FISH-BONE DETECTION DEVICE SHOWS PROMISE

An automatic detector-rejector device which will "spot" bone-bearing fish fillets and eject them from the conveyor line is now a probability, the Department of the Interior reported on February 20, 1959. The device is being perfected by a Fitchburg, Mass., laboratory under a contract with the Bureau of Commercial Fisheries, United States Fish and Wildlife Service.

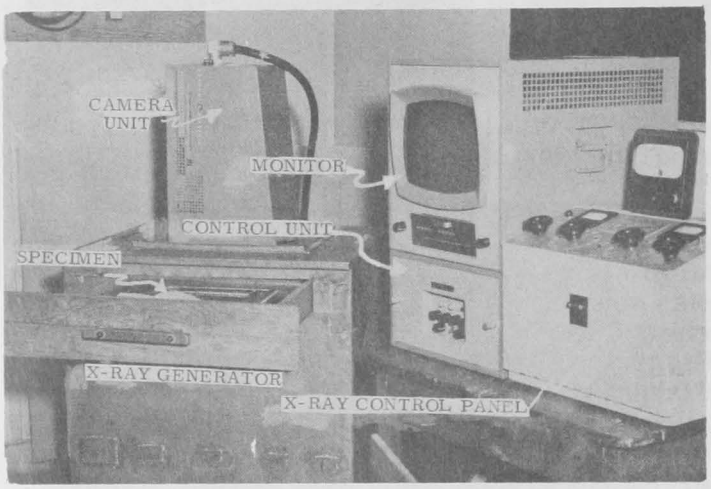


Fig. 1 - TVX system and X-ray generator.

The detector part of the system has already been devised. Future work contemplates a method of adapting the weak electrical signal sent when a bone is detected to activate a mechanical device which will automatically reject fillets containing bones.

The detector system is somewhat similar to that of a closed TV circuit. An X-ray image of the fillet is picked up by a special X-icon tube in place of the standard TV camera. The image is transmitted by wire to a receiving set some distance from the X-ray machine. There it is converted into a visual image by a special monitor. This gives inspectors an opportunity to view the cod and haddock or other fillets and yet be away from the dangers of excessive X-ray exposure.

A truly bone-free fishery product would be much more attractive to the consumer and result in a greater utilization of fish, processors believe. At present a small percentage of bone-containing fillets get past even the most rigid inspection. It is hoped that the Bureau experiments will make it possible for the industry to detect every bone in the early stages of processing.

Previous research had resulted in laboratory use of the fluoroscope to discover fillets containing bones. To protect the worker under this system a reflector was used and the actual inspection of the fluoroscopic image was made in the mirror.

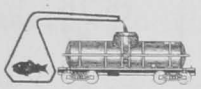
DISCUSSIONS ON FISHY ODORS AND AUTOXIDATION IN FISH OILS

The Bureau of Commercial Fisheries held a one-day conference at the Food Technology Department, University of California, Davis, Calif., on March 26. Topics for discussion centered about the problems of odor in fishery products, particularly

fish oils, including a consideration of types of odors and the probable mechanism of their formation. A description of some Bureau-sponsored research in this area was given, and samples of fishery products having different types of odors were displayed.

Although the discussions were aimed primarily toward odor and flavor problems with fish oils, many of these problems stem from spoilage and deterioration in the raw fish from which the oil is prepared. Therefore, consideration of the relationship between spoilage and odors were considered in the discussions. This conference generated ideas which should be of interest to many in the fishing industry--from handlers of fresh and frozen fish to producers of fish oils.

The morning session was devoted to fishy odors in fishery products and included a discussion of the definition of types of fishy odors and speculation on chemical reactions and modes of formation; investigations of chemical causes of fishy odors; and investigations on chemistry of fish spoilage. The afternoon session concentrated on autoxidation of fish oils and antioxidants and included discussions on recent results with antioxidant synergists and antagonists for fish oils; studies on mechanism of antioxidant activity; and autoxidation of oils research at Hormel Institute.



TECHNICAL NOTE NO. 52 - RECOMMENDATIONS FOR PROCESSING FISHERY PRODUCTS FOR LOW-SODIUM DIETS

BACKGROUND

The drop in use of frozen fishery products by hospitals because of a recent revision of the American Heart Association's dietary recommendations for patients on restricted low-sodium diets may be remedied by slight changes in processing methods and through appropriate labeling of the finished packaged product. Hospitals are large users of fishery products and a curtailment in the use of those products means some financial loss to fish processors. Since fishery products are an inexpensive form of highly nutritious protein, hospital authorities, too, are concerned over the effect of the revised recommendations on their budgets and on the loss of a source of flavor and texture variety in what may be, to the patient, an otherwise monotonous and unappealing diet.

Immediate action on the part of processors is necessary to prevent possible loss of further markets. Some portion of the retail consumer trade may also eliminate fishery products from their diets. Many health-conscious individuals or cardiac patients who are not presently in hospitals carefully follow the Heart Association's diet recommendations. These recommendations are made available to them through the medical profession.

The recommendation of the U. S. Bureau of Commercial Fisheries technologists as to what can be done to solve the problem is to prepare a product suitable for the hospital trade and for persons with low-sodium dietary requirements. The traces of various sodium salts (table salts) normally absorbed by fish fillets during processing enhance the flavor and appearance of the product and are in no wise injurious to the well-being of consumers who have no special dietary requirements. For this reason, the processor may wish to prepare only part of his production to conform to the low-sodium dietary restrictions common to a specific market.

NATURAL SODIUM CONTENT OF FISH

Research at the Bureau's Technological Laboratories has shown that the natural sodium content of some 34 species of fish is, in general, markedly lower than the medically-prescribed upper limit of 100 milligrams per 100 grams (0.0035 ounces of sodium per $3\frac{1}{2}$-ounce serving portion of meat. The species of fish in table 1 appear to be satisfactory for use in restricted low-sodium diets when used in accordance with instructions, provided no form of sodium such as table salt (sodium chloride) is added during processing.

Table 1 - Natural Sodium Content of Marine and Fresh-Water Fish

Fish Species	Milligrams of Sodium per 100 Grams 1/	Milligrams of Sodium Per Oz. 2/
Marine Fish:		
Albacore tuna	34	9.65
Pollock	48	13.63
Spanish mackerel	48	13.63
Halibut	53	15.05
Shad	54	15.34
Yellowtail rockfish	56	15.90
Sea trout	59	16.76
Haddock	61	17.32
Ling cod	62	17.61
Yellowtail rockfish	50	14.20
Scup (porgy)	63	17.89
Whiting	65	18.46
Whiting	82	23.29
Red rockfish	66	18.75
Black rockfish	66	18.75
Sea bass	68	19.31
Red snapper	70	19.88
Orange rockfish	71	20.17
Pink salmon	76	21.59
True cod	76	21.59
Pacific ocean perch	79	22.44
Ocean perch	79	22.44
Mullet	81	23.01
Starry flounder	85	24.14
Spanish mackerel	89	25.28
English sole	91	25.85
Petrale sole	96	27.27
Average	68	19.31
Fresh-Water Fish:		
Lake herring	38	10.79
Lake herring	56	15.90
Buffalofish	50	14.20
Carp	51	14.48
Yellow pike	52	14.77
Mullet (suckers)	52	14.77
Whitefish	53	15.05
Sheepshead	59	16.76
Sheepshead	84	23.86
Yellow perch	67	19.03
Average	56	15.90

1/Corresponds to raw $3\frac{1}{2}$-ounce portion which will yield approximately 3 ounces (84 grams) when cooked. Values should never exceed 100 milligrams per 100 grams when raw.

2/Corresponds to sodium content per diet unit--used as basis for diet development. One unit of fish meat (1 ounce) should not contain appreciably more than 25 milligrams of sodium when raw. (To correct sodium chloride (table salt) values to sodium volume, multiply weight of salt by 0.45.)

EXCESSIVE SODIUM ADDED DURING PROCESSING

Since both marine and fresh-water species of fish contain natural sodium well below the prescribed upper limits, the prohibition against their consumption is based on the sodium added during processing. This usually takes the form of added table salt (sodium chloride) absorbed by the meat during the brining process or added in the canning process. It may, however, be the result of in-process use of sodium hydroxide (lye) as in the preparation of lutefisk, of sodium benzoate, sodium propionate or sodium bisulfite as preservatives or enzyme inhibitors, of sodium alginate or monosodium glutamate as glaze materials, gelling agents, or flavor enhancers. It may even be the result of use of drinking water containing sodium in any form in quantities greater than 5 milligrams per 8 ounces (1 cup) of water. "Softened" water usually contains too much sodium to be used in the preparation of dietetic foods.

GUIDELINES FOR REDUCING SODIUM CONTENT IN PROCESSED FISHERY PRODUCTS

The following Bureau-recommended processor guidelines for reducing the sodium content

in processed fishery products have been developed from the point of view of the frozen groundfish fillet industry, but they can be also easily adapted to the canned fish industry.

1. Survey carefully the entire processing line to determine that no unrecognized sources of sodium exist which have not been taken into account. Such possible sources may include (1) washing and rinsing waters, (2) brines, (3) preservatives, (4) flavor additives, (5) breading materials, (6) gelling agents, and (7) glazing materials.

2. Obtain information on the sodium content of wash and rinse waters. If the sodium content is in excess of 5 milligrams per 8 ounces, use another water source. Consult with the local Public Health groups as to the sodium content of the local drinking water supply.

3. Eliminate the use of sodium chloride brines for dipping and washing fillets. If plain water is not suitable because of excessive "drip" from the fillets during thawing, with the aid of an experienced consultant experiment with the use of brines containing salts other than sodium salts. Such salts might conceivably include potassium chloride, potassium citrate, or any of the potassium phosphates. Use of such salts should, of course, be cleared with local food and drug officials.

4. If flavor is considered lacking in the finished product, add lemon juice or approved liquid spices to the plain water in the dipping tank.

5. Do not use sodium-containing preservatives, flavor enhancers, or enzyme inhibitors. Look at the label; the appearance of the words, sodium or soda or of the chemical symbol for sodium, Na, should be warning signs. Watch for these compounds and keep away from them.

6. Obtain periodic reports on the sodium content of the finished product to ensure continued compliance with the prescribed sodium limitations of 100 milligrams per 100 grams of product.

7. Conspicuously label pack as complying with the requirements for a low-sodium diet. The label-face could contain the following types of phrases: "Low-Sodium," "Low-Sodium Dietetic," or "Suitable for Low-Sodium Diets." The term "dietetic," since it may refer to several types of specialized dietary products, is not wholly satisfactory when used alone on the label. The ingredient legend then should (1) plainly state "contains no added salt," (2) should show the sodium content per ounce in milligrams, and (3) should show the sodium content per 100 grams. "Low-Sodium" label declarations are subject to the Food, Drug, and Cosmetic Act. Mislabeled products may be seized by the U. S. Food and Drug Administration.

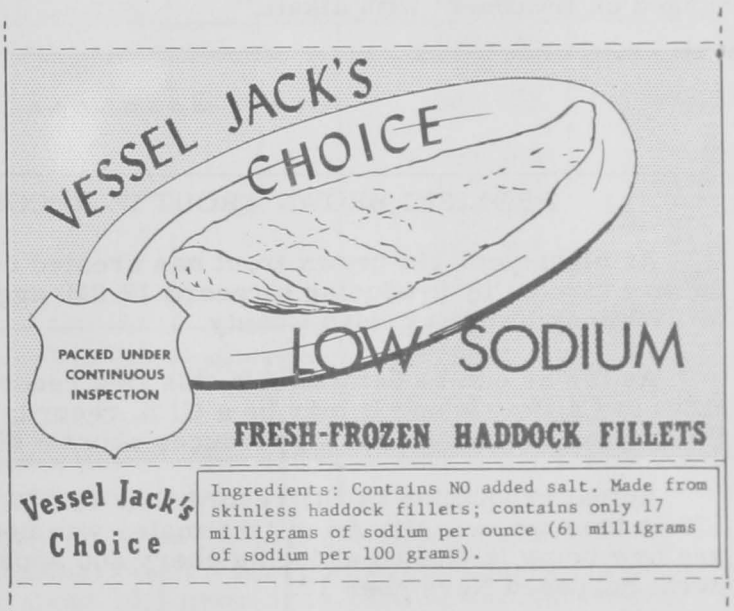


Fig. 1 - One suggested label declaration pointing out that the product complies with the requirements for a low sodium diet.

8. Plan a coordinated promotion campaign to alert the institutional trade and the individual consumer that restricted-sodium dietetic packs of fishery products are available.

CONCLUSION

Most people can eat fishery products as now prepared and, in fact, prefer the added salt flavor. The use of the Bureau's guidelines for reducing the sodium content of processed fishery products by an individual processor should be determined by his knowledge of the requirements of his specific market outlets. The American Heart Association has given assurance of full cooperation in making known that fishery products suitable for low-sodium diets are available.

CORRECTIONS

In the article "Significance of Ultraviolet Absorption Data of Fish-Oil Fatty Acids," Commercial Fisheries Review, November 1958 - Supplement (vol. 20, no. 11a), formula (c) at the top of page 13 should read: $k = \frac{A}{\mathcal{C} \cdot 1}$

In the article "Chemical and Nutritional Studies on Fish Oil," Commercial Fisheries Review, November 1958 - Supplement (vol. 20, no. 11a), the third or last sentence of the paragraph headed "UNKNOWN 2, 4-DINITROPHENYLHYDRAZONE DERIVATIVES:" should read: "Most of the nonmigrating compounds gave blue to violet colors when treated with strong alkali, suggesting that they are derivatives of α-dicarbonyl compounds, but some of the nonmigrating fractions remain unchanged on treatment with alkali."

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PROLIFIC BROWN TROUT IN RECORD PERFORMANCE

An eight-year old brown trout has created considerable excitement in fish-culture circles by producing a record 12,040 eggs early in November 1958 at the Mt. Whitney Hatchery, Inyo County.

As far as can be determined, this is a record for artificially-spawned brown trout in California and it may be a U. S. record. Normally, the average two- to three-year old female brown produces about 3,000 eggs.

Actual production by the record fish was 70 liquid ounces of eggs, averaging 172 to the ounce. Milt from two males was needed to fertilize the eggs, which are now being incubated at the hatchery and appear to be of excellent quality. The event happened November 13.

The fish was 29 inches long and weighed $11\frac{1}{2}$ pounds when hatchery workers took her eggs. A captive fish, the Mt. Whitney brown had been held in the hatchery's display pond as a typical fish of her species. Returned to the pond after spawning, the fish will now rate star billing.