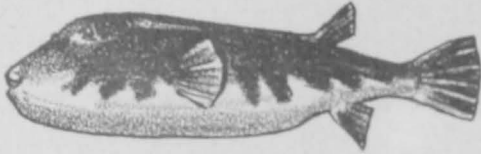


NUTRITIVE VALUE OF THE PROTEIN OF SWELLFISH

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Inquiries have been received from time to time concerning the utilization of swellfish (*Spheriodes maculatus*). This fish, also called puffer, blowfish, and "chicken of the sea," is caught principally in Long Island Sound, off New York. Despite an unusual appearance, this species has gained increasing importance as a food fish. In 1945, there were 270,000 pounds of swellfish sold in the Fulton Fish Market in New York City. This was the major part of the United States production. Only 2,000 pounds were marketed in New York in 1939.



The swellfish is dressed to furnish a very fleshy tail piece, containing only a rather large, and easily separated, backbone. The flesh is very white and attractive in appearance. The flavor of the cooked flesh is bland but tasty.

EXPERIMENTAL DATA: The reported experiments are concerned with determining the comparative nutritive value of the protein of the edible portion of swellfish. The fish used were shipped in the round in ice from New York to the laboratory at College Park, Md. The dressed fish were simmered for ten minutes, after which the flesh was removed from the bones, flaked, and compressed into blocks, which were tightly wrapped in cellophane to prevent dehydration. The blocks were frozen until needed for experimental feeding.

Fresh beef purchased at a local market was freed from most of the external fat, baked at 325° F., to an inside temperature of 165° F. The meat was stripped from the bones, ground, and then handled in the same manner as the fish.

Table 1 - Analysis of Cooked Samples

Product	PERCENT BY WEIGHT			
	Dry Matter	Protein N X 6.25	Ether Extract	Mineral Matter
Swellfish	25.8	23.20	0.73	0.96
Beef	40.1	31.03	8.50	1.21

The nutritive value of the protein was determined by feeding limited amounts of swellfish and beef daily to two groups of growing rats. The basal diet was so constituted that the quality of the test proteins should be the chief factor causing any difference in growth rate. The rats were allotted to the experiment at an initial live weight ranging from 49 to 55 grams. All were housed individually in wire cages over wire screen floors. Ten rats were fed swellfish, and five were fed beef. One rat fed beef died of pneumonia after six weeks. The data were not included in the summary.

Each day, the animals were fed weighed portions of the cooked samples, calculated to give equal amounts of protein based on the data presented in Table 1. During the first two weeks, each rat received 0.54 grams of protein daily. This was increased to 0.86 grams of protein for the next three weeks, and 1.17 grams

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for the remaining three weeks. The rats received approximately 50 grams of protein during the 8-week period.

Water and a basal diet were available to the rats at all times. The basal diet included all of the necessary food elements, except protein, needed by the rats for normal growth. It consisted of cornstarch, 80; lard, 10; cod liver oil, 2; wheat germ, 2; dried brewer's yeast, 1.5; Wilson's powdered liver concentrate, 0.5; and U.S.P. XI, No. 2 salt mixture, 4 parts by weight. The supplementary protein content of the basal diet, amounting to 1.6 percent, was taken into consideration in subsequent calculations involving food intake.

Some difficulty was encountered in feeding the daily portions of swellfish and beef. The rats had a tendency to scatter the food. Food not eaten was weighed daily, and extra feedings weekly covered the loss of food due to scattering.

Table 2 - Average Gain in Weight, and Protein Intake for an Eight-week Period

Product	Number of rats	Gain in Weight		Average Food intake*	Average Protein intake
		Average	Co-efficient of variation		
		Grams	Percent		
Swellfish	10	120.40	26.33	445.6	55.99
Beef	4	115.25	9.90	406.0	55.32

*Weight of basal diet plus weight of swellfish or beef, calculated on basis of dry matter plus 15 percent moisture.

The data in Table 2 shows that the rats receiving the diet containing swellfish gained an average of 120 grams during the 6-week period as compared with 115 grams for those fed beef. This small difference would be further reduced if the gains were adjusted to equal food intake.

It has been found in previous experiments that protein is the limiting factor in promoting growth of rats if included in a level less than 15 percent of an otherwise adequate diet. In this case, the protein content of the air-dry equivalent diet containing swellfish was 12.6 percent, and of the diet containing beef was 13.6 percent. The difference in average gain between the two groups was not statistically significant, although they received almost identical amounts of protein. The data, therefore, indicate that the two proteins are about equal in quality.

During the eighth week, the feces were collected from certain of the animals, and analyzed for nitrogen. It was found that the apparent digestibility coefficient of the protein in the diet containing swellfish was 91.8 percent, and of that containing beef was 91.2 percent. This means that the proteins of both swellfish and beef are highly digestible.

