY TEST"

Elements of a test design (table 1) for obtaining the samples have been worked out. The design may best be understood by following through on haddock, as shown in column A of table 1. Samples of haddock would be obtained at three different periods of the fishing season. Since haddock are caught throughout the year, as indicated in column B, the plan would be to obtain the first samples in late January, as shown in column C--that is, prior to the peak of the fishing season, as indicated in column D, and prior to the spawning period of haddock which is late February to early May, as shown in column E. The second group of samples would be obtained in late May which, as indicated, is just after the period of spawning. The third selection of samples would be made in late September, at a period about midway between the end of the previous spawning season for haddock and the beginning of the next spawning season. Column F represents the desired size of the fish in the round. The weights designated represent marketable-size haddock that are sexually mature.

Table 1 - Elements of a Sampling Procedure

A. Species	B. When Caught	C. Designated Periods for Obtaining Samples	D. Main Fishing Season	E. Spawning Season	F. Size of Fish for Selected Samples
Haddock	All Year	1. Late Jan. 2. Late May 3. Late Sept.	March thru May	Late Feb. to Early May	3-6 lbs.
Mackerel	April to Nov.	1. Early May 2. Late July 3. Mid-Sept. 4. Mid-Nov.	Sept. Oct.	April thru June	1-3 lbs.
Salmon, silver	June to Nov.	Troll-Caught: 1. Late June 2. Mid-Sept. 3. Late Oct.	July thru Oct.	Sept. to Nov.	6-10 lbs.
		Seine-Caught: 1. Late Sept. 2. Late Oct.			
		Gill-Net Caught:[1/] 1. Late Aug. 2. Late Sept. 3. Late Oct.			

[1/] Subject to seasonal fishing regulations for the various districts.

The next example to be considered is mackerel. Mackerel is caught from April to November in New England waters but there are generally two distinct periods during the fishing season when it is most abundantly caught--(a) the late spring and early summer months, and (b) the fall. The latter period, September to November, is

Fig. 2 - "Brailing" the fish onto the deck.

usually the period of greatest catch. Four sample lots of mackerel would be selected. The first samples would be obtained in early May, just prior to the spawning season, and the second group of samples would be selected in late July, or just after the spawning period. A third group of samples would be obtained in mid-September, near the beginning of the main run of fish, and a fourth selection would be made in mid-November, near the end of the peak run of mackerel.

For a third example, let us look at salmon. Since these fish die after spawning, salmon are caught prior to or during their migration to the spawning grounds. Samples would be obtained from troll-caught ocean kings and silvers, and from troll-caught late-run kings and silvers. Other samples would be obtained from early- and late-run seine-, gill-, and trap-caught king, silver, pink, and fall salmon.

With respect to silver, a species caught off the Washington coast and in Puget Sound, the samples would be obtained in late June from the troll catch. A second group of samples would be obtained from troll-caught silvers in September, or near the end of the summer run. A third group of samples would be selected from silvers caught in late October, or near the end of the trolling season. In Puget Sound during October silvers are mainly caught by gill nets and seines, and, since there is a

fall run of silver salmon, samples would be obtained from early-run gill-net and seine-caught silvers and late-run gill-net and seine-caught silvers. Since the period of the silver salmon run varies somewhat according to the locality, the particular source for acquiring samples would have to be taken into consideration in setting up the requirements.

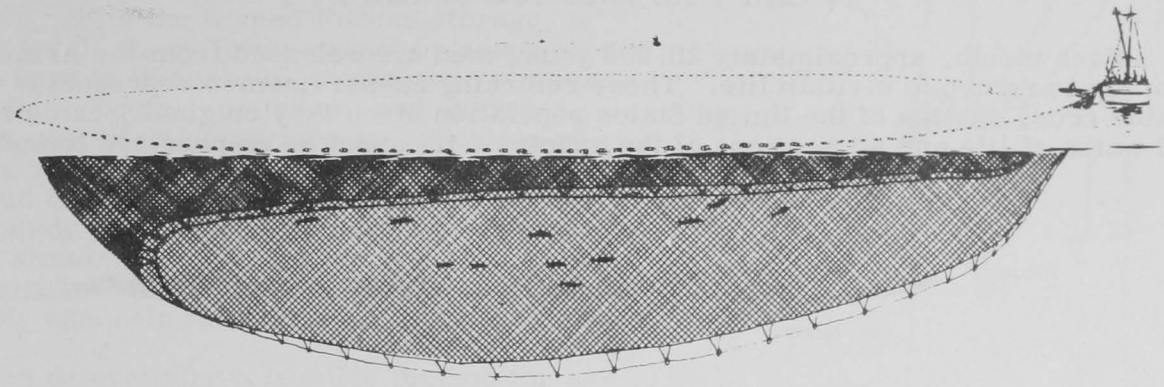

Fig. 3 - Diagram of salmon purse-seining operation--the net is set for fishing.

If feasible, 1-, 3-, and 7-day old fish would be secured from all of the species to be tested at the different periods of the year. These fish would be processed into frozen fillets or steaks for relative consumer preference tests and also for technological examination. As an example, 200 pounds of frozen fillets processed from 1-day-old haddock would be procured. A total of 150 pounds of these frozen fillets would be shipped to Fort Lee, Virginia, to determine relative consumer preference of this haddock. Tests would be conducted there not only to determine the relative consumer preference of each species when caught at a particular period of the season, as indicated, but also for the varying degrees of initial freshness. Consideration would be given the regional preferences in selection of consumer respondents. Normally, the population of the coastal areas is accustomed to eating fish caught in that area. It is, therefore, desirable that a cross-section of the Armed Forces be utilized in determining the relative consumer preference for the various species of fish. The remaining 50 pounds would be shipped to the Institute for technological examination; the greatest portion of the sample would be utilized in a storage study.

Fig. 4 - Preparing to unload fish from a purse seine.

Determining the relative consumer preference for the 25 or 30 species may enable procurement of fresh frozen fish the year around, thereby minimizing the storage problem and increasing the potential supply of acceptable fish to the Armed Forces. In addition, such a study would determine whether or not the lesser known species

are acceptable for Armed Forces use. Assurance of a constant supply to Armed Forces kitchens of high quality fish should result in a better serviceman acceptability of frozen fish and a greater utilization of these products by the Armed Forces. This means, of course, that thawing and preparation procedures are optimally observed.

IT CAN'T BE SAID TOO OFTEN . . .

Each month, approximately 25,000 young men are released from the Armed Forces to return to civilian life. These returning ex-servicemen represent a veritable cross section of the United States population since they originally came from all walks of life and all sections of the country. It cannot be emphasized too often

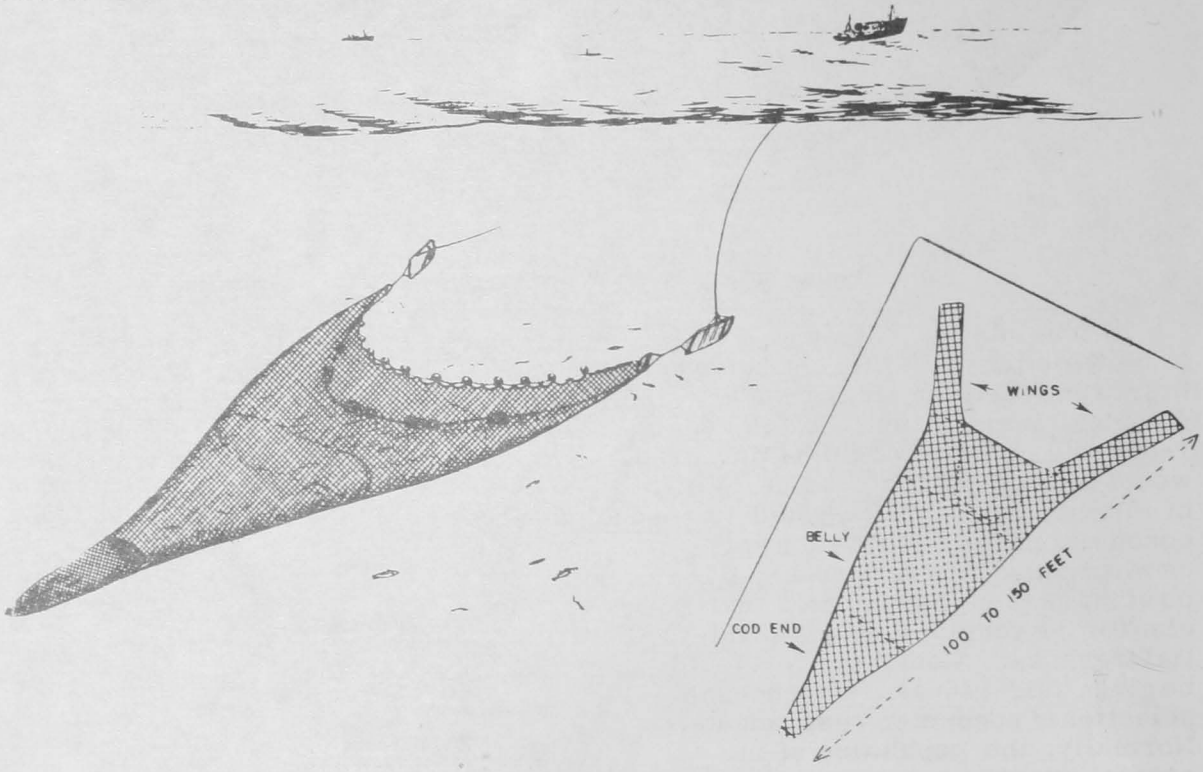

Fig. 5 - North Atlantic otter trawling for groundfish. Otter boards hold mouth of net in open position during $1\frac{1}{2}$- to 3-hour trawling period.

that these men represent a cross section of young civilian consumers. Many of these ex-servicemen's future likes and dislikes for food can well be molded during their period of training in the Armed Forces. This can be particularly true of fish, which is initially afflicted with certain consumer acceptability barriers attributable in many instances to unsatisfactory past performance. A reflection of unsatisfactory past performance is contained in the term used for canned salmon, "Goldfish," during World War II days. Although there is a considerable difference between the quality of canned salmon currently obtainable and the quality of canned salmon served to the doughboy of 1918, "the flavor lingers."

It will be necessary to determine the storage life of acceptable species of fish caught at different periods of the year. Assuming that study number one has demonstrated that several acceptable species of fish would be available at any time of the year, a storage program would only be necessary to determine overseas requirements.

Information is already available on the storage life of various species of fish, but specific data are not yet developed on fish handled and stored under Armed Forces conditions. In commercial storage, temperatures of 0° F. or lower are generally available, and the variation in storage temperature can be kept to a minimum. Packaging can also be adapted to control requirements. With the Armed Forces storage, a constant 0° F. or lower cannot be assured, and there is likely to be variation in temperatures, especially in transit and overseas. Packaging meets minimum specification requirements only. For these reasons, it should be evident why the frozen fish storage study must be conducted in accordance with simulated conditions encountered in the distribution of frozen fish through military supply channels to remote areas of the world.

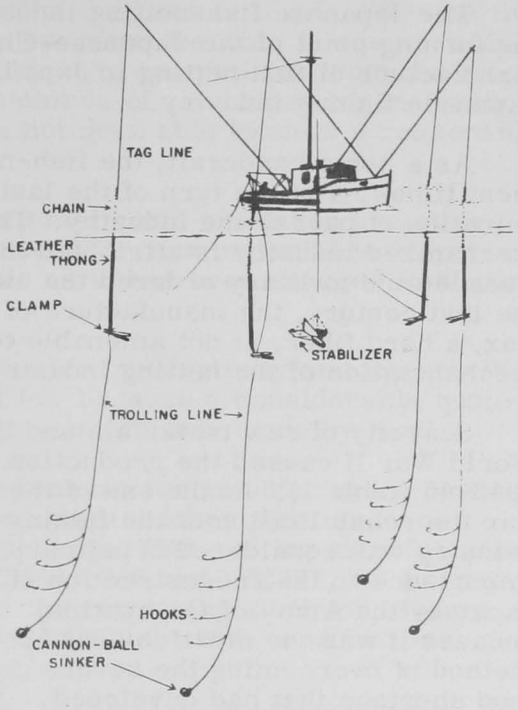

Fig. 6 - Diagram showing gear used in trolling for certain species of salmon.

In determining a feasible method for ascertaining freshness in frozen fish, advantage must be taken of various methods that have been devised to determine freshness of fish despite the fact that none of these methods have been found successful for general application. A specific plan for initiating this phase of the frozen fish investigation has not yet been established and suggestions are welcome from the industry. Also to be established are the reasons for the various physical and chemical changes that occur during the various phases of processing, storing, and preparing fish.

It is realized that the proposed frozen fish program is one of considerable scope. It would necessarily extend over a period of several years and to many regions since various species of fish found in Atlantic, Pacific, and Gulf Coast waters would be of concern in this study. The critical review of this program by the industries will be sincerely appreciated.

WHALE BEEF DISH WINS BLUE RIBBON

"Whale Beef a la Kosmos" was the most popular dish prepared by six Norwegian chefs at an international culinary exhibition in Berne, Switzerland. One Oslo chef said that most cooks process whale meat too much before it is cooked. "I simply put some deep-frozen whale meat in the frying pan and cook it much the same as ordinary beef, not quite through, but almost. Small onions and mushrooms were added. Guests couldn't believe they were eating the meat of a sea animal, and insisted on seeing a piece of raw whale meat."

--The Fishing News, July 2, 1954.