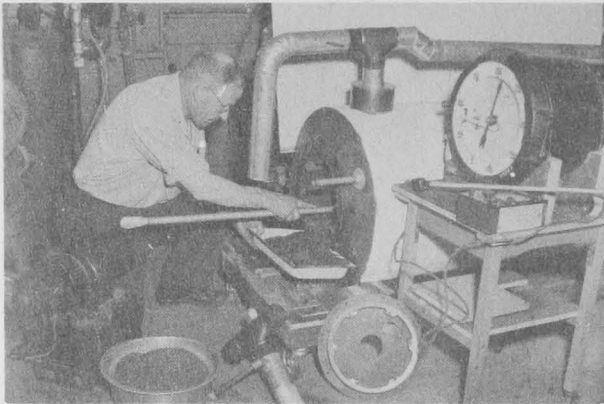




EXPERIMENTAL FISH MEAL DRYER

A small laboratory-scale direct-heat dryer has been constructed at the Service's Seattle Fishery Technological Laboratory for use in the research on the nutritive value of fish meal. It consists of (1) a rotating inner drum with parallel vanes to distribute and tumble the meal while drying; (2) a stationary drum or housing to confine and direct the hot gasses around the rotating drum; (3) a nozzle-type gas burner as a heat source; and (4) accessories--drum motor, exhaust fan, thermocouples, and air ducts. The dryer is 60 inches long and 24 inches in diameter, with the inner rotating drum 30 inches long by 12 inches in diameter. Press cake is dried within about an hour's time in batches; four to five pounds of meal are dried per batch. The temperature within the dryer can be maintained at a predetermined setting with a range in the uniformity from one point to another of about 3° F.; the temperature is



Removal of meal from the laboratory-scale direct-heat fish meal dryer.

adjusted by manual manipulation of the gas flow by means of an indexed needle valve.

In preliminary experiments, whole herring and tuna waste were dried successfully. The dryer will be used in preparing samples of meal under carefully controlled conditions for study in collaborative tests under way between Fish and Wildlife Service, the University of California, and the University of Wisconsin.



EXPERIMENTAL BULK OCEAN SHIPMENTS OF ALASKA HERRING MEAL

In recent years a serious economic problem of the Alaska herring meal and oil industry has been the high cost of handling the meal in sacks at the reduction plant and at the ultimate destination. Handling and shipping the meals in bulk has been suggested as a possible solution to the problem. This presents another problem, namely, the danger of spontaneous heating of the herring meal, which, in ocean shipment, can be serious.

During the summer of 1956, investigations were initiated at the Fish and Wildlife Service technological laboratories in Ketchikan, Alaska, and Seattle, Wash., to study the problem of bulk-handling herring meals. Plant tests, recently conducted



Brailing pursed herring destined for reduction to herring meal.

by a technologist from the Ketchikan laboratory, indicated that the addition of an oil antioxidant to the meal as it leaves the dryer was effective in reducing the temperature of herring meals stored in confined areas. Additional experimental work is necessary, however, before all the answers to these problems are known.



PROCESSING STUDIES ON MENHADEN MEAL

Bacteriological, chemical, and engineering investigations of current practices in the curing of menhaden fish scrap have indicated the possibility that the present routine "pile-turning" practices could be modified to the advantage of the processor. The studies are part of an extensive U. S. Fish and Wildlife Service research program on fish meals supported by funds made available through Public Law 466, commonly known as the Saltonstall-Kennedy Act of 1954.

These investigations constitute the second phase of the fish-meal processing studies initiated last year. An important conclusion already made, as a result of the investigation, has been to question the practice of routine "turning" of piles of scrap one or more times a day to dissipate the heat generated in the interior. Temperatures of the interior of the piles will be determined by suitable temperature-indicating devices. It is probable that there are two factors, oxidative and bacterial, responsible for the increase in temperature, and an evaluation is being made of their comparative importance. Recommendations can then be made regarding need for alterations in methods of handling.

The investigations are being conducted at the plants in the various areas where menhaden are utilized. The mobile trailer laboratory, assigned to the Service's Fishery Technological Laboratory, College Park, Md., has been suitably equipped and is being used for the bacteriological and chemical aspects of these studies.



ANTIOXIDANTS IN FISH MEALS

Continuing studies on the synergistic effect of mixtures of antioxidants in minimizing oxidative deterioration in fish meal have revealed that the effectiveness of a given antioxidant or mixture of antioxidants depends on how well it is mixed in with the meal. This research is being undertaken in the Department of Food Technology at the University of California in collaboration with the Seattle Fishery Technological Laboratory of the U. S. Fish and Wildlife Service as a part of the research program under Public Law 466, commonly referred to as the Saltonstall-Kennedy Act of 1954. The antioxidants that have been studied so far are butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT), diphenyl-paraphenylenediamine (DPPD), nordihydroguaiaretic acid (NDGA), and 1, 2-dihydro-2, 2, 4-trimethyl-6-ethoxyquinoline. Of these, the last appeared to be the most effective single antioxidant. Mixtures of the antioxidants appear to have an enhanced effect. Subsequent to the inception of these studies, the use of DPPD for this purpose has been prohibited by the Food and Drug Administration, pending further investigation of its physiological effects.

In work at the Seattle Technological Laboratory, these findings on the necessity of thorough mixing of antioxidants and meal were confirmed independently. It thus appears that the usefulness of antioxidants in reducing oxidative deterioration in commercial fish meals is quite promising, and further research should be very profitable. The choice of antioxidant or of mixtures of antioxidants is determined by the following criteria:

1. Effectiveness in inhibiting oxidation.
2. Adaptability to commercial processing conditions.
3. Cost.
4. Toxicological properties and Federal approval.



CONVERTING FISH SCALES INTO ANIMAL FOOD

Contrary to general opinion, fish scales are digestible and the U. S. Fish and Wildlife Service is seeking the best ways to make the high-protein content of this waste available for animal food.

Two research studies on utilization of fish scales are in process. One, at the Service's Fishery Technological Laboratory at College Park, Md., in cooperation with Georgetown University has already proved that dried ground pollock scales are readily digested by rats used as experimental animals. The second stage, now in progress, will involve experimentation to determine the composition of a diet designed to utilize fully the nutritive value of the scales.

The second study, being conducted at the University of Massachusetts, involves modification of the scales by chemical treatment before feeding them to rats and chickens. The work in Massachusetts is being done under a Saltonstall-Kennedy Act (1954) contract.

Experimentation was started to find a way to utilize profitably fish scales which for many years have been nothing more than a troublesome waste material.

There has been a market for certain types of fish scales for some years, but the market demand and the supply have failed to coincide in most instances. Some years ago it was learned that fish scales could be used to make foam-firefighting

material. Lack of an available supply of suitable fish scales forced the makers of firefoam to seek other material for their operations. The iridescent matter on fish scales, known as pearl essence, is also used in making jewelry and certain lustrous paint but the scales of only one or two species of fish are all that have been successfully used in this work.



SALMON WASTE AS BAIT

An interesting development in southeastern Alaska during recent years has been the growth of industries utilizing selected portions of the waste from salmon canneries as bait.

A few years ago, a West Coast bait company started collecting large quantities of chum salmon eggs for packaging and sale to sports fishing enthusiasts. This operation is still in progress. A small industry has developed this year from the collection, packaging, and freezing of pink salmon heads for use as bait in the commercial halibut fishery. The use of salmon heads as a halibut bait is not new. In the past, individual fishermen have collected fresh heads during the canning season. The present innovation, however, is the first effort to be made in this area to make frozen salmon heads available commercially on the same basis as frozen bait herring.



BREADED SHRIMP INTERIM FEDERAL SPECIFICATION

The Interim Federal Specification for "Shrimp, Breaded, Raw; Frozen," PP-S-00315, was issued July 12, 1956, by the General Services Administration (GSA). This specification was developed by the Quartermaster Food and Container Institute for the Armed Forces and the U. S. Fish and Wildlife Service, based on currently-available technical information. It has not been approved for promulgation as a Federal Specification and is subject to modification. It will be converted to a Federal Specification after further industry and Federal agency conferences. Government purchases are customarily made on the basis of specifications developed by Government-employed experts in the various fields with cooperation from industry.

The specification deals with the quality-level required, species of shrimp to be used, allowable percentages of breading, composition of breading, and packaging methods and materials for specific uses. Processors when preparing frozen raw breaded shrimp for Government purchase, whether for civilian or military use, should be governed by the requirements of this specification although its use, at this stage of development, is usually optional.

Single copies of this specification required by activities outside the Federal Government for bidding purposes are available without charge at the General Services Administration Regional Offices in Boston, New York, Atlanta, Chicago, Kansas City, Mo.; Dallas, Denver, San Francisco, Los Angeles, Seattle, and Washington, D.C.

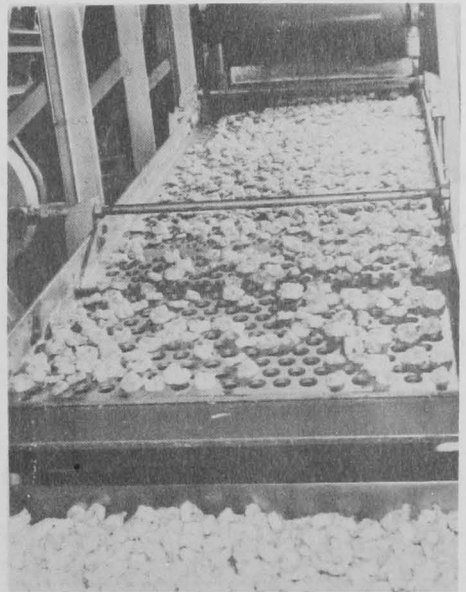


Fig. 1 - Cooked and peeled shrimp on automatic grader prior to being breaded and packaged.

