LIPID DISTRIBUTION IN BODY AND SKIN OF FOUR SPECIES OF MARINE FISH

P. T. MATHEW, K. DEVADASAN AND R. VENKATARAMAN
Veraval Research Centre of C.I.F.T., Veraval-362 265.

The paper presents results of a study on the analytical characteristics of lipids from the skin and muscle of four important species of Gujarat coast fishes. Changes in characteristics like saponification value, iodine value and unsaponifiable matter of these lipids during different months of the year are also reported.

INTRODUCTION

Gujarat waters abound in a variety of highly relished table fishes of good nutritive value. Many of these fishes have fairly high lipid contents. Very little is known about the nature and composition of these fish lipids. In the case of several species of fishes of the south-western coast of India, detailed studies on all aspects of their body oils including fatty acid composition have been reported (Gopakumar and Nair, 1972). But from Gujarat coast, only seasonal changes in the proximate compositions of black and silver pomfrets have been reported (Venkataraman, Solanki and Kandoran, 1968; Solanki, Kandoran and Venkataraman, 1976). The present study forms part of an exhaustive investigation of these aspects and reports seasonal variations in the analytical characteristics of the lipids, both from skin and muscle, of four major species of fishes of Gujarat coast.

MATERIALS AND METHODS

Fresh silver pomfret (*Pampus argenteus*), black pomfret (*Parastromateus niger*), *Hilsa toli* and *Hilsa ilisha* were obtained from the catches of the trawlers operated by the Institute. As far as possible representative specimens of same size, sex and maturity were selected for analysis each time to minimise variation due to differences in these factors. After washing well to remove adhering dirt and slime, skin and muscle were separated from the samples and the total lipid contents determined separately in each case by the method of Bligh and Dyer (1959). The lipids from each sample were analysed for saponification value, iodine value and unsaponifiable matter according to the methods of A.O.A.C. (1960). The studies were conducted at regular intervals of one month to get a clear idea of the variations during different seasons. As the Port of Veraval remains closed during

TABLE I

ANALYTICAL CHARACTERISTICS OF LIPIDS FROM SILVER POMFRET

Month	Size of fish		Total lpids as %		Saponification value		Iodine value		Unsaponifiable matter as % of lipids	
	Length cm.	Weight g.	Skin	Muscle	Skin lipids	Muscle lipids	Skin lipids	Muscle lipids	Skin lipids	Muscle lipids
September	26	480	10.82	1.96	214.6	215.8	59.3	49.2	0.46	0.25
October	22	420	11.63	2.72	215	206	58.56	46.25	0.44	0.23
November	24	450	10.6	1.9	215.8	207.1	60.2	48.5	0.40	0.21
January	22.7	485	14	1.4	212.2	220	59.8	51.8	0.51	0.18
February	32	510	14.5	1.6	210.2	221	60.0	52.0	0.54	0.23
March	31	600	10	2.1	211.1	221.8	61.05	53.1	0.40	0.25
April	29	450	10.68	3.6	212.4	222.4	62.80	54.0	0.45	0.30
May	34	600	10	2.0	212.9	224.8	64.2	56.1	0.41	0.35

TABLE II

ANALYTICAL CHARACTERISTICS OF LIPIDS FROM BLACK POMFRET

Month	Size of fish		Total lipids as %			Saponification value			Iodine value			Unsaponifiable matter as % of total lipids		
	Length cm.	Weight g.	Skin	White muscle	Red muscle	Skin lipids	White muscle lipids	Red muscle lipids	Skin lipids	White muscle lipids	Red muscle lipids	Skin lipids	White muscle lipids	Red muscle lipids
September	35	850	12.7	10.7	7.59	180.2	208.5	196.1	163.8	174.5	188.0	0.1	0.4	0.50
October	34	815	11.0	6.2	7.0	182	215.2	194.0	165.3	215.2	194.0	0.1	0.32	0.40
March	48	1720	12.5	6.7	7.5	181.2	210.2	197.2	164	176.4	180.9	0.17	1.2	0.1
April	49	1500	15.5	11.25	10.1	182.3	211.1	197.9	165.1	177.3	181.8	0.16	0.8	0.38

the monsoon, there is no fishing during the period June-August. So samples could not be obtained during this period. Due to the seasonal nature of the fishery, black pomfret was not available round the year. In black pomfrets, the red and white muscles were analysed separately each time for comparison of characteristics of lipids in them.

Results And Discussion

Table I gives the analytical characteristics of the lipids from the skin and muscle of silver pomfret during different months of the year. It is observed that skin of silver pomfret has higher lipid content compared to the muscle. Lipid content of the skin registered the maximum level during January-February. Both the skin and muscle lipids had saponification values in the range of 210-220. The skin lipid had an iodine value of 60-65 and that of muscle oil 50-55. Iodine value tended to increase in both cases towards April-May.

In the case of black pomfret, samples were collected in March, April, September and October. In this case also the skin had higher lipid content. The red muscle had slightly higher lipid content than the white muscle. The skin lipid had the lowest saponification and iodine values. The white muscle lipid had the highest saponification value whereas the red muscle lipid registered the highest iodine value. During March-April the white muscle oil showed higher content of unsaponifiable matter. The iodine value did not show any regular or appreciable variation during these months. The results are presented in Table II.

Of the two species of Hilsa, *Hilsa ilisha* showed higher lipid content both in the skin and muscle. In *Hilsa toli*, the skin had a high lipid content whereas the muscle was poor in it. The lipid was maximum in both cases during October - December (Tables III and IV).

Compared to the muscle lipid, the skin lipid had higher iodine value in *Hilsa toli* The muscle lipid of *Hilsa ilisha* had only very low iodine value. The unsaponifiable matter in the muscle oil of *Hilsa ilisha* was also high. The percentage of unsaponifiable matter in muscle lipid generally recorded high values during september-January, when the total lipid content was also was high. The changes in iodine values were not very significant in either case. The skin lipid of *Hilsa ilisha* had higher saponification and iodine values compared to the muscle lipid.

The seasonal variations in iodine values in commercial herring oil samples were studied by Ackman and Eaton (1970 a, b). In the case of fillets of winter herrings, the same authors (1975) did not observe any specific or regular pattern of change in iodine value. In the present study it has been observed that the lipid content is generally high during the winter months of September-December. The iodine values of lipids were generally showing a slight increase during the summer months, March-May. Low iodine values and the high percentages of unsaponifiable matter in the lipids of muscle of *Hilsa ilisha*, especially September to January, was another noteworthy feature. Lipids of silver pomfrets also had notably low iodine values.

TABLE III

ANALYTICAL CHARACTERISTICS OF LIPIDS FROM *HILSA TOLI*

Month	Size of fish Length cm.	Size of fish Weight g.	Total lipids as % Skin	Total lipids as % Muscle	Saponification value Skin lipids	Saponification value Muscle lipids	Iodine value Skin lipids	Iodine value Muscle lipids	Unsaponifiable matter as % of lipids Skin lipids	Unsaponifiable matter as % of lipids Muscle lipids
September	44	1100	13.2	4.6	236.4	256.8	172.6	119.3	0.48	0.76
October	42	1240	12.4	4.8	231.1	260.1	168.9	116.5	0.45	0.81
November	46	1380	13.9	6.8	231.6	246.1	168.8	115.1	0.5	0.82
December	42	950	15.00	7.0	232.1	248.9	170.2	118.3	0.7	1.2
January	42	825	11.00	3.8	232.4	260.5	170.4	117.8	0.3	0.5
February	53	1400	10.4	3.2	232.6	260.8	171.1	117.9	0.4	0.5
March	50	1310	11.2	4.2	233.1	262.2	172.2	118.3	0.35	0.45
April	48	1000	14.0	5.8	233.4	263.4	173.2	119.1	0.40	0.51
May	34	600	13.1	4.2	234.2	263.9	174.9	120.2	0.45	0.50

TABLE IV

ANALYTICAL CHARACTERISTICS OF LIPIDS FROM *HILSA ILISHA*

Month	Size of fish		Total lipids as %		Saponifiable value		Iodine value		Unsaponifiable matter as % of lipids	
	Length cm.	Weight g.	Skin	Muscle	Skin lipids	Muscle lipids	Skin lipids	Muscle lipids	Skin lipids	Muscle lipids
September	42	815	16.1	18.2	158	148.2	146.4	45.1	0.7	3 1
October	46	900	16.2	20.3	158.1	148.9	146.5	45.92	0.8	3.1
November	39	780	15.0	18.52	158.5	159.0	148.3	48.25	1.05	3.2
December	36	680	14.1	16.8	161.2	160.1	150.0	54.50	1.00	3.1
January	44	825	14.4	13.4	162.0	162.4	154.0	51.90	0.9	3.1
February	48	1007	13.2	11.5	162.3	162.6	155.1	53.4	0.95	2.8
March	47	1200	13.8	13.2	163.1	163.0	155.8	54.20	0.85	1.25
April	48	1200	13.1	12.57	163.4	163.4	156.2	55.40	0 89	1.40
May	44	1000	12 8	10.2	164.1	163.6	157.4	56.30	0.86	1.80

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