



# RESEARCH

## IN SERVICE LABORATORIES

March 1950

NUTRITION: Mixed diets and special diet components used by Washington State Department of Fisheries in hatchery feeding were analyzed. Approximately 20 diet components being used at the Leavenworth Hatchery were likewise analyzed.

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PRESERVATION: A new series of salmon eggs was preserved in open cans as contrasted to previous tests in which the samples were stored in hermetically-sealed tin cans. Since it was observed that oxidation was taking place, several series of tests were started using different anti-oxidants in an effort to reduce such oxidation. Some preliminary tests have indicated that n-butyl p-hydroxy benzoate gives excellent preservation of the fish eggs. However, this chemical is so expensive that it appears uneconomical to use it alone. Some tests were started during the month to see whether small concentrations of this preservative could be used in combination with other less effective chemicals to produce a mixture which would be economically feasible to use.

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REFRIGERATION: A series of pH measurements were made on strictly fresh oysters at the time of preparation for market at oyster shucking houses in Crisfield, Maryland, and Chincoteague, Virginia. Oysters from the Norfolk area (Eastern Bay) as well as from Tangier Sound were available for pH tests at Crisfield.

The average pH values of these samples, taken at the packing table, were as follows:

Sample	Selects			Standards
	Chincoteague	Norfolk	Tangier	Norfolk
Single oyster	6.50	6.80	6.70	6.80
Three oysters	6.52	6.84	6.68	6.79
Six oysters	6.53	6.83	6.70	6.79
Liquor	6.56	6.98	6.97	6.97

The average pH values for the Chincoteague oyster were slightly less than those for the oysters which have been obtained through the season at a nearby shucking house; the Norfolk and Tangier oysters are somewhat higher in pH.

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Shucked oysters were brought back from Crisfield for a new beginning on the studies on the darkening which occurs during frozen storage. As reported last month, the previous lot had a pink discoloration upon thawing and the test was

terminated. "Pink yeast" was suspected, but it seemed hardly likely that this organism would grow to such proportions under the conditions of storage and thawing followed in these tests. However, examinations definitely showed that the trouble was due to "pink yeast." In the meantime, nearly 100 more packages of oysters given various dips and treatments with ascorbic acid, citric acid, and plain water were prepared, frozen, and placed in zero storage.

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After one year in zero storage, the fish that were wrapped in vegetable parchment, dipped in water, wrapped in moisture-vaporproof material and frozen were still well coated with ice and were not desiccated or discolored. The fish prepared by the usual methods were entirely unacceptable.

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Fillet samples from the freezing-fish-at-sea project were examined after the fifth month in storage. Palatability tests revealed a preference for fillets from fish frozen in the round at sea over fillets from fish gutted and iced at sea. There is an indication, however, that the white, bleached appearance of a fillet from fish gutted and iced at sea, with which the consumer has become accustomed, is preferred to the true pinkish hue of the fresh fish evident in the fillets from fish frozen in the round. The free-drip and press-drip values have not changed materially from those values attained after the fourth month of storage. Soluble protein determinations demonstrate higher values in fillets from frozen-round fish than in fillets from iced-gutted fish, thus indicating that the freezing effect is less in the controlled double freezing of a fish right out of water than in the single freezing of a fish iced for a considerable period.

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ANALYSIS: Much more consistent results are being obtained on the vitamin B<sub>12</sub> analyses. During the month, 10 samples of products being used in the hatchery program were analyzed for vitamin B<sub>12</sub>. Further work was done on the biotin and folic acid microbiological assays, but to date no satisfactory procedure has been found.

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BYPRODUCTS: Calculations of vitamin A and oil content from the analyses of the 227 livers obtained in Bering Sea were completed. The data will be compiled and reported in the near future.

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PROCESSING: Additional examinations were made of the experimental packs of canned sockeye salmon prepared from frozen fish. Similar observations to those summarized in the January and February reports have been noted in all examinations. The significant loss in quality of the product canned from salmon frozen and stored only six weeks in a commercial cold storage suggests that the process should be used only under carefully controlled conditions if the processor wants to prepare a marketable pack. Utilizing only fresh prime fish, freezing promptly, glazing well, storing at a subzero temperature for short periods are the precautions indicated which will minimize the loss in quality when the salmon is canned.

The packs prepared after both the 6- and 16-week-frozen-storage periods showed a marked decrease in the free oil, which may be the most important quality loss from the marketing viewpoint. The loss of color, the increased amount of curd and discoloration in the flesh, and the off-flavor present in the fatty tissue were the quality factors in the experimental packs of greater importance from a consumer's viewpoint. The increased toughening of the fish did not seem to be of great importance in itself, although it is probably related to the decreased liquid and oil yield. These alterations in the canned product were present to the greatest extent in the pack prepared from fish frozen and stored unglazed for the longest period (16 weeks) in a commercial cold storage.

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### TECHNICAL NOTE NO. 3 - FISH MEAL IN ANIMAL AND POULTRY FEEDING

At the 117th meeting of the American Chemical Society in Philadelphia on April 10-14, 1950, one investigator indicated that vegetable protein can be substituted for animal protein in the poultry diet. He reported that good results for growing and starting chicks were obtained using all vegetable rations, supplemented with certain minerals and Animal-Protein-Factor concentrates; and that fish meal or other animal proteins were not necessary. This new ration was less costly than those normally used.

Other studies on animal and poultry nutrition indicated that aureomycin, streptomycin, and possibly other antibiotics possess a stimulating effect over and above that shown by vitamin B<sub>12</sub>. Nothing has been presented, however, that indicates fish meal and fish solubles contain anything less than has been reported before. They are still very good sources of animal protein, necessary minerals, and some vitamins. Their use is still recommended in practical rations for poultry and swine. The substitutions which have been recently recommended have been mostly in the ration of growing stock, and are based on economic considerations.

The symposium on vitamin B<sub>12</sub> indicated that apparently there still remains some difference of opinion regarding the relationship between B<sub>12</sub> and the Animal Protein Factor. Some investigators claim that vitamin B<sub>12</sub> and the APF are one and the same thing; others pointed out that APF is multiple in value; and still others maintained that though APF is multiple in value, vitamin B<sub>12</sub> is the most important member of the complex.

