

RESEARCH

IN SERVICE LABORATORIES

August 1952

REFRIGERATION: Freezing Shrimp at Sea--Gulf States Area: Shrimp which were brine- and air-frozen in the Gulf of Mexico area for the study of freezing shrimp at sea were analyzed for salt content. Samples included whole and headless shrimp frozen in brine at 5° F. and held for periods up to 48 hours before removal and storage in air at 0° F. Refrozen shrimp were prepared by thawing in water the whole brine-frozen shrimp (frozen in brine at sea), removing the heads, packaging in waxed cartons, and refreezing in air at -20° F.

Results of the salt analyses showed a considerable variation in salt absorption of shrimp in each lot and indicate the desirability for further work to resolve the factors affecting salt absorption in brine-frozen shrimp.

All brine-frozen shrimp tested were frozen and held in sodium chloride brine (85° salometer) at approximately 5° F. The tests indicate the following:

1. The salt content of the meat from frozen fresh shrimp was approximately 0.5 percent by weight. Iced shrimp had a slightly lower salt content than shrimp fresh out of the water, presumably due to the leaching action of melting ice.
2. The salt content of the meat of brine-frozen shrimp varied from 1.1 to 7.4 percent by weight. The meat of fresh whole shrimp frozen and held in brine for periods of 4 hours or less had a salt content of approximately 1.5 percent.
3. After brine-freezing the salt content of the meat of iced whole shrimp and shrimp tails varied from 1.6 to 3.2 percent, or definitely higher than that of fresh whole shrimp brine-frozen immediately.
4. The absorption of salt increased when shrimp were held in the refrigerated brine for longer periods, such as 21, 24, and 48 hours.

Pending further tests on these factors, it is recommended for commercial application of brine-freezing of shrimp that:

- (1) Only fresh, firm, whole or headless shrimp be brine-frozen.
- (2) Shrimp be chilled in fresh ice water just prior to brine-freezing.
- (3) Shrimp be removed from the brine within 4 hours after freezing, rinsed in fresh cold water (34°-36° F.), and stored at 0° F.
- (4) The temperature of the brine be maintained at 10° F. or below to minimize salt absorption.
- (5) Brine-frozen whole shrimp be thawed ashore in fresh running water at 60° F. for 15 minutes, heads removed immediately, washed in fresh water, packaged, either glazed or overwrapped with a moisture vapor-proof film, and stored at 0° F.

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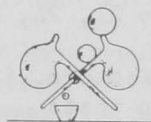
Freezing Fish at Sea, Defrosting, Filleting and Refreezing the Fillets:
The experimental research trawler Delaware completed Test Cruise No. 13. Approximately 23,000 pounds of Georges Bank scrod haddock were landed. All fish were frozen in-the-round immediately after catching, and were stored in the vessel's refrigerated hold until arrival at port. The entire lot of 23,000 pounds of fish was landed at the Boston Fish Pier and stored in commercial cold storage for later thawing and processing into packaged frozen fillets. This lot of fish comprises a second commercial lot of fish that will be used for obtaining information on the length of time that round frozen fish can be stored in commercial cold storage prior to processing. A small lot (approximately 1,000 pounds) of haddock was frozen in-the-round for pilot-plant studies on processing round frozen fish into frozen dressed fish and frozen fish steaks without defrosting the round fish.

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ANALYSIS AND COMPOSITION: Composition and Cold-Storage Life of Fresh-Water Fish: The proximate composition of 12 individual Lake Michigan chub was determined. The data are presented in the following table:

Composition of Edible Portion of Lake Michigan Chub (*Leucichthys* sp.)

Sample Number	Length of Fish Centimeters	Weight of Fish (Eviscerated) Grams	Fillet Yield from Eviscerated Fish Percent	Proximate Composition of Edible Portion			
				Moisture Percent	Fat Percent	Protein Percent	Ash Percent
1	25	145	43.4	75.0	12.05	14.4	0.97
2	23	128	45.3	74.6	9.87	15.2	0.91
3	23	137	34.3	76.9	8.54	15.9	1.04
4	23	125	37.6	75.4	8.04	15.6	0.97
5	24.5	160	45.0	77.3	11.89	14.3	0.84
6	25	145	48.3	72.2	11.50	16.4	0.85
7	22	110	40.9	77.3	7.95	15.4	1.02
8	23	107	37.4	81.4	4.84	13.8	0.83
9	21.5	88	39.8	74.9	11.52	15.5	0.95
10	22.5	95	42.1	78.8	5.16	16.2	0.87
11	21	105	40.0	75.3	7.50	14.8	0.94
12	33	125	42.4	76.4	12.82	14.6	0.85



FOOD VALUE OF FISH AND SHELLFISH

DO YOU KNOW THAT:

That the protein in fish and shellfish amounts to about 18 percent of the edible portion and is from 85 to 95 percent digestible. About 1/3 the protein eaten daily should come from animal sources to balance the less effective proteins of cereals and vegetables. An average serving of fish or shellfish supplies enough animal protein to satisfy this daily requirement. . .