The Food Values of New Zealand Fish.

Part 7: The Vitamin Content of the Tarakihi.

(Chilodactylus macropterus.)

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IN popular language it may be said that in those cases where it has been found to be rich in vitamin-A, fish, as an article of diet, combines the properties of both meat and butter, and since this vitamin is always associated with the fat, the more fatty kinds of fish are likely to be the more valuable in this respect. For this reason the tarakihi *(Chilodactylus macropterus)* was chosen as the subject of these experiments, for previous work in this Department has shown that it may contain from 3% to 10% of fat. The samples used in this work averaged 5% to 7%.

In Paper 6 of this series some preliminary experiments on tarakihi were reported, in which it was shown that the dried flesh and the ether-extracted fat did not give any striking effects—probably due to some loss of the vitamin from oxidation during drying. In this set of experiments it was decided to repeat the use of dried fish, and to compare the result with that of fish preserved by refrigeration.

METHODS.*

Two quantities, each of about a dozen tarakihi, were lightly boiled, and the flesh, separated from the bones, skin, fins, etc., was thoroughly mixed. A certain amount was then weighed out into packets of 100 grm. each, and placed in cold storage till required, while the remainder was dried in the sun and ground to a powder.

The experiments were conducted so as to show what amount of the fish, dried or frozen, was necessary for the growth or maintenance of rats, and, since fish is commonly used as a substitute for meat, eggs, or other protein-rich material, the following plan was adopted for recording the results. The dietetic mixture used for vitamin work on rats usually consists of 20% protein (casein) plus starch, fat, salts, and vitamin B. A similar mixture was made with fish instead of casein. This would correspond to the case of a person living solely on fish as the source of protein, and these experiments are referred to as "20% frozen" or "20% dried" fish diet. In other cases, 15%

*Since the technical details of vitamin experiments are not of great interest to the majority of the readers of the *Transactions*, only a brief account of the method is given and the weight curves have been omitted.

of the protein was supplied by fish and the remainder, 5%, by casein; these are referred to similarly as "15% frozen" or "15% dried," and in still others, 10% fish plus 10% casein, and 5% fish plus 15% casein. The last mentioned would be equivalent to a person obtaining about one-fourth of his daily protein in the form of fish, and would probably correspond to an ordinary breakfast helping.

Results.

"20% frozen" fish diet, made in the way described, produced, in two rats, growth and development that could not be distinguished from normal. When the usual vitamin-A-free diet was substituted for the fish diet, growth ceased, and the animals declined somewhat in weight. When the fish diet was again given, growth was resumed.

On "15% frozen" fish diet, two rats, and on "10% frozen," four rats, grew rapidly, and promptly began to lose weight when the basal diet was substituted. On "5% frozen," four rats grew fairly well up to a certain stage (about 100 grm. weight) then began to decline; "10%" was then given and the weights remained steady, and on "15%" they showed resumption of growth.

The results indicate that tarakihi parboiled, and then frozen, contains a quite appreciable quantity of vitamin-A. Even a breakfast ration of tarakihi would probably yield enough vitamin-A for an adult, apart from other sources of this vitamin in the diet, such as butter, egg, or green vegetables.

"20% dried" and "15% dried" fish diets also showed fairly good growth. "10%" gave only a bare maintenance of weight without growth. While these results with dried fish were distinctly poorer than those with frozen, it was clear that the vitamin had not been altogether destroyed. It is likely that the method of drying in the sun is better than that of drying in a hot-air oven commonly used for analytical work.

The writer is of opinion that tarakihi would be a very suitable fish for canning. It has a distinctive, but not too marked flavour, is rich in fat and vitamin, and, as indicated above, the vitamin is not readily destroyed.

In experiments carried on at the same time, evidence was obtained that the vitamin-A content was little, if at all, affected by tryptic digestion.

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