Progress on Projects, July 1953

REFRIGERATION: Freezing Fish at Sea, Defrosting, Filleting, and Refreezing the Fillets: The experimental freezing trawler Delaware began this season's operations on June 3. A short cruise (No. 18, June 3-5) was carried out to test the operating characteristics of various mechanical equipment that was installed or reconditioned during the winter lay-up period.

A six-day cruise (No. 19, June 18-23) was carried out for the purpose of testing the newly-designed and installed brine-freezing mechanism, and the refrigeration equipment under full-load conditions. During the course of testing the equipment, a number of lots of experimentally frozen and iced fish were prepared. The vessel carried out fishing operations on the southwest part of Georges Bank. Approximately 10,000 pounds of large haddock were caught, of which 8,000 pounds were frozen in sodium-chloride brine for experimental purposes. Some of the fish which were frozen were "glazed" in sea water prior to storage in the vessel's hold at 0° F. These "glazed" fish will be compared with a similar lot of unglazed fish to determine storage characteristics on the vessel and also in commercial cold storage ashore prior to defrosting, filleting, and refreezing in commercial fish-filleting plants. A small lot of gutted fish was also frozen in sodium-chloride brine to determine to what extent sodium chloride will penetrate into the meat of fish that have been gutted. The results of the tests with the new freezing mechanism were very satisfactory, based on the limited quantities of haddock which were caught and frozen.

The Delaware completed a test cruise (No. 20, July 7-15) during which approximately 22,000 pounds of fish were caught. The fish were frozen, using the modified brine-freezing equipment, which functioned satisfactorily. The primary purpose of the cruise was to test the new brine-freezer mechanism under full-load conditions. However, several test lots of brine-frozen haddock were prepared to determine the effect of rinsing the round fish with clean sea water before they are stored in the hold. The new brine freezer permits the loading and unloading of fish at the deck level. Greater efficiency of operations was noted with this new arrangement. Fishing operations were carried out on the southwest part of Georges Bank. A number of experimental lots of brine-frozen and of iced fish were prepared for further studies in the laboratory and pilot plant ashore. Large lots of haddock were weighed carefully to determine changes in weight at several stages of handling by both icing and freezing procedures. These are to be weighed again when landed and the yields of fillets from the two lots will be determined. A large lot of haddock frozen in the round was prepared for thawing and filleting ashore, the fillets to be used for studies of brine-uptake during the brine-dipping process. Several lots of gutted haddock, heads on and heads off, were brine-frozen to determine space requirements in frozen storage, as compared to that of round frozen haddock. (Boston)

Cold-Storage Life of Frozen Halibut: Examination was made of the frozen halibut stored for 12 months. The purpose of the project is to provide information on the cold-storage life of frozen halibut packed according to present commercial methods,

and to compare various packaging and storing methods. Four series of samples were prepared. A summary of the results after 12 months of storage of the fish is as follows:

1. Dressed halibut were superior to the halibut steaks. Steaks stored at -15° F. and -20° F. had a longer storage life than those stored at 0° F.

2. The limiting factor in storing halibut as steaks appears to be the loss of ice glaze, permitting subsequent dehydration and development of rancidity.

3. The loss of ice glaze depends upon such factors as (a) packaging materials; (b) type of refrigerator room; (c) location of cartons in respect to refrigerated coils; (d) air circulation.

The results of each periodic examination are summarized in the following table:

Results of Storage Tests on Halibut Steaks Sliced From Frozen Dressed Halibut

Dressed halibut were stored at 0° F. Steaks were prepared at intervals of 0, 6, 9, and 12 months. Steaks were packaged for further storage at 0° F. in two ways: (A) The glazed steaks were packed in a 15-pound corrugated-type cardboard carton lined with parchment paper. A sheet of parchment paper was placed between each layer of steaks. (B) Glazed steaks were placed in MSAT cellophane bags. The bags were heat sealed and packed in 15-pound corrugated-type cardboard cartons.

Series	Description of Samples	Storage Temperature of Steaks	Packaging Code (see headnote)	Quality of Halibut Steaks After Total Storage Period (Storage Period of Steaks Plus Storage Period of Dressed Fish From Which Steaks Were Cut) of:		
				6 Months	9 Months	12 Months
I	Steaks cut from frozen dressed halibut stored for 0 days at 0° F.	0° F.	A	Thawed steaks appeared spongy or honeycombed; odor and flavor normal; portions of dark meat were very slightly rancid; texture slightly dry but good; steaks packed layer-style and in cellophane bags about equal in quality.	Steaks next to inner surface of carton lost much of the glaze and were dehydrated; dark meat was slightly to moderately rancid; rated unacceptable.	-
			B		Steaks had lost some glaze and were dehydrated in small areas; dark meat was slightly rancid in only a few steaks; rated fair in quality and on the borderline of acceptability.	Steaks were dehydrated in large areas; the dark meat was rancid, and some portions of the white meat had an off-flavor; rated unacceptable.
		-15° F.	A	-	Normal odor and flavor; texture somewhat dry and firm; small amount of dehydration on steaks near inner surface of carton; rated acceptable.	Glaze almost entirely gone; steaks near inner surface of carton were dehydrated; dark meat darkened somewhat; dark meat of some steaks discolored and rancid; texture somewhat dry and firm; rated on borderline of acceptability
			B	-	Normal odor and flavor; texture somewhat dry and firm; rated acceptable.	Glaze almost entirely gone; dark meat darkened somewhat; dark meat of some steaks discolored and rancid; texture somewhat dry and firm; rated on borderline of acceptability.

(TABLE CONTINUED ON NEXT PAGE)

Results of Storage Tests on Halibut Steaks Sliced From Frozen Dressed Halibut (Contd.)

Series	Description of Samples	Storage Temperature of Steaks	Packaging Code (see headnote)	Quality of Halibut Steaks After Total Storage Period (Storage Period of Steaks Plus Storage Period of Dressed Fish From Which Steaks Were Cut) of:		
				6 Months	9 Months	12 Months
II	Steaks cut from frozen dressed halibut stored for 6 months at 0° F.	0° F.	A	Thawed steaks were spongy in appearance; large amount of curd on baked steaks; odor and flavor normal; texture slightly dry but good.	Steaks had lost only a small amount of glaze; dark meat in some steaks was slightly rancid; texture somewhat dry; rated acceptable.	Many steaks were dehydrated; discolored, and rancid; rated unacceptable.
			B		The glaze was in good condition; dark meat was slightly rancid in some steaks; texture somewhat dry; rated acceptable.	Many steaks were dehydrated, discolored, and rancid; rated low in quality but acceptable.
		-15° F.	A	-	Glaze was gone from the surfaces adjacent to the carton; the dark meat in a few steaks was slightly rancid; texture was somewhat dry and firm; rated acceptable.	Glaze was gone on many steaks, particularly those adjacent to inner surface of carton; the dark meat of steaks showed loss of glaze and was discolored and rancid in flavor; texture was somewhat dry and firm; rated on the borderline of acceptability.
		-20° F.	A	-	Some glaze lost on small areas on steaks; normal flavor and odor; rated acceptable.	Steaks next to inner surface of carton were dehydrated and were rancid in flavor; texture was dry and firm; rated on the borderline of acceptability.
			B	-	Glaze was intact; normal flavor and odor; rated acceptable.	Steaks lost some glaze; dark meat in a few steaks was rancid; rated fair.
III	Steaks cut from frozen dressed halibut stored for 9 months at 0° F.	0° F.	A	-	Thawed steaks had spongy appearance; baked steaks had moderate amount of curd; odor and flavor was normal; texture was somewhat dry and firm; rated good.	Some steaks showed slight loss of glaze; dark meat in a few steaks was slightly rancid; texture somewhat dry and firm; rated acceptable.
			B	-		Steaks showed very little change; rated acceptable.
		-20° F.	A	-	-	Glaze was good; dark meat of a few steaks was slightly rancid; texture was dry and firm; rated acceptable.
			B	-	-	Glaze was good; dark meat of a few steaks was slightly rancid; the texture was dry and firm; rated acceptable.
IV	Steaks cut from frozen dressed halibut stored for 12 months at 0° F.	-	-	-	-	Thawed steaks had spongy appearance; baked steaks had considerable amount of curd on surface; odor and flavor normal; texture was somewhat dry and firm; rated good.

Cold-Storage Life of Frozen King and Silver Salmon: Examination was made of the frozen king and silver salmon stored for nine months at 0° F. The results of each periodic examination are summarized in the following table:

Results of Storage Tests on Frozen Silver and King Salmon

ies ber	Species of Salmon	Description of Dressed Fish Samples Used to Produce Steaks	Storage Period of Dressed Fish Prior to Steaking	Quality of Salmon Steaks After Total Storage Period (Storage Period of Steaks Plus Storage Period of Dressed Fish From Which Steaks Were Cut) of:			
				0 Months	3 Months	6 Months	9 Months
I	Silver	Fish from Neah Bay, Wash., dressed, frozen, and stored at 0° F.	Months 0	Good to excellent.	Good, but belly tips were slightly rancid.	Good, but belly tips were slightly rancid.	Good, but belly tips were slightly rancid.
			3	-	Good, but belly tips were slightly rancid.	Fair; color faded slightly; belly tips and dark meat rancid; flat to off-flavor.	Fair; color slightly faded; belly tips rancid; dark meat slightly rancid; off-flavor.
			6	-	-	Fair; color moderately faded; belly tips and dark meat rancid; flat to off-flavor.	Fair to poor; color slightly faded; belly tips rancid; dark meat slightly rancid; off-flavor.
			9	-	-	-	Poor; color moderately faded; belly tips and dark meat very rancid; off-flavor.
II	Silver	Fish from Lapush, Wash., dressed, frozen, and stored at 0° F.	0	Good to excellent.	Good, but belly tips were slightly rancid.	Good, but belly tips were slightly rancid.	Good, but belly tips were slightly rancid.
			3	-	Good, but belly tips were slightly rancid.	Fair; color slightly faded; belly tips and dark meat were rancid; flat to off-flavor.	Fair to poor; rancid belly tips; off-flavor.
			6	-	-	Fair; color slightly faded; belly tips and dark meat were rancid; flat to off-flavor.	Poor; color faded to pale; belly tips and dark meat were rancid; off-flavor.
			9	-	-	-	Unacceptable; color faded badly; belly tips and dark meat were very rancid; off-flavor.
III	Chinook	Fish from Ilwaco, Wash., dressed, frozen, and stored at 0° F.	0	Good to excellent, but texture somewhat soft.	Good, but texture somewhat soft.	Good, but belly tips were slightly rancid.	Good, but belly tips were slightly rancid.
			3	-	Good, but texture was somewhat soft and belly tips were slightly rancid.	Fair to good; color slightly faded; belly tips slightly rancid; slight loss of flavor.	Fair; color slightly faded; belly tips were rancid; dark meat showed trace of rancidity; off-flavor.
			6	-	-	Fair; color slightly faded; belly tips and dark meat were rancid; flat to off-flavor.	Fair; color slightly faded; belly tips were rancid; dark meat showed trace of rancidity; off-flavor.
			9	-	-	-	Poor to unacceptable; color faded considerably; belly tips and dark meat were very rancid; off-flavor.

BYPRODUCTS: Vitamin Content and Nutritive Value of Fishery Byproducts: Riboflavin assays were completed on 23 samples of pilchard meal. These represent samples of carload lots. The results were as follow:

Meal	Number of Samples	Riboflavin Content in Micrograms Per Gram (Moisture- and Oil-Free Basis)		
		Minimum	Maximum	Average
Pilchard	23	4.2	7.2	5.4

(Seattle)

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PUBLICATIONS: The Fisheries Experimental Commission of Alaska released two publications pertaining to curing and canning of Alaska fish and shellfish.

Technical Report No. 4, Home Canning Alaska Fish and Shellfish, by R. G. Landgraf, Jr., Christine Heller, and John A. Dassow, is made available to Alaskans through the cooperation of the Fishery Products Laboratory at Ketchikan and the University of Alaska Agriculture Extension Service. This publication gives complete instructions for the home canning of salmon, smoked salmon, halibut, halibut cheeks, herring, butter clams, and crab meat.

Technical Report No. 6, Specialty Food Products from Alaska Herring, by R. G. Landgraf, Jr., and H. J. Craver, gives complete instructions for the preparation of the following specialty products from Alaska herring: canned smoked herring niblets, canned smoked herring in tomato sauce, kippered herring, and pickled herring.

These publications should be of considerable interest to Alaskans who preserve fish and shellfish for use throughout the year. They may be obtained by Alaska residents free of charge from the Fishery Products Laboratory, 622 Mission Street, Ketchikan, Alaska. (Ketchikan)

HALIBUT ADDS VARIETY TO HOMEMAKERS' MENUS

Halibut--from the cold deep waters of the North Pacific--is now in good supply. Largest of the flounder or flatfish family, halibut have been taken as large as 500 pounds and as long as nine feet.

Homemakers can add variety to their menus by serving halibut, one of the finest food fishes. Its white flaky meat is lean and firm. The home economists of the Fish and Wildlife Service recommend Chinese Fried Halibut as a savory, economical, and easily prepared main dish.

CHINESE FRIED HALIBUT

2 POUNDS HALIBUT STEAKS OR FILLETS
1 TEASPOON SALT
1/4 CUP FLOUR
1/2 CUP VINEGAR
1 CUP SUGAR
1-1/3 CUP WATER
3 CHICKEN BOUILLON CUBES
1 LARGE GREEN PEPPER, CUT INTO STRIPS
1 CUP PINEAPPLE CHUNKS, DRAINED
1-1/2 TEASPOONS WATER
1-1/2 TEASPOONS SOY SAUCE
3 TABLESPOONS CORNSTARCH

Sprinkle both sides of halibut with salt; roll in flour. Place fish in a heavy frying pan which contains about 1/8 inch fat, hot but not smoking. Fry at a moderate heat. When fish is brown on one side, turn carefully and brown other side. Cooking time about 10 minutes, depending on thickness of fish. Drain on absorbent paper. Combine vinegar, sugar, water, bouillon cubes, green pepper, and pineapple; simmer for 10 minutes. Combine soy sauce, water, and cornstarch. Add gradually to hot sauce and cook until thick, stirring constantly. Serve over fish. Serves 6.