



# RESEARCH

## IN SERVICE LABORATORIES

November 1951

REFRIGERATION: Freezing Fish at Sea, Defrosting, Filletting, and Refreezing the Fillets: The sixth test cruise of the research trawler Delaware was completed. At no time during any of the six cruises had the refrigeration systems operated entirely satisfactory. During Cruise No. 5, approximately 6,000 pounds of fish were frozen in the brine freezer; about 3,000 pounds of fish were iced for comparative studies. On Cruise No. 6, in the course of operating the refrigeration machinery, the heat-exchanger tubes in the brine cooler were ruptured for the second time.

Because of a mandatory reduction in funds for personnel, the crew of the Delaware will be released on December 10 for a period of three months and the vessel will be laid up for the winter. During this time, the refrigeration equipment will be repaired. The brine-freezing and frozen-storage systems will be redesigned and improved based upon the experience and observations made during the summer and fall operations. It is expected that the next vessel operations at sea will begin about March 1952.

Laboratory studies continue on evaluation of trimethylamine as a freshness index for fish, salt penetration in fish frozen in refrigerated brine, evaluation of quality of fish frozen at sea as compared to iced fish, and investigation of the possible use of other freezing mixtures or solutions. (Boston)

\* \* \* \* \*

BYPRODUCTS: Vitamin Content and Nutritive Value of Fishery Byproducts: Fish meal has recently suffered considerably because of inadequate information concerning its chemical composition. Competing products, especially those being produced by pharmaceutical manufacturing companies are carefully standardized and can be advertised to contain definite amounts of nutritive components. This project has as its aim to determine the range of concentration of certain vitamins, especially vitamin B<sub>12</sub> and riboflavin, in fish meal from different sources and to determine the possible presence of unknown vitamins and other growth substances which may be present in fish meal.

\* \* \* \* \*

Samples of (pilchard) material representing the various stages in the manufacture of sardine meal by the flame-drying procedure were obtained at a reduction plant in California. Analyses for riboflavin and niacin were completed on these samples and the data are shown in table 1. Each value reported in the table is an average of five individual samples: each sample was assayed a minimum of five separate times.

Also, samples of sardine and menhaden fish before and after processing by the Viobin process were analyzed for riboflavin, niacin, and vitamin B<sub>12</sub>. These results are shown in table 2.

Sample	Vitamin content <sup>1/</sup> (moisture-and-oil-free basis)	
	Riboflavin	Niacin
	<u>Micrograms Per Gram</u>	<u>Micrograms Per Gram</u>
Raw fish.....	9.5	218
Fish from cooker.....	6.65	197
Press cake.....	4.7	90
Foots from foots press...	6.4	114
Stickwater (uncondensed).	23.7	691
Meal (flame dried).....	4.4	66

<sup>1/</sup> EACH VALUE IS AN AVERAGE OF AT LEAST FIVE SEPARATE SAMPLES.

With respect to the sardine meal processed in California (table 1), there is little or no loss of riboflavin due to flame-drying the meal. However, there is a definite loss of niacin during the drying process (90 micrograms niacin per gram in the press cake as compared to 66 micrograms per gram in the meal on the moisture-and-oil-free basis). A large part of both the niacin and riboflavin is present in the stickwater rather than the meal.

There was a loss of niacin in the Viobin-processed samples as shown in table 2 (318 micrograms niacin per gram in the raw product as compared to 193 micrograms per gram in the meal on the moisture-and-oil-free basis).

Species	Sample	Vitamin content (oil-and-moisture-free basis)		
		Riboflavin	Niacin	Vitamin B <sub>12</sub>
		<u>Micrograms Per Gram</u>	<u>Micrograms Per Gram</u>	<u>Micrograms Per Gram</u>
Pilchard	(Raw fish .....	18.8	318	0.92
	(Processed material ...	19.0	193	0.75
Menhaden	(Raw fish .....	13.4	198	0.57
	(Processed material ...	15.0	107	0.46

(Seattle)

\* \* \* \* \*

COMPOSITION: Composition and Cold-Storage Life of Fresh-Water Fish: Very little information is available as to the chemical composition of fish of inland fresh waters and no published information whatever is available concerning the cold-storage life of fresh-water fish. The project has as its purpose the determination of the chemical composition and cold-storage life of such fish. The data on the composition of the first six samples of yellow pike, sheepshead, and blue pike are presented in the following table:

Composition of First Six Samples Analyzed for Each of Three Species of Lake Erie Fish

Fish	Sample No.	Length	Weight	Fillet Yield	Moisture	Fat	Protein	Ash
		Centimeters	Grams	Percent	Percent	Percent	Percent	Percent
Yellow Pike ( <u>Stizostedion vitreum</u> )	1	38	480	52	79.5	1.17	19.0	1.15
	2	38	540	57	79.0	1.10	19.4	1.20
	3	58	2165	53	79.5	3.02	18.8	1.20
	4	34	360	57	79.2	1.33	19.7	1.16
	5	40	535	56	79.9	1.39	19.0	1.12
	6	41	595	59	79.8	2.02	19.4	1.15
Sheepshead ( <u>Aplodinotus grunniens</u> )	1	25	230	37.8	78.0	3.02	18.6	1.11
	2	27	255	37.2	77.8	3.78	19.0	1.05
	3	27.5	235	40.4	77.7	4.26	17.9	1.08
	4	26.5	215	34.9	76.1	6.00	18.5	1.10
	5	27	255	37.2	78.9	2.76	18.1	1.04
	6	29	315	38.1	75.1	7.31	18.4	1.08
Blue Pike ( <u>Stizostedion vitreum glaucum</u> )	1	27.5	155	41.9	81.1	0.80	18.3	1.10
	2	26.5	145	41.3	80.1	0.87	19.1	1.29
	3	28	185	44.3	79.4	0.78	18.4	1.23
	4	28	170	42.4	80.3	0.82	18.8	1.24
	5	29	222	45.0	79.2	0.95	19.4	1.20
	6	33	280	45.4	79.7	0.89	18.9	1.15

(Seattle)



## REFRIGERATED LOCKER STORAGE OF FISH AND SHELLFISH



The locker operator will find that, in introducing fishery products to his patrons, commercially-frozen packaged fish offer certain advantages. These commodities are more convenient to handle and require less care. It may, however, be more profitable to purchase fresh fish, during the seasons of abundance and prepare, package, and freeze them for sale to locker patrons for storage.

--Fishery Leaflet 128