TECHNICAL NOTE NO. 6--VITAMIN-A POTENCIES OF LIVER OILS OF BERING SEA COD AND FLOUNDER

Oil and vitamin-A analyses were made of the livers of certain species of Bering Sea cod and flounder. The fish were obtained by the Exploratory Fishing and Gear Development Section of the Branch of Commercial Fisheries while conducting exploratory fishing in the northern Bering Sea area during June-July 1949 (Ellson, Powell, and Hildebrand 1950). The livers of the following species of fish were analyzed: Pacific cod (Gadus macrocephalus), flathead sole or flounder (Hippoglossoides robustus and H. elassodon), lemon sole or Alaska plaice (Pleuronectes quadrituberculatus), rock sole or flounder (Lepidopsetta bilineata), and yellowfin sole or mud dab (Limanda aspera).

Table 1 - Data on the Type of Fish, Sex, and Number of Fish Examined, and Average Value of the Measurements Obtained on Fish Length, Fish Weight, Liver Weight, Oil Concentration in Liver, and Vitamin-A Potency of Liver Oil

Species of fish	Sex of fish	Number of specimens	Fish length[1]		Fish weight		Liver weight		Oil concentration in liver	Vitamin-A potency of liver oil
		Number	Centimeters	Inches	Grams	Pounds	Grams	Pounds	Percent	"Spec" units per gram[2]
Pacific cod	Male	19	68.1	26.8	3,305	7.28	119	0.262	29.5	7,600
	Female	27	73.2	28.8	3,975	8.77	149	0.329	37.9	18,100
Flathead sole	Male	3	43.6	17.2	849	1.87	12	0.026	27.2	14,400
	Female	19	43.6	17.2	936	2.06	11	0.024	10.9	35,800
Lemon sole	Male	42	36.8	14.5	643	1.42	8	0.018	9.[illegible]	10,200
	Female	58	44.0	17.3	1,143	2.52	22	0.048	6.2	7,800
Rock sole	Female	7	43.5	17.1	1,281	2.82	13	0.029	3.3	37,000
Yellowfin sole	Male	2	36.1	14.2	495	1.09	5	0.011	9.3	10,600
	Female	100	39.3	15.5	704	1.55	12	0.026	5.1	20,200

1/Fish length was the distance from the tip of the nose to the fork of the tail.
2/2,000 x E (1 percent, 1 cm., 328 mmu., isopropanol, whole oil).

The livers were analyzed by the "shaking method," using ethyl ether as the solvent (Anonymous 1947). The data are reported in Tables 1 and 2.

The livers of the flathead sole, lemon sole, rock sole, and yellowfin sole were, on the average, less than an ounce in weight and contained only a small amount of oil, which was of a relatively low vitamin-A potency. Such livers are of only marginal value.

Oil concentrations and vitamin-A potencies of the cod livers reported here are similar to those of livers taken commercially in 1947 from fish caught in the Bering Sea off the Alaska Peninsula (Sanford and Nilson 1949). Northern Bering Sea cod livers may, therefore, be of potential commercial value. This conclusion, however, is contingent upon the price of vitamin A rising at least to the 1947 level.

Table 2 - Data on the Lowest and Highest Values Obtained in the Measurement of Fish Length, Fish Weight, Liver Weight, Oil Concentration in Liver, and Vitamin-A Potency of Liver Oil

Species of fish	Sex of fish	Fish length[1]		Fish weight		Liver weight		Oil concentration in liver		Vitamin-A potency of liver oil	
		Low	High	Low	High	Low	High	Low	High	Low	High
		Centimeters	Centimeters	Grams	Grams	Grams	Grams	Percent	Percent	"Spec" units per gram[2]	"Spec" units per gram[2]
Pacific cod	Male	56.8	79.0	2,010	5,840	52	210	10.3	52.8	1,500	18,400
	Female	62.5	87.0	2,240	7,825	47	288	1.2	51.5	1,100	73,100
Flathead sole	Male	42.2	44.9	782	894	10	13	20.2	36.9	6,120	26,700
	Female	39.5	48.0	652	1,750	7	16	4.2	29.0	7,600	93,600
Lemon sole	Male	30.3	42.4	366	910	3	15	3.8	34.8	865	102,000
	Female	34.2	55.9	580	2,100	3	42	1.4	17.2	1,840	42,300
Rock sole	Female	41.2	47.7	820	2,780	5	32	2.6	5.0	24,200	61,200
Yellowfin sole	Male	36.0	36.2	448	542	3	7	7.6	11.0	8,280	13,000
	Female	31.3	48.0	324	1,245	3	44	2.0	16.6	1,740	96,800

1/Fish length was the distance from the tip of the nose to the fork of the tail.
2/2,000 x e (1 percent, 1 cm., 328 mmu., isopropanol, whole oil).

LITERATURE CITED

ANONYMOUS
1947. PRELIMINARY PROCEDURES FOR THE ANALYSIS OF VITAMIN A IN FISHERY BYPRODUCTS. COMMERCIAL FISHERIES REVIEW, VOL. 9, NO. 1, (JANUARY) PP. 40-2.

ELLSON, J. G., POWELL, DONALD E., AND HILDEBRAND, HENRY H.
1950. EXPLORATORY FISHING EXPEDITION TO THE NORTHERN BERING SEA IN JUNE AND JULY 1949. U. S. FISH AND WILDLIFE SERVICE FISHERY LEAFLET 369.

SANFORD, F. B. AND NILSON, H. W.
1949. VITAMIN A AND D POTENCIES OF THE LIVER OIL OF PACIFIC COD. COMMERCIAL FISHERIES REVIEW, VOL. 11, NO. 5, (MAY) PP. 13-5.

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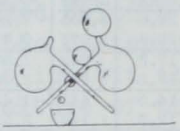

INFORMATION SOURCES FOR STUDENTS OF COMMERCIAL FISHERIES

Fishery Leaflet 362, Information Sources for Students of Commercial Fisheries, is a 20-page publication designed to show the student various means of obtaining information on the commercial fisheries of North America. It is not meant to be a complete bibliography--only the principal contributions or bibliographies are listed.

References in this publication are listed under the following major categories: Agar; byproducts; canning; cookery; directories; employment; fish and fisheries; freezing; gear; libraries; marketing; oils, rancidity, antioxidants; salting; sanitation; smoking; spoilage; statistics; technical journals; trade journals; visual aids; and vitamin oils. Items which are recommended as basic sources are indicated.

By R. Paul Elliott

--Fishery Leaflet 362 (January 1950)