OXIDATION RESEARCH SHOWS REASONS FOR QUALITY DETERIORATION OF CERTAIN FOODS

Fundamental research on the effect of oxidation on fishery products has shown that the same basic mechanism involved in the discoloration of canned tuna is also involved in some forms of rancidity of fishery products as well as in the deterioration of some forms of fish meal. The commercial fishing industry is already testing many of its processing practices to take advantage of these recent discoveries.

Technologists of the U. S. Bureau of Commercial Fisheries believe also that the findings may have application in the meat industry and possibly in other food industries. The studies, which began in 1955, are being financed through funds made available by the Saltonstall-Kennedy Act of 1954. The work is being done at the Bureau's Fishery Technological Laboratory, Seattle, Wash.; and at the Food Technology Department and the Institute of Marine Resources, both at the University of California.

A number of significant findings have resulted from the basic research approach to the problem of oxidative deterioration. It has been proved that some forms of oxidative rancidity in the tissue of fish are accelerated by the presence of hematin. Hematin is the hydroxide form of the iron-bearing protein which comprises a portion of the respiratory protein, hemoglobin, commonly found in the red blood cells. The dark meat of fish which contains most of the hematin compound absorbs oxygen to a much greater extent than does the light meat. A series of tests amply demonstrated that the content of hematin is a major factor in determining the rate at which fish meals deteriorate.

Research conducted on the catalytic effects of hematin compounds on oxidation of fish oils has helped to clarify the process-induced problem of discoloration during the precooking of tuna. Previous to this work the chemical changes that resulted in "green" tuna were completely unknown. Preventive steps can now be taken prior to processing to inhibit its development.

Similarly, it was demonstrated that fish meals which deteriorated most rapidly were highest in their content of hematin compounds. Corrective measures now cut this rapid oxidation down to a fraction of its original rate.

PROGRESS REPORT ON FISH-MEAL RESEARCH

Approximately 265,000 tons of fish meal worth almost $35 million is produced annually in the United States and its territories. Of this amount, approximately 80 percent is used by chicken farmers in feed formulations. To be of greatest value

for this use, fish meal should,as far as is commercially feasible, be a standardized product. This standardization is difficult to achieve, however, as the tremendous variation inherent in the raw material as well as the differences in methods of manufacture are difficult to overcome.

The initial approach to the problem by the U. S. Bureau of Commercial Fisheries has been to discover those factors that adversely affect the nutritive value of the fish meal. The study was begun in 1955 when funds provided by the Saltonstall-Kennedy Act of 1954 were made available. A joint investigation of the nutritional value of fish-meal protein is being carried out by workers at the Universities of California and Delaware and in the Bureau's Branch of Technology. The objectives of this research are (1) to survey the variability of protein quality in commercially-prepared fish meals and (2) to discover the causes of these variations.

The investigation of the causes of variability in protein quality includes studies on the effects of (1) raw material, (2) storage, and (3) processing conditions. In conjunction with these studies, a chick assay was developed for the measurement of "available" amino acids.

Although final conclusions have not been reached on the relative importance of any of the factors studied, it has been found that the condition of the material used to prepare the meal can affect nutritive value. Meal made from cooked tuna waste that had subsequently been allowed to spoil did not permit growth of chicks, whereas meal prepared from cooked fish that was unspoiled or from raw fish--whether unspoiled or spoiled--permitted good growth.

An important result of these investigations has been the development of an assay to measure, in the meal, the amounts of individual amino acids that are in a form available for use by the chicks. The assay has now been found to be apparently successful for lysine, methionine, arginine, threonine, and combined methionine and cystine. The assay also shows promise for histidine, phenylalanine, tryptophane, and combined phenylalanine and tyrosine.

THIS CROAKER A THREE-TIME LOSER, BIOLOGIST FINDS

People are said to be accident-prone when they continuously suffer mishaps. But some fish are accident-prone too, says Frank J. Wojcik, biologist at the Virginia Fisheries Laboratory, Gloucester Point.

Fishing from a pier here recently, Wojcik caught a croaker bearing a Virginia Fisheries Laboratory tag. Much to his astonishment, he found that this was the same fish he had caught three weeks before at the same place.

The croaker was caught originally by Wojcik on June 27, and was tagged and released by Tony Pacheco of the Laboratory staff. Exactly one month later the fish was caught again at the same place by the same fisherman. He noted the number on the tag and released it again, never dreaming that it would take his hook once more. But bite it did, almost exactly three weeks later.

Wojcik believes that he has solved the age-old problem of the sport fisherman. By releasing the fish he catches, he ensures good fishing for himself and his friends in the future.