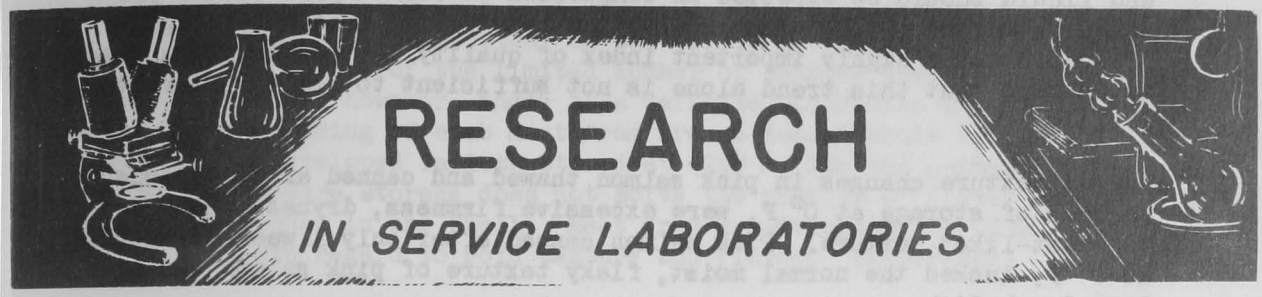

February 1951

CANNING: Handling Frozen Salmon for Canning: Canned packs from frozen whole sockeye salmon stored at 0° and -20° F., respectively, were prepared for comparative tests to determine whether storage of the frozen fish at low temperatures would minimize adverse changes in the frozen salmon used for canning. The frozen fish, stored at these temperatures for 22 weeks, were thawed and canned in ½-pound flat cans using the regular process. Both lots of frozen salmon had been wrapped before storage to prevent evaporation of the ice glaze. Both lots were in excellent condition; however, it was apparent, after the fish were thawed and dressed, that those stored at -20° F. were superior in quality to those stored at 0° F. The thawed salmon which were stored frozen at 0° F. had a definite "fishy" off-odor in comparison to the fresh-fish odor of those stored at -20° F. Examinations of the canned packs will be made after they have been stored for 60 days to allow proper "curing."

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Organoleptic examinations have been almost completed on the series of canned pink salmon processed after the fish had been frozen and stored under various conditions. The following tentative conclusions have been made. Additional samples are being tested currently in order to confirm the indicated trends with respect to the adverse changes in texture. All comparisons were based on control samples processed from the same lot of fresh fish used for the storage tests.

1. Pink salmon thawed and canned after one week of storage at 0° F. were rated slightly lower in quality than the control pack prepared from fresh fish.

2. Pink salmon thawed and canned after 6 weeks of storage at 0° F. were rated definitely lower in quality than the control pack but were considered of marketable quality.

3. Pink salmon thawed and canned after either 16 or 24 weeks of storage at 0° F. were rated unmarketable or on the borderline in comparison with control samples.

4. Pink salmon thawed and canned after increasing periods of storage at 0° F. showed the development of adverse changes in texture, excessive curd formation on the surface, and off-flavors in the flesh close to the skin. These changes occurred in greater intensity in fish frozen and stored for the longer periods.

5. The examination of pink salmon thawed and canned after various periods of storage at 0° F. indicated that slightly lower yields of free oil

and liquid should be expected in comparison to canned pink salmon prepared from fresh fish. Inasmuch as the quantity of free oil in pink salmon is not a highly important index of quality for marketing purposes, it is felt that this trend alone is not sufficient to limit its marketability.

6. Adverse texture changes in pink salmon thawed and canned after various periods of storage at 0° F. were excessive firmness, dryness, and a "sawdust-like" texture. Pink salmon canned after only 1 week of storage at 0° F. lacked the normal moist, flaky texture of pink salmon canned from fresh fish.

7. There was little difference in the average quality between salmon stored for 6 weeks at 0° F. glazed and those stored unglazed; however, wide variations in the flavor scores were found in samples prepared from the unglazed fish. The occurrence of occasional cans with a strong rancid or off-flavor in the pack prepared from unglazed salmon suggests that glazing is of considerable importance if a pack of uniform quality is to be obtained. (Ketchikan)

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REFRIGERATION: Freezing and Storing Alaska Shrimp and Dungeness Crab: Frozen coon-stripe (Pandalus hysinotus) and side-stripe (Pandalopsis dispar) shrimp were examined organoleptically after 3 months of storage at 0° F. These experimental samples were fresh-frozen aboard the Service's exploratory vessel John N. Cobb. Coon-stripe shrimp frozen raw in the shell had a satisfactory flavor but were slightly soft in texture. This was especially true of the shrimp frozen whole as compared to frozen tails. Side-stripe shrimp meats cooked 4 minutes in a 10-percent sodium chloride (salt) solution and frozen in ½-pound flat cans were completely unmarketable because of toughening and the development of off-flavors. Side-stripe shrimp which were cooked in water and peeled had satisfactory texture and flavor and were of marketable quality. The addition of ascorbic acid to side-stripe shrimp cooked in brine minimized the development of rancidity; however, a definite "hay-like" off-flavor was present.

* * *

Frozen side-stripe shrimp were examined after a secondary storage at 0° F. for 2 months. These packs were prepared from shrimp frozen whole at sea on the vessel John N. Cobb and thawed, processed, and refrozen after one month of initial storage at 0° F. Shrimp vacuum packed in ½-pound flat cans were slightly superior in color and flavor to those hermetically sealed in the same type can with plastic top. There was little difference in the color, flavor, and texture of the brine-cooked shrimp before freezing, although shrimp which had been cooked four minutes in 10-percent brine were considered slightly salty. Shrimp cooked 20 minutes at 5-pounds-steam pressure in a retort before freezing had a slightly mealy texture and a definite off-flavor. Judging from these samples it would appear practical to freeze the raw shrimp at sea for later thawing, packaging, and refreezing ashore. The soft texture of the frozen whole shrimp is counteracted, apparently, by brine-cooking before refreezing. All packs were considered of marketable quality with the exception of shrimp steam cooked in the retort before refreezing.

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Frozen whole Dungeness crab were examined after 4 months of storage at 0° and -20° F. in connection with the study of the effect of freezing the whole crabs both cooked and raw. Because of the limited number of samples examined these results are considered tentative; however, there is a definite indication that storage at -20° F. minimized the toughening of crab meat from frozen cooked whole crab. Loss of normal color and flavor developed in lots stored at -20° F. for the 4-month period. Evidently low temperature storage does not solve the problem of flavor change in cooked Dungeness crab frozen in the shell. Meat from raw-frozen whole Dungeness crab was unsatisfactory with regard to both texture and flavor. (Ketchikan)

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Palatability and Cold-Storage Life of Various Species of Rockfish: A study is being made of the cold-storage life of various species of rockfish in an effort to determine whether some species have a greater cold-storage life than certain others. Results obtained during the month indicated that after six months in cold storage at 0° F. only the samples of Sebastes marinus (Atlantic rosefish or ocean perch), Sebastodes alutus (long-jawed rockfish), S. paucispinis (bocaccio), "idiot" (scientific name unknown), and S. goodei (?) ("chili pepper") were still of edible quality but showed signs of incipient rancidity. The samples of S. minatus (vermilion rockfish), S. ruberrimus (red rockfish), S. pinniger (orange rockfish), and S. diploproa (lobe-jawed rockfish) were inedible. (Seattle)

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NUTRITION: Utilization of Salmon Cannery Waste for Hatchery Food: Arrangements were made by the Seattle laboratory with a local fish company for the collection of 100,000 pounds of salmon waste at Petersburg, Alaska, next summer for use by Federal fish hatcheries for production of hatchery fish. Frozen viscera and preserved and frozen eggs will be collected at Petersburg and shipped to hatcheries in Washington for large-scale feeding tests. Results of experimental fish feeding tests with salmon waste indicated the feasibility of using selected portions of the waste.

This large scale test should demonstrate whether or not it is practical to obtain such material for hatchery feed from Alaska if it is not available in quantity in the Puget Sound and Columbia River areas.

A portion of the salmon eggs will be preserved in accordance with methods developed and tested in the laboratory. Best results so far were obtained on eggs preserved with bisulfite.

This large-scale feeding study is part of an over-all hatchery-food project being carried out by the Seattle laboratory in cooperation with Federal fish hatcheries and various State organizations. The objective of the investigation is to develop optimum nutritional diets of lowest cost for use in artificial propagation of salmon in fish hatcheries. (Seattle)

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TECHNICAL NOTE NO. 10 - PAPER BAGS FOR FISH MEAL

Paper bags have become a permanent fixture in the West Coast fish meal industry. Complaints voiced in the early days of their use, such as "easy to break," "hard to handle," and "oily stains on bags" are seldom heard due to improvement in bags and

handling techniques. Shortage of burlap has had a great deal to do with the general shift to multi-wall paper bags. Now that burlap is easier to obtain, the pendulum is still toward paper. As long as paper competes economically, this situation will continue.

As with any other container, every producer has his own preferences as to size of bag, strength of paper, filling and closing techniques, and storage methods.

Bags now being used for packing 100 pounds of meal are about 23 inches wide and from 35 to 41 inches long. The length depends on the size of the gussets along the edges. A good average bag would be 19 x 4½ x 40 inches; that is, a width of 19 inches, a gusset of 4½ inches, and a length of 40 inches. When the bag is spread flat, the gusset would make the total width 23½ inches.

Most bags used are made of heavy 50-pound (per ream) kraft paper. Plys vary from 3 to 5 with 4 being the minimum recommended by bag manufacturers. If meal is to be shipped over long distances or by boat, it is a good idea to add one ply of asphalt paper for protection. Starting from the inside, the first ply would be 50-pound kraft; the second ply, 75-pound asphalt tar sheet; and the next three plys, 50-pound kraft. Many manufacturers use this asphalt paper for all shipments including local orders, and others declare this an unnecessary expense. It must be stressed, however, that the asphalt ply is necessary in long-distance shipping to reduce fire hazards caused by heating meal. A great deal of this heating is stopped in asphalt bags due to the stoppage of air (oxygen) from permeating the paper.

Meal bags are filled by placing or hanging them under hopper spouts. The amount of meal in the filled bag is controlled by several different methods. Most simple among these procedures is to manually release the hopper door until sufficient meal has fallen into the sack which is sitting on a tared scale. Newer methods consist of automatic scales sometimes integrated with constantly revolving turrets.

After it is filled, the meal sack is placed on a conveyor belt which passes under the closing or stitching machine. Most meal producers use a double-locked stitch with five- or six-ply twine. A filler thread is sometimes used, but has been found unnecessary. Tape along the top seam is also not required but does make a neater looking package that will eliminate any possible sifting. The few plants that tape the top seam use 90-pound (per ream) natural kraft tape.

There is much disagreement among producers as to whether meal should be cooled before sacking in paper bags. Some let the meal cool on the floor or in bins for a day or so before sacking; others sack the meal as it comes directly from the dryer at 110° F. to 130° F. In no instance are the filled paper bags allowed to cool before stacking. Practically no fires caused by heating meal are being reported so these cooling methods must be fairly adequate.

The kraft multi-wall bags now in industrial use are so popular that only a shortage of paper will prevent their contined use.

--George M. Pigott, Chemical Engineer
Fishery Technological Laboratory,
Seattle, Washington