

107.—TABLES ILLUSTRATIVE OF THE NUTRITIVE VALUE OF FISH.

By Prof. W. O. ATWATER.

[Samples of fish, whole or dressed, and of oysters &c., including or freed from the shell, as ordinarily sold in the New York and Middletown, Conn., markets, were found to contain: 1. Refuse: Bone, shells, and other inedible matters. 2. Edible portion: Water and nutritive substances. 3. Ingredients of nutritive substance (nutrients): Protein, fats, carbo-hydrates, &c., ("non-nitrogenous extractive matters"), and mineral matters—in parts in 100 by weight, as below (nutrients + water + refuse=100).]

TABLE I.—Percentages of refuse, water, and nutritive ingredients in specimens of food-fishes and invertebrates as found in the markets.

Kinds of food-fishes and invertebrates and portions taken for analysis.	Salt.	Refuse bones, skin, shells, &c.	EDIBLE PORTION.					
			Water.	Nutrients.	Nutrients.			
					Protein.	Fats.	Carbo-hydrates, &c.	Mineral matters.
FRESH FISH.								
Alewife, whole.....	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>
Black bass, whole.....		49.4	36.8	13.8	10.0	3.0		0.8
Bluefish, entrails removed.....		54.9	34.5	10.6	9.3	0.8		0.5
Cod, head and entrails removed.....		48.6	40.2	11.2	9.9	0.6		0.7
Eel, skin, head, and entrails removed.....		30.0	57.4	12.6	11.5	0.3		0.8
Lamprey eel, whole.....		20.2	57.0	22.8	14.8	7.2		0.8
Flounder, whole.....		45.8	38.5	15.7	8.1	7.2		0.4
Haddock, entrails removed.....		60.8	27.9	5.3	4.7	0.2		0.4
Halibut, sections of body.....		52.5	39.4	8.1	7.3	0.3		0.5
Herring, whole.....		18.7	62.4	18.9	16.0	2.2		0.7
Mackerel.....		46.0	37.0	17.0	10.3	5.9		0.8
Rather lean, whole.....		50.4	37.0	12.3	9.6	2.1		0.6
Fat, whole.....		33.8	42.0	24.2	12.5	10.7		1.0
Average, whole.....		44.6	40.3	15.1	10.2	4.2		0.7
Yellow perch, whole.....		62.7	29.6	7.7	7.0	0.3		0.4
Pike perch, whole.....		57.3	34.0	8.7	7.9	0.2		0.6
Pickarel (pike), whole.....		42.7	45.7	11.6	10.7	0.3		0.6
Salmon.....								
In season, fat, whole.....		38.5	38.7	22.8	14.1	7.9		0.8
"Spent," lean, whole.....		43.7	43.3	13.0	10.4	2.0		0.6
Shad, whole.....		50.1	35.1	14.8	9.4	4.8		0.6
Smelt, whole.....		41.9	45.9	12.2	10.2	1.0		1.0
Brook trout, whole.....		48.1	40.2	11.7	10.0	1.1		0.6
Salmon trout, entrails removed.....		35.2	44.9	19.0	12.5	6.6		0.8
Whitefish.....		53.5	32.2	14.3	10.6	3.0		0.7
PREPARED FISH.								
Dried cod, boned and dried.....	2.9	0.0	14.7	82.4	75.4	1.9		5.1
Salt cod, salted and dried.....	15.3	24.9	38.8	21.0	18.4	0.3		2.3
Salt mackerel, "No. 1 mackerel" salted.....	8.2	22.9	32.8	36.1	16.4	17.6		2.1
Smoked haddock, salted, smoked, and dried.....	1.5	33.2	48.6	16.7	15.6	0.1		1.0
Smoked herring, salted, smoked, and dried.....	0.5	44.4	19.1	30.0	20.4	8.8		0.8
Canned salmon, California (Oregon).....	1.0	3.9	50.2	35.9	19.3	15.3		1.3
Canned fresh mackerel.....	1.9	0.0	68.4	29.7	19.7	8.7		1.3
Canned salt mackerel, "No. 2 mackerel" salted.....	8.8	10.7	34.0	37.1	13.8	21.3		2.0
INVERTEBRATES, SHELL-FISH, ETC.								
Oysters.....								
In shell (inferior) ¹		88.8	10.2	1.0	0.5	0.1	0.2	0.2
In shell, best ¹		81.4	15.2	3.4	1.5	0.2	1.3	0.4
In shell, average ¹		82.3	15.4	2.3	1.0	0.2	0.6	0.5
Solids, ² edible portion average.....		0.0	67.2	12.8	6.2	1.5	4.1	1.0
Long clams, in shell average.....		43.8	48.3	7.9	4.3	0.5	1.3	1.8
Round clams, in shell.....		68.3	27.3	4.4	2.1	0.1	1.3	0.9
Mussels, in shell.....		49.3	42.7	8.0	3.9	0.5	2.1	1.5
Scallops, edible portion (muscle).....		0.0	80.3	19.7	14.7	0.2	3.4	1.4
Lobsters, in shell.....		60.2	33.0	6.8	5.4	0.5	0.2	0.7
Crabs, in shell.....		55.8	34.1	10.1	7.3	0.9	0.5	1.4
Crayfish, in shell.....		87.7	10.0	2.3	1.9	0.1	0.1	0.2
Canned oysters.....		0.0	85.4	14.0	6.4	1.6	5.1	1.5
Canned lobsters.....		0.0	77.7	22.3	18.1	1.1	0.6	2.5

¹In respect to quantity of nutrients.²Including solid and most of liquid shell contents as commonly sold.

Explanations.—Latin names and results of a larger number of analyses from which the above were selected, may be found in accompanying sheets.

TABLE II.—Percentages of water and nutritive ingredients in flesh, edible portion (freed from bone, shells, and other refuse matters) of food-fishes, and invertebrates.

[Specimens of flesh of fish and of edible portion (flesh and liquids) of oysters, etc., were found to contain water and nutritive substances, as below. The figures represent parts in 100 by weight. Protein + fats + carbo-hydrates, etc., + mineral matters = nutrients. Nutrients + water = 100.]

Kinds of food-fishes and invertebrates.	Salt.	Water.	Nutrients.	Nutrients.			
				Protein.	Fats.	Carbo-hydrates, etc.	Mineral matters.
FRESH FISH.							
	<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>
Alewife		72.8	27.2	19.7	6.0		1.5
Black bass		76.6	23.4	20.5	1.7		1.2
Bluefish		78.2	21.8	19.3	1.2		1.3
Cod		82.0	18.0	10.4	0.4		1.2
Cel.		71.4	28.6	18.5	9.1		1.0
Lamprey cel.		71.1	28.9	15.0	13.3		0.6
Flounder		84.0	16.0	14.0	0.7		1.3
Haddock		81.4	18.6	17.1	0.3		1.2
Halibut		75.2	24.8	18.5	5.2		1.1
Herring		68.6	31.4	19.0	10.9		1.5
Mackerel:							
Rather lean		75.1	24.9	19.4	4.2		1.3
Fat		63.4	36.6	18.9	16.2		1.5
Average		73.1	26.9	18.6	7.0		1.8
Yellow perch		79.2	20.8	18.8	0.8		1.2
Pike perch		79.6	20.4	18.5	0.5		1.4
Pickrel (pike)		79.7	20.3	18.7	0.6		1.0
Salmon:							
In season, fat.		62.9	37.1	22.9	12.9		1.3
"Spent," lean		76.9	23.1	18.4	3.6		1.1
Shad		70.4	29.6	18.8	9.5		1.8
Smelt		79.0	21.0	17.5	1.8		1.7
Brook trout		77.5	22.5	19.2	2.1		1.2
Salmon trout		68.9	31.1	18.5	11.4		1.2
Whitefish		69.2	30.8	22.7	6.5		1.6
PREPARED FISH.							
Dried cod, boned and dried artificially	3.0	14.7	82.3	75.4	1.8		5.1
Salt cod, salted and dried ..	20.6	51.6	27.8	24.4	0.3		3.1
Salt mackerel, "No. 1 mackerel," salted	10.6	42.6	46.8	21.3	22.8		2.7
Smoked haddock, salted, smoked, and dried	2.0	72.9	25.1	23.4	0.2		1.5
Smoked herring, salted, smoked, and dried	11.6	34.4	54.0	36.8	15.7		1.5
Canned salmon, California (Oregon)	1.0	61.8	37.2	20.2	15.7		1.5
Canned fresh mackerel	1.9	68.4	29.7	19.7	8.7		1.3
Canned salt mackerel, "No. 2 mackerel," salted	10.4	43.4	46.2	17.3	26.4		2.5
INVERTEBRATES, SHELL-FISH, &c.							
Oysters, shell contents, inferior ¹		91.4	8.6	4.5	0.6	1.9	1.6
Shell contents, best ¹		80.8	19.2	8.2	1.7	7.3	2.0
Shell contents, average ¹ solids, ² edible portion, average		87.3	12.7	5.7	0.9	8.2	2.9
.....		87.2	12.8	6.2	1.5	4.1	1.0
Long clams, shell contents, average		85.9	14.1	7.6	0.9	2.3	3.3
Round clams, shell contents ..		86.2	13.8	6.5	0.4	4.2	2.7
Mussels, shell contents		54.2	15.8	7.7	0.9	4.2	3.0
Scallops, edible portion (muscle)		80.3	19.7	14.7	0.2	3.4	1.4
Lobsters, edible portion		81.8	18.2	14.5	1.4	0.6	1.7
Crabs, edible portion		77.1	22.9	16.6	2.0	1.2	3.1
Crayfish, edible portion		81.2	18.8	16.0	0.5	1.0	1.3
Canned oysters		85.4	14.6	6.4	1.6	5.1	1.5
Canned lobsters		77.7	22.3	18.1	1.1	0.6	2.5

¹In respect to quantity of nutrients.

²Shell contents as commonly sold, including whole of "solid," and most of liquid portion.

Explanations of technical terms, Latin names, and results of a larger number of analyses from which the above were selected, may be found in accompanying sheets.

TABLE III.—Comparative expensiveness of actual nutrients of foods, illustrated by costs of protein.

[The costs of the nutrients (actual nutritive ingredients) in a given food material may be computed by comparing the amounts of the several nutrients, protein, fats, and carbo-hydrates, it contains, with its market price, one pound of protein being assumed to cost, on the average, five times as much, and a pound of fats, three times as much, as a pound of carbo-hydrates. The computed costs of the same nutrient, *e. g.*, protein, in different foods, thus affords a basis for comparing the relative expensiveness of the foods, as in the figures below.]

Meats, vegetables, etc.	Prices per pound.	Cost of protein per pound.	Fish, etc.	Prices per pound.	Cost of protein per pound.
Beef:			Salmon:		
Sirloin, medium fatness.....	\$0 25	\$1 08	Early, in season	\$1 00	\$5 72
Same, at lower price.....	20	86	Same, when plenty.....	30	1 72
Round, rather lean.....	18	70	Shad.....	12	98
Same, lower.....	16	62	Shad, when abundant.....	8	65
Corned, lean.....	18	56	Bluefish.....	10	98
Flank, ¹ very fat.....	15	36	Haddock.....	7	94
Mutton:			Halibut.....	15	87
Leg.....	22	1 07	Mackerel.....	10	80
Side, medium fatness.....	20	50	Mackerel, when abundant.....	5	40
Pork: ¹			Cod.....	8	67
Very fat.....	16	30	Cod, at lower price.....	6	50
Smoked ham.....	18	48	Alewife.....	3	19
Milk, 8 cents per quart.....	4	61	Canned salmon.....	20	70
Cheese:			Salt mackerel.....	12 5	46
Whole milk.....	18	38	Salt cod.....	7	38
Skimmed milk.....	8	19	Salt cod, lower.....	6	33
Wheat flour, best.....	5	19	Oysters, ² 25 cents per quart.....	12 5	1 56
Corn (maize) meal.....	3	12	Oysters, ² 50 cents per quart.....	25	3 12
Oatmeal.....	5	15	Lobsters.....	12	2 00
Beans.....	5	14			
Potatoes, ¹ 50 cents per bushel.....	0 8	14			
Potatoes, ¹ \$1 per bushel.....	1 7	28			

¹ Contains very little protein.

² Shell contents, edible portion.

108.—HOW TO AVOID A SOFT OR MUDDY TASTE OF CARP.

By E. Z. BUTCHER.

[From a letter to Prof. S. F. Baird.]

We catch large buffalo-fish sometimes in summer, in hot weather, out of ponds with muddy bottoms. To prevent the muddy taste that some complain of in carp, I find this the best way: Kill the fish as soon as caught, clean directly, soak in ice water a few minutes, then sprinkle with salt slightly, and hang up to dry. The above will make them *firm, sweet, and good*. I know whereof I speak, as I have bought, dressed, and sold fish for ten years; and those who complain of carp, if dressed and served as above, would not know them as the same fish.

SOLOMON CITY, KANS., *March 7, 1884.*