

THIAMINE ASSAYS OF FISHERY PRODUCTS ✓

By Philip M. Sautier*

In the data available on the nutritional values of foods there is a lack of information on the quantities of thiamine (vitamin B₁) in fishery products. The results of the few assays that have been published, however, indicate that some fishery products do contain significant amounts of thiamine.

Table 1 - The Thiamine Content of the Edible Flesh of Fishery Products of Southeastern Alaska

Common Name	Scientific Name	Number of Assays	Thiamine content micrograms per 100 grams	
			Range	Average
Clams--butter	<i>Saxidomus giganteus</i>	2	138-140	139
cockle	<i>Cardium corbis</i>	2	68-69	69
horse	<i>Schizothaerus nuttalli</i>	2	127-129	128
little neck	<i>Paphia staminea</i>	2	73-77	75
mud	<i>Mya arenaria</i>	2	78-80	79
Cod--grey	<i>Gadus macrocephalus</i>	2	90-94	92
ling	<i>Ophiodon elongatus</i>	2	36-62	49
kelp (Alaska greenling)	<i>Hexagrammos octogrammus</i>	2	100-110	105
Crab--dungeness	<i>Cancer magister</i>	2	170-182	176
Eulachon	<i>Thaleichthys pacificus</i>	2	30-40	35
Flounder--arrow-tooth halibut	<i>Atheresthes stomias</i>	1		60
Dover sole	<i>Microstomus pacificus</i>	1		59
English sole	<i>Parophrys vetulus</i>	2	60-64	62
flathead sole	<i>Hippoglossoides classodon</i>	2	40-42	41
petrale sole	<i>Eopsetta jordani</i>	1		68
rex sole	<i>Errex zachirus</i>	1		38
rock sole	<i>Lepidopsetta bilineata</i>	1		62
starry flounder	<i>Platichthys stellatus</i>	1		58
Halibut	<i>Hippoglossus hippoglossus</i>	6	30-82	45
Halibut cheeks		1		58
Herring	<i>Clupea pallasii</i>	16	11-40	23
Mussels	<i>Mytilus edulis</i>	1		162
Octopus	<i>Octopus bimaculatus</i>	2	2-48	25
Rockfish--black	<i>Sebastes species</i>	2	78-83	81
brown	<i>Sebastes species</i>	1		29
red	<i>Sebastopyr ruberrimus</i>	4	42-73	55
Sablefish	<i>Anoplopoma fimbria</i>	2	105-120	113
Salmon--red	<i>Oncorhynchus nerka</i>	2	140-155	148
pink	<i>Oncorhynchus gorbuscha</i>	3	139-150	143
chum	<i>Oncorhynchus keta</i>	3	73-84	80
silver	<i>Oncorhynchus kisutch</i>	3	84-90	87
king	<i>Oncorhynchus tshawytscha</i>	3	92-109	101
Shrimp--pink	<i>Pandalus borealis</i>	1		57
sidestripe	<i>Pandalopsis dispar</i>	1		47
Trout--cutthroat	<i>Salmo clarkii</i>	1		56
Dolly Varden	<i>Salvelinus malma</i>	2	60-62	61
rainbow	<i>Salmo irideus</i>	1		76
steelhead	<i>Salmo gairdnerii</i>	1		75

Assays of the content of this vitamin in various fishery products of Southeastern Alaska were carried out at the Fishery Products Laboratory in Ketchikan and are presented here for the purpose of supplementing the nutritional data now available. In all cases, unless otherwise stated, the analyses were made on the uncooked, edible portion only. Since there would be significant losses of thiamine during cooking or processing, the figures given are only suggestive of the quantity of the vitamin that would be available in the product as actually eaten.

1/This is the first of two articles by this author on the occurrence of the B vitamins in fishery products. In the March 1946 issue of Commercial Fisheries Review will appear "Riboflavin Assays of Fishery Products."

Formerly Assistant Technologist, Ketchikan Fishery Products Laboratory.

The analytical procedure used was the method recommended by the American Association of Cereal Chemists (1941), with the following slight modifications: The vitamin was extracted by refluxing the sample with 2 percent acetic acid on a steam bath for 30 minutes, instead of 15, and was then cooled, adjusted to pH 4.5 and incubated for 1 hour at 50° C. with takadiastase. After the thiamine was

Table 2 - The Thiamine Content of Miscellaneous Raw Fishery Byproducts of Southeastern Alaska

Portion Assayed	Sample	Number of Assays	Thiamine content micrograms per 100 grams	
			Range	Average
Liver:	Salmon--red	1	83-172	204
	pink	2	83-172	128
	chum	1		92
	silver	3	102-140	121
	king	3	73-243	136
	Lingcod	3	63-137	98
	Grey cod	5	64-106	87
	Sablefish	1		97
	Arrow-tooth sole	1		139
	English sole	1		134
	Flathead sole	1		120
	Grayfish (<i>Squalus suckleyi</i>)	2	13-22	18
	Roe:	Herring	2	70-199
Salmon--red		1		300
pink		1		333
chum		1		229
silver		1		400
king		1		432
Heads:	Salmon--pink	1		72
	king	1		80
	Halibut	3	50-60	55
	Lingcod	1		43
	Red rockfish	2	65-92	79
Milt:	Herring	1		52
Entire viscera:	English sole	1		420
	Herring	1		86
Miscellaneous:	King salmon backbones (from filleting)	1		93
	Shrimp waste (including heads, tails, small shrimp, etc.)	1		77

absorbed on Decalso, a hot solution of 25 percent potassium chloride in 2 percent acetic acid was used for the elution. However, since this work has been done, some questions have arisen regarding the method employed, and further improvements have been suggested.

Table 3 - The Thiamine Content of Miscellaneous Marine Products of Southeastern Alaska

Common Name	Scientific Name	Number of Assays	Thiamine content micrograms per 100 grams	
			Range	Average
Octopus (whole tentacle)	<i>Octopus bimaculatus</i>	1		29
Sea cucumber	<i>Stichopus californicus</i>	2	30-40	35
Shrimp (whole)	<i>Pandalus borealis</i>	1		79
Starfish--orange	<i>Pisaster giganteus</i>	1		07
brown	<i>Pisaster ochraceus</i>	1		13
purple	" "	2	6-13	10
twenty ray	<i>Pycnopodia helianthoides</i>	1		17
Hair seal liver	<i>Phoca richardii richardii</i>	1		140
Steller sea lion--flesh	<i>Eumetopias jubata</i>	1		43
liver		1		183
blubber		1		17

The data in Table 1 (shown on p. 17) indicate that the ordinarily edible portion contained, when raw, from 2 to 182 micrograms of thiamine per 100 grams of material. Thus, before being cooked, an average serving portion would have contained from 2 to 250 micrograms of the vitamin as compared to a daily requirement for man of about 1,700 micrograms. Thiamine, however, is easily destroyed by exposure to heat and air, and a significant part would, undoubtedly, be destroyed by ordinary cooking methods. These analyses do not show the effects of seasonal and other environmental changes.

The data of Tables 2 and 3 (shown on p. 18) indicate that portions or species not ordinarily used by humans may contribute thiamine for animal feeding.

Literature Cited

CONNOR, R. T., AND STRAUB, C. J.

1941. Combined Determination of Riboflavin and Thiamine in Food Products. Industrial Engineering Chemistry. Anal. ed. 13: 385-388.

1941. Cereal Laboratory Methods. American Association of Cereal Chemists. 4th ed. p. 41. Omaha.



THE COVER PAGE

Photographs of attractive fish dishes are useful in increasing consumer interest in fish and shellfish. The Fish and Wildlife Service, in its Market Development Section, is accumulating a library of photographs which, among other uses, will be made available to the fishery industries to supplement its publicity work. Various firms and organizations are contributing to the collection. The photographs reproduced on the cover include:

- | | | |
|--------------|---|--|
| Center | - Planked lake trout
--Courtesy of Smith Bros., Port Washington,
Wisconsin. | |
| Left top | - Salmon steaks and shrimp | } |
| Left bottom | - Broiled flounder | |
| Right top | - Baked mackerel | |
| Right bottom | - Fried sea scallops | |
| | | --Courtesy of the
Fishery Council,
New York City,
New York. |