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PART II - TECHNOLOGICAL STUDIES ON HANDLING ABOARD SHIP AND PREPARATION ASHORE, AND ACCEPTABILITY OF THE COOKED PRODUCTS

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INTRODUCTION

In conjunction with the experimental diving and beach survey work (Part 1), very preliminary studies were carried out on the handling of the abalone aboard ship, methods of preparation ashore, and general acceptability of the cooked products. These data are necessary to provide information on the practicability of abalone fishing operations and marketing.

HANDLING ABOARD SHIP

The limited diving operations and survey of the beaches (Part 1) indicated that daily deliveries of abalone from the fishing grounds to the processor were not feasible. Therefore, in order to permit utilization of any abalone resource, practical methods of handling aboard ship must be developed to insure delivery of good-quality abalone to the processor or marketing center. The conditions involved during the fishing operations and the distance of the fishing grounds from processing centers seemed to indicate that proper methods for handling abalone would involve holding and delivery in the live state.

Since the primary purpose of the abalone investigation concerned the diving operations and the survey of fishing grounds, it was not possible to fully investigate the various methods of handling live abalone. Tests were carried out, however, on holding the live abalone in burlap bags. These bags, containing the live abalone, were suspended from the sides of the boat in the sea water during the fishing operations. Whenever the boat was under way, the sacks were placed on deck and kept moist with sea water.

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One test was carried out using three bags of abalone: the first bag contained 4 pounds of live abalone; the second, 13 pounds; and the third 40 pounds. (The bags when full hold about 50 pounds of whole abalone.) Under the conditions indicated, the abalone in the bags containing 4 and 13 pounds of shellfish remained alive for 5 days but were inactive at the end of this period. This applied only to the uninjured abalone; those with a cracked or broken shell or with torn muscle died rapidly and lasted only up to 2 days. Most of the abalone in the largest bag, containing 40 pounds, were dead after 2 days except for the top layers. Those in the top layers lasted about 5 days. The lower layers of abalone apparently died of suffocation. Because of the non-rigid construction of the bags, the abalone packed into a compact mass, and only the top layers of shellfish were able to get enough sea water circulation for survival. It is possible that a rigid slatted box container would prove more feasible for holding the live abalone.

PREPARATION ASHORE

Fresh samples of the abalone collected during the diving operations were shipped alive in burlap bags by airplane to the Ketchikan Fishery Products Laboratory for preparation and cooking tests. The burlap bags and contents were held in sea water during the fishing operations and prior to loading aboard the airplane.

At the laboratory, the contents of the shells were removed by use of a stiff-bladed knife. The viscera were stripped from the muscle portion, which was then ready for trimming and cleaning. Data on sizes and component parts of the abalone are shown in table. The muscle represented about an average of 42 percent of the weight of the whole abalone. The amount of trimmed edible meat obtained was about 35 percent of the weight of the whole abalone.

Sizes and Weights of Component Parts of the Alaska Abalone

Location of Fishing Grounds	Number of Abalone	Size Range	Average Weight of Muscle	Component Parts in Percent of the Whole Abalone		
				Muscle	Viscera	Shell
		Inches	Ounces			
Kelly Cove	48	2.0-4.8	1.9	45	30	25
Lulu Island	64	2.2-5.2	1.9	39	32	29
Blanquizai Point	117	2.2-5.0	1.7	42	30	28

NOTE: SAMPLES WERE OBTAINED FROM THREE FISHING GROUNDS OFF THE WEST COAST OF PRINCE OF WALES ISLAND, ALASKA.

Samples of the whole muscles were soaked in each of several dilute solutions of (1) baking soda, (2) salt, and (3) vinegar, and in fresh water in order to find an easy method of removing the black pigment from the edges of the meats. The common practice of the homemaker in Alaska is to soak the abalone meats in fresh water. No improvement was noted over this method by the use of dilute solutions of baking soda, salt, or vinegar.

The cleaned and trimmed abalone meats were tenderized by pounding and were further dressed for the preparation of cooked dishes. Difficulty was encountered in cutting some meats into steaks because the foot of the abalone had apparently assumed the contour of the object to which it had been fastened. In California a method (Bonnot 1948) is used whereby the cleaned and trimmed muscle is allowed to relax on a smooth wet surface before the steaks are cut. It is entirely possible that this procedure might also work for the Alaska abalone.

COOKING TESTS

Cooking tests with the trimmed abalone meats showed them to be quite acceptable when prepared as chowder, fried steaks, or fritters. The laboratory taste

panel showed a slight preference for the fried steaks. In general, the meats were very tender and mild in flavor. However, the meats were small in size and presented a ragged appearance. The raggedness was caused by the pounding of the raw meats necessary to make them tender. Perhaps improved methods of pounding or tenderizing the meats would eliminate this problem.

SUMMARY

Alaska abalone were held alive up to 5 days in burlap bags containing about 13 pounds of the whole shellfish (total capacity of bag was 50 pounds) when placed in sea water while suspended over the side of the fishing vessel.

Abalone with cracked or broken shells did not remain alive longer than two days when held in burlap bags immersed in sea water.

In the preparation of the meats, soaking of the muscles in fresh water aids in removal of the black pigment. Soaking in dilute solutions of baking soda, salt or vinegar was of no advantage over soaking in water.

The average weight of the meats (whole muscle) was 1.8 ounces or about 42 percent of the weight of the whole abalone.

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PACKAGING FROZEN FISHERY PRODUCTS

The low temperatures which are required for proper storage of frozen fishery products and frozen foods in general will cause extreme desiccation or drying out unless special preventive precautions are taken. The humidity of the air in a frozen-storage room is quite low. On the other hand, the air immediately surrounding the frozen food is practically saturated with moisture. The dry air in circulating through the room will pick up any moisture that is available. Any exposed or improperly packaged food products in the room will thus lose moisture, in the form of water vapor, and will rapidly develop a dry, spongy, and discolored surface. The tissues become tough due to denaturation or irreversible changes in the protein. This condition is known as "freezer burn." The package is of prime importance in order to prevent this drying. Care is needed to package the food properly in containers which have a very low or, ideally, a zero rate of water-vapor transfer, so as to keep the moisture where it belongs--within the package.

--Fishery Leaflet 324