Fins and Fin Rays from Whale Shark (*Rhiniodon typus* Smith)

A. RAMACHANDRAN and T. V. SANKAR
Research Centre of Central Institute of Fisheries Technology, Veraval - 362 265

The whale shark *(Rhiniodon typus Smith)* is an under exploited species and it is mainly caught for its liver oil. The processing of shark fin for rays is reported here. The fins have a high content of rays. The yield of fin rays from undried fins ranged from 0.53 to 4.40 percent with maximum ray content in the lower lobe of caudal fin. The physical and chemical characteristics of the rays are reported. The total nitrogen content is about 15 to 16 percent (dry weight basis).

A large number of shark species like *Rhycobatus djiddensis, Scoliodon walbheemi, Carcharinus melanopterus* and *Zygaena malleus* are commercially exploited for shark fins and rays (Nair & Madhavan, 1974). Fins from shark (*Sphyrna* spp.), Mako shark (*Isurus* spp.) and blue shark (*Prionace* spp.) are considered in trade as top grade. Fins from white shark *(Carcharidon* spp.) and Thresher shark (*Alopias* spp.) are considered as grade 1, those from white tipped shark (*Charcharhinus* spp.) and tiger shark *(Galeocerdon* spp.) as grade 2 and fins from smaller sharks as grade 3 (Lia Ka- Keong, 1983).

On an average (1976-1985) India exported 1,45,774 kg of dried shark fins every year (Anon, 1985). The export price of shark fin depends on the rays, its quality and grade (Anon, 1988).

No mention or study has so far been made on the quality of fins and their ray content of whale shark. The whale shark itself is an unknown fishery in many parts of the world and no organised or directed fishery exists in any part of India except in Veraval where fishing is done for a short period during February-May exclusively for the liver oil.

The paper deals with the study on the extraction of fin rays from whale shark of commercial size landed at Veraval, Gujarat, its physical and chemical characteristics and explores its suitability as an additional source for quality fin rays.

Materials and Methods

The fins from the whale sharks (8.64-9.97 metres long) which were dragged to the shore for collecting the liver were cut and collected as per the procedure described by Lia Ka-Keong (1983). The fins thus collected were immediately brought to the laboratory, washed and weighed. Those portions where rays were located alone were taken for further processing (the shaded portions in Fig. 1). The fins-first dorsal, second dorsal, pelvic, pectoral, upper and lower lobes of caudal - were separately kept in 5% (V/V) acetic acid solution for 3 to 6 days. another set was kept in water for the same period. The water was changed daily. The fins were later warmed to 60 to 65°C for 1 to 3 hours, depending on the size of the fin to soften the muscles. The softened muscles were scrapped off and rays were separated from the fins. Some samples of fins were initially dried

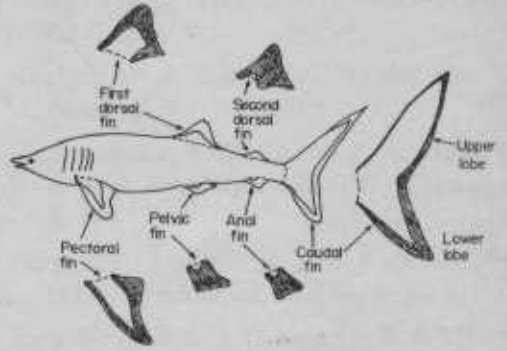

Fig. 1. Lateral view of whale shark with longitudinal cross section of fins

and latter, extracted for fn rays as described above. The extracted rays were thoroughly washed to remove all the adhering muscle particles and dried in sun to a moisture content of about 10 percent.

The physical characteristics of the dried fin rays like appearance, colour, length, thickness (using vernier calipers) and flexibility were noted. The moisture, ash, acid insoluble ash and total nitrogen were estimated by AOAC (1975) methods.

Results and Discussion

Fig. 1 shows the location of the fins where the rays are concentrated. The first dorsal and caudal fins are very massive in size and processing of the whale fins as such for the extraction of rays is difficult. Only the portion of the fins where the rays are concentrated alone need to be taken for processing. This helps to reduce the consumption of acetic acid used for softening the muscle and the bleaching agents if any used during processing. Moreover it accelerates the softening process as well as reduces the unnecessary handling of the unwanted portions of the fins. Keeping the muscles in acetic acid accelerates the softening process compared to that in water. The initially dried fins take more time to soften in acetic acid or water than the fresh fins.

Table 1 gives the length, height, weight and yield of fins. As per the Indian Standards (IS: 5471, 1969), the first and second dorsal fins fall in grade 'D', pectoral fins in grade 'C' and pelvic fins in grade: 'B'. It is reported (Nair & Madhavan, 1974) that the ray contents in other species like *Rhycobatus djiddensis, Carcharinus melanopterus* and *Zygaena malleus* are high in the dorsal and pectoral fins but in whale shark the ray content in the first dorsal and pectoral fins are comparatively lesser than in other fins. The upper and lower lobes

Table 1. *Measurement and grades of fins and yield of fin rays from undried fins*

Type of fin	Basal length	Height	Weight	Yield of rays from fin	Grades of fin
	cm	cm	kg	%	
First* Dorsal	104.00 (70.00)	64.00	23.93	0.530	D
Second Dorsal	48.00 (30.00)	22.50	1.33	2.430	D
Pectoral**	22.00 (29.00)	29.00	4.87	0.654	C
Pelvic	38.00 (19.00)	17.00	0.59	2.750	B
Anal	36.00 (18.00)	17.50	0.06	2.710	B
Lower lobe of caudal fin	66.00 (100.00)	90.00	12.90	4.401	D
Upper lobe of caudal fin	-	45.50	9.50	1.816	D

* The weight of first dorsal fin where rays are located was 3.50 kg and yield of rays obtained from it was 3.6%.

** The length was measured across the fin. The figures in bracket show the lengths measured as per IS: 5471-1969

Table 2. *Physical characteristics of fin rays*

Type of fin	Colour/ appearance	Length (cm) ± SD	Thickness (mm) ± SD	Number of observations
1st Dorsal	Lustrous* whitish yellow	10.21 ± 2.53	0.795 ± 0.231	175
2nd Dorsal	"	9.69 ± 2.29	0.537 ± 0.147	150
Caudal (upper lobe)	"	11.08 ± 2.41	0.980 ± 0.238	100
Caudal (lower lobe)	"	12.30 ± 3.23	0.728 ± 0.188	150
Pectoral	"	7.29 ± 1.89	0.488 ± 0.132	175
Pelvic	"	6.33 ± 1.51	0.406 ± 0.153	276

* Golden yellow colour in the case of initially dried and processed samples.

of caudal fins of this shark are good source of bigger and thicker rays. It is estimated that from a shark of about 9-10 metres long, about 660 g of dried fin rays (moisture content 10%) can be obtained.

Table 3. *Average chemical composition of fin rays*

Type of rays	Ash (dry weight basis) %	Acid insoluble ash %	Total nitrogen %
First dorsal	0.51	Nil	15.86
Second dorsal	0.67	Nil	15.74
First pectoral	0.86	Nil	15.70
Ventro caudal	0.94	Nil	15.62

The physical characteristics of the fin rays are presented in Table 2. It was found that the fins which were processed in fresh condition, yielded rays with better colour and appearance than the fins which were initially dried. The fin rays whale shark are equally translucent as those from other sharks. Since the commercially landed size of this species is between 8 to 12 metres in length, rays thicker and longer than in other species can be extracted. The rays obtained from various fins are flexible. The rays from caudal fin are very thick and elongated.

The biochemical quality of the fin rays is given in Table 3. The nitrogen content is very high and it ranges between 15 and 16 percent. The ash content is in the range of 0.5 to 0.9 percent. This shows that the nitrogen compounds form the major constituents of fin rays.

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