

POSSIBILITIES OF FOOD FROM FISH.^a

The fisheries of the United States produce annually about 1,500,000,000 pounds of food fish, including shellfish, in a fresh condition. Alaska has a yearly output of about 250,000,000 pounds of fish canned, salted, and otherwise preserved. Reducing the latter to the fresh-weight basis, the total yield of the American fisheries can be stated as reasonably close to 2,000,000,000 pounds each year. The total output of the hatcheries of the United States Bureau of Fisheries in eggs, fry, and other small fish is about four and a half billions annually.

Some of the fishes have been sought too eagerly and in consequence are declining in numbers; others have held their own; while in some cases there are possibilities of an increased production without impairing the fishery. In the last class belong the carp, kingfish, grouper, silver hake or whiting, Pacific shad, Pacific herring, and croakers.

The most promising outlook for an increase in the food supply by the fisheries is in fishes hitherto unused and those that have just been brought to public attention. Some of these are sharks, bowfin, toadfish, squids, goosefish, skates, grayfish, sablefish, burbot, lamprey eels, and menhaden.

It should be borne in mind, however, that fishes are wild animals and part of a vast but balanced system of animals that are preyed upon, those that prey upon them, and those that convert useless plant life into available meat, and that it would be shortsighted to take all fish without due regard to the part each plays in the economy of nature. It is therefore necessary that precautions be taken against working permanent injury to the fishery resources. Care should be exercised that laws for the protection of the fisheries should not be unduly relaxed. The conservation of the supply for the future is no less important than its increase in the present.

A great deal of waste results from improper or careless methods of catching, cleaning, and salting fish which are employed at present by too large a number of fishermen. Many whole fishes and great quantities of the edible portion of fish are lost to the food supply of the country through wasteful practices in catching and curing. The Bureau of Fisheries has begun an energetic campaign among catchers and packers of food fishes to induce them to avoid waste and conserve all fish caught.

Moreover there are certain wastes in the fish trades that can be turned profitably into the food markets if prejudice can be overcome. While the roes of many kinds of fish are utilized the milts have been invariably thrown away or disposed of to the fertilizer factories. The milts are a wholesome and nutritious food; and with a little recommendation should find willing buyers. Much more extensive economics can be practiced with the roes also.

^a By H. F. Taylor, scientific assistant, Bureau of Fisheries.

TX 385
T 33

In introducing to the public new fishes, such as those mentioned above, not the least obstacle is the prejudice of people against a suggestive name, or an unattractively appearing fish. As a matter of fact, almost every fish taken from pure water is fit to eat, in the sense that it furnishes food and is not injurious to health. Some have a coarse or tough texture, or are without distinctive taste, but such defects can usually be remedied by proper cooking. Sharks, for instance, furnish an abundance of meat, wholesome and of good flavor. The food of the shark is less questionable than that of pigs and chickens. There is nothing against it except the fact that it is a shark. Smoked shark recently received and examined by this Bureau was of both attractive appearance and agreeable taste. A fish like the common toadfish or the goosefish, of unattractive appearance, is discriminated against, while the appearance of the flounder is considered no obstacle to the extensive utilization of its excellent flesh. The difference is, of course, in custom. This psychological factor must be recognized and overcome by emphasizing the unwisdom and waste and ill-founded dislike. People must be persuaded to eat a fish if it is wholesome, and to disregard unpleasant names.

The people of the United States, especially in the inland States, do not eat much fish. In the case of fresh fish, there is possibly a good reason. Yet, locally caught, and even locally propagated, fishes from lakes, streams, and millponds may add considerably to the supply of fresh fish at a low price. Canned and pickled fish are always available, are wholesome and of a comparatively low price. Salt fish are particularly recommended for people in the inland States. The scarcity of tin plate prevents unlimited increase in the output of the canneries, and this fact, together with the probable necessity of shipping much of the canned output to Europe, makes it advisable for inland people to use salt fish. This Bureau is assembling a number of recipes for preparing salt fish for the table, thereby helping to make available a palatable and wholesome food.

In addition to the natural sources of fish—the ocean, lakes, and streams—there are great possibilities for pond culture of fish in the United States. Ponds already in existence and ponds made for the purpose can be stocked with rapid-growing fish that can be managed with little trouble. Such ponds would add a great amount of meat to the food supply.

The one-day-a-week nature of the fish business is one of the most serious deterrents to an increased consumption of fish. The fisherman's business is largely governed by wind and tide—conditions beyond his control. He must catch fish whenever he can, but hold them against the risk of spoiling and by expensive icing until the one-fish day of the week. The consumer must buy when everybody else is buying and the dealer must obtain from one day's sales a profit to cover six days' expenses. Cheaper and better fish will be obtainable if the dealer and consumer will cooperate to make every day a fish day.

Fish are often looked upon as not being meat. There is no characteristic difference between fish flesh and the flesh of any other animal. The bulk of it is protein and water. Pound for pound there is nearly, if not quite, as much protein in fish meat as in beefsteak. Fish could be substituted for all other kinds of meat every day in the year without ill effects. Oily fish, like shad, herring, and eels, especially nutritious, affording a large quantity of fat for fuel

as well as the tissue-building proteins. Fish roe generally contains more protein than beef, and some fat in addition. Fish meat is quite as easily digested (i. e., as large a proportion in as short a time) as other forms of meat. It has been recommended as being a highly suitable form of protein for sedentary workers. It will be observed in the figures given below that when fish compare unfavorably with other meats, the difference is chiefly in fat. Fat has twice the fuel value of protein, and shows up heavily in the fuel-value column, but protein is the only tissue-building material. It has no substitute and is the high-priced element of food, while fats may be replaced by other diets, such as vegetables, with their sugars and starches. Fuel energy is the only element in food values that can be expressed in figures, but it would be a serious mistake to make this the sole standard of comparison without considering the quite essential tissue-building function of proteins, the value of which can not at present be expressed in figures.

The following tabulated analyses show comparisons of fish with other common meats:

ANALYSIS AND FOOD VALUE OF FISH AND OTHER MEATS, EDIBLE PART, DRESSED.

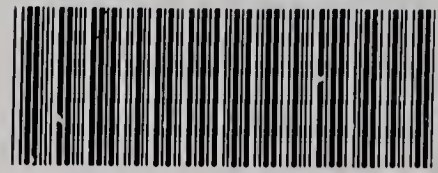
Kind.	Water.	Dry flesh.	Protein.	Fat.	Ash.	Total nutrients.	Fuel value per pound.
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Calories.</i>
Sirloin steak.....	60.00	40.00	20.00	19.00	1.00	39.00	1,175
Salmon, fresh.....	63.60	36.40	21.60	13.40	1.40	35.00	965
Beef, round.....	66.70	33.30	23.00	9.00	1.30	32.00	805
Shad.....	70.62	29.28	18.55	9.48	1.25	28.03	745
Mackerel.....	64.01	28.38	18.77	8.21	1.40	26.98	695
Eel.....	64.51	35.49	15.82	18.74	.93	34.56	1,085
Butterfish.....	69.84	30.16	17.99	11.03	1.14	29.02	795
Striped bass.....	77.47	22.53	18.54	2.83	1.16	21.37	460
Flounder.....	84.21	15.79	13.82	.69	1.28	14.51	285
Halibut.....	75.42	24.58	18.35	5.18	1.05	23.53	560
Mutton, leg.....	61.80	38.20	18.30	19.00	.90	37.30	1,140
Chicken.....	71.30	28.70	24.30	2.60	1.40	26.90	540
Herring roe.....	76.88	23.12	17.53	2.41	2.18	19.94	425
Shad roe.....	71.29	28.71	23.40	3.78	1.53	27.18	533
Carp.....	78.43	21.57	19.07	1.26	1.24	20.33	405

ANALYSIS OF FISH AND OTHER MEATS, UNDRESSED, AS PURCHASED.

Kind.	Edible part.	Water.	Dry flesh.	Protein.	Fat.	Ash.	Total nutrients.	Fuel value per pound.
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Calories.</i>
Beef, round.....	90.00	60.00	30.00	20.62	8.11	1.20	28.80	725
Beef, sirloin.....	75.00	45.00	30.00	15.00	14.25	.75	29.25	885
Mutton, leg.....	81.60	50.82	31.42	15.07	15.50	.78	30.50	938
Salmon.....	64.70	40.60	24.10	14.30	8.80	1.00	23.10	635
Eel.....	64.00	41.60	22.70	10.14	12.00	.55	22.14	684
Mackerel.....	55.40	40.40	15.00	10.00	4.30	.70	14.30	365
Carp.....	50.00	39.22	10.78	9.53	.63	.62	10.16	202
Halibut.....	82.30	61.90	20.40	15.10	4.40	.90	19.50	465
Chicken.....	58.40	41.60	17.20	14.20	1.20	.80	15.40	315

The analyses given are only representative. The food value of fish is variable from month to month, the variations being largely due to fluctuations in content of fat, especially in the fat species, like eels, shad, and salmon.

Fish meat compares favorably with other meats in digestibility. Experiments recently carried out in the States Relations Service,



Department of Agriculture,^a show that, when eaten as a part of a mixed ration, the four fishes, mackerel, butterfish, grayfish (canned), and salmon (canned) are digested with equal completeness. These fishes were the subject of 18 experiments on digestibility in 6 men; 92.5 per cent of the protein and 92.6 per cent of the fat was digested. From numerous other investigators we have ample evidence that fish meat is as easily digested as are other meats, as wholesome, and quite as able to supply the flesh-building proteins of the body.

In substituting fish for other kinds of meat, attention should, of course, be paid to proper methods of cooking to make the fish as agreeable as possible. Some fish owe their present disrepute largely to the fact that they were seldom or never properly cooked—as, for example, the carp, which is both abundant and, when properly cooked, palatable. Information of the cooking of some of these fishes has been published by the Bureau of Fisheries; other information on this subject may be obtained from the Bureau of Home Economics, Department of Agriculture, and from the domestic science departments of State universities and agricultural colleges.

There are other sound reasons for looking to the fisheries for increased production of nitrogenous food in this time of national emergency. Nearly all land animals which furnish meat depend upon agricultural products for their food. A great part of the vegetation now devoured by cattle might be used for human consumption; cattle and poultry, for the most part, merely convert one available form of food into another. On the other hand, fishes consume directly or indirectly animal and vegetable forms which in their natural state are unavailable and useless as food for man, such as the aquatic plants which derive their nutrients and mineral fertilizers from the waters. The materials thus assembled are converted directly or indirectly by the fishes into food available for mankind. It is therefore obvious that the adoption of a fish diet by a larger number of people will shift a part of the burden from land vegetation to aquatic vegetation. And this is the more to be desired since land animals have to consume proportionately a greater amount of food than fishes. Land animals, which are warm blooded, expend a large part of their nutrition in maintaining a constant temperature above that of their surroundings, with consequent radiation of large quantities of heat, whereas fishes, which are cold-blooded and actually receive heat from their surroundings, use all their food in the necessary activities and body growth.

One should not expect to buy at a low price a fish that is caught only at distant places. The burbot should not be looked for in the markets in Alabama, nor the tilefish on the Pacific coast. The sablefish, cheap on the Pacific, may be expensive in the Atlantic States. Canned, salted, and dried fish, however, may be had anywhere at nearly uniform prices. With alertness and some study of the market, one should be able to provide oneself with enough fish to supply all demand for meats and at prices far from prohibitive.

In summary, the fisheries of the United States offer large possibilities for increased food production if people can be induced to eat more fish, especially the kinds that have hitherto not been on the market.

^a By Dr. A. D. Holmes, from a forthcoming paper from the Bureau of Home Economics, Department of Agriculture.