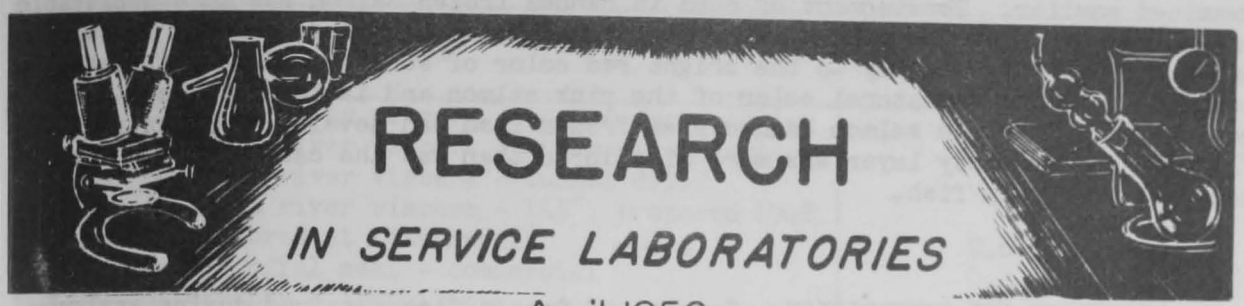

April 1950

REFRIGERATION: Volatile acid numbers (V.A.N.) were determined for the striped bass that were pan-dressed, packaged in different ways, and held in zero storage for 12 months. The fish that were wrapped (unfrozen) in vegetable parchment, followed by dipping in water, wrapping in cellophane, and freezing, had a V.A.N. of 10.6. Those that were frozen first, then glazed, followed by wrapping in cellophane, had a V.A.N. of 12.8. Unfrozen fish that were wrapped in cellophane and then frozen (no glaze), had a V.A.N. of 39.5. (Volatile acid numbers increase as quality decreases). These determinations bear out the findings of visual examinations in that the water-soaked parchment maintained a higher quality in the fish than did the other treatments.

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The first month's examination of frozen oysters treated with ascorbic acid and glazes revealed an acceptable score for all samples. Differences between lots were small.

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SANITATION AND QUALITY CONTROL: A study is being made on the cultural characteristics of "pink yeast" isolated from oysters.

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The survey project of the southern states to determine the effect of industrial waste pollution on the marine fisheries was completed.

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PRESERVATION: Several additional chemicals were tried as preservatives for salmon eggs. Sodium metaphosphate and sodium phosphate were tried without success. Formaldehyde gave adequate preservation but badly distorted the texture of the eggs. Sodium borate in preliminary trials gave very promising results. A combination of sodium sulfate and sodium benzoate gave better preservation than either chemical alone. Several additional phenolic compounds are under test at the present time.

* * *

Samples of canned pink salmon prepared from frozen fish were examined. Members of the National Canners Association Laboratory cooperated with the Service in examining the packs. There was a small decrease in free oil in pink salmon canned from frozen fish than was the case in a previous lot of sockeye salmon

examined earlier. Development of curd in canned frozen salmon was more noticeable on the sockeye than the pink salmon. This is because the curd is white in color and contrasts very sharply to the bright red color of sockeye, whereas it seems to blend in with the natural color of the pink salmon and is therefore not so noticeable. The pink salmon canned from frozen fish had developed strong rancid flavors and the fatty layer was more discolored than was the case with sockeye canned from frozen fish.

* * *

NUTRITION AND COMPOSITION: Samples of frozen fish obtained during exploratory operations in the Bering Sea were analyzed for proximate composition. The results are as follows:

Species	Percent ash	Percent moisture	Percent oil	Percent protein
Yellowfin sole	1.46	82.7	1.3	17.0
Rock sole	1.30	80.7	1.3	19.2
English sole	1.29	80.7	1.8	18.5
Lemon sole	1.23	84.1	1.0	18.1
Pollock	1.37	81.6	1.0	19.3
Flathead sole	1.15	80.9	1.2	19.7
King crab	2.15	79.3	1.4	18.9

* * *

BYPRODUCTS: Work was continued during the month on the project concerned with the loss of vitamin B_{12} and animal protein factor during processing of fish meal. Four samples of herring fish meal were obtained from different sources. Also, three samples of raw frozen herring were obtained, likewise from different sources. The raw herring was ground, stirred until uniform, hermetically sealed in $\frac{1}{2}$-pound flat cans, and stored at 0° F. The herring meal was also stored in hermetically sealed tin cans. Work is now proceeding on analyses of the vitamin B_{12} content of the fish meal and fresh herring samples. The purpose of these tests is to determine whether the vitamin B_{12} content of the fish meal, after correcting for losses occurring during manufacture (that is, moisture loss, etc.), is less than the vitamin B_{12} content of the original raw material. If no significant losses occur during processing, no further extensive work will be required. However, if it develops that there is a significant loss of vitamin B_{12} during preparation of fish meal, further tests will be made to determine whether this occurs during cooking, drying, or other stages of the manufacturing process.

* * *

A number of hatchery food materials were analyzed for vitamin B_{12} with the following results:

Material Analyzed	Vitamin B_{12} Content (micrograms per gram)
1. Columbia river viscera - vacuum-freeze dried	0.5
2. Columbia river viscera - steam-vacuum dried	0.7
3. Columbia river viscera - tunnel dried	0.7
4. Columbia river viscera - 145°, prepared 1948, stored at Leavenworth	0.64
5. Salmon offal meal - commercial	0.2
6. Stickwater - lyophilized	2.5
7. Crab meal - East Coast (commercial)	0.16
8. Crab meal - Pacific Coast (commercial)	0.012
9. Herring stickwater concentrate	0.2
10. Crab meal (prepared here, not used at Leavenworth)	0.06
11. Herring solubles (dried)	0.4
12. Halibut sawdust	0.01

Aside from the principal value of these analyses in connection with the hatchery feed program, the data give some indication as to the possible distribution of vitamin B_{12} in fish meals. Samples 1 through 4 and 6 were all prepared from the same raw material at the Seattle laboratory. It would appear that exposure of the raw material to temperatures up to that of free steam do not destroy vitamin B_{12}, but that a large quantity of this vitamin appears in the stickwater. Sample 9 (herring stickwater concentrate), which had a relatively low vitamin B_{12} content, was one poorly processed as evidenced by the low content of other vitamins and very poor nutritive value in fish-feeding tests. From the almost zero content of vitamin B_{12} in the halibut sawdust (collected during cutting of frozen halibut steaks), it is probable that vitamin B_{12} does not occur in appreciable quantities in the meat of fish.

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TECHNICAL NOTE NO 4 - FISHERY BYPRODUCTS FOR ANIMAL FEEDING

Condensed fish solubles and fish meals contain several of the newly discovered growth-promoting vitamins, according to reports by research men attending the scientific meetings in Philadelphia and Atlantic City this year. These products are among the few natural feedstuffs which probably contain growth-promoting factors similar in action to the antibiotic aureomycin. They also contain at least one other newly-discovered growth-promoting factor only otherwise found in dried yeast or liver.

Condensed fish solubles are usually included in the concentrate feeds for poultry and swine at a level of two percent, and fish meals at a level of 4 to 6 percent of the ration. Not only do these fishery byproducts supply certain other necessary vitamins, including vitamin B_{12}, but they are good sources of high quality protein, and certain nutritionally essential minerals, particularly calcium, phosphorus, iron, and copper. The high protein content (from 55 to 70 percent protein) and low fiber content of fish meal makes it a particularly efficient source of protein, minerals, and vitamins in high-energy rations for

quickly growing poultry and swine. Condensed fish solubles may also be used, particularly because of their high values for vitamins and minerals.

Condensed fish solubles or fish meals may also be included to good advantage in breeder rations for these farm animals since they efficiently balance the nutrients of the low-cost cereals or cereal byproducts which make up the bulk of the rations. They also act as a safety factor in the rations to protect the animals against the occasional serious deficiencies of specific nutrients of other feed ingredients used in the rations fed, which may be caused by adverse storage conditions or poor processing; and against factors of undue stress in the animals themselves, produced by unfavorable surroundings, adverse weather, or potential infections.

--Dr. Hugo Nilson, Pharmacologist,
Fishery Technological Laboratory,
College Park, Maryland.

BAKED HALIBUT STEAKS

2 pounds halibut steaks.
1 teaspoon salt.
1/8 teaspoon pepper.
2 tablespoons lemon juice.
1 teaspoon onion, grated.
4 tablespoons butter or other fat, melted.
paprika.

Cut fish into serving size portions. Sprinkle both sides with salt and pepper. Add the lemon juice and onion to the melted fat. Dip each piece of fish into this mixture and place in a greased baking pan. Pour the rest of the fat over the fish. Bake in a moderate oven 350° F. for 25 to 30 minutes or until fish flakes easily when tested with a fork. Sprinkle with paprika. Serve immediately on a hot platter. Serves 6.