FAT AND WATER DISTRIBUTION PATTERNS IN THE FLESH OF THE COMMON CAT-FISH *WALLAGO ATTU* (BL. & SCHN.)

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The quantitative distributional pattern of fat and water has been studied in the flesh of the various zones corresponding to the dorsal and ventral regions of the body of a common cat-fish, *W. attu*. The ventral aspect of the body showed more accumulation of fat than the dorsal aspect. The fat content in the ventral region also exhibited an increase from the anterior to the posterior zones. In the dorsal region, however, the back portion of the body, behind the dorsal fin, generally possessed low fat content. On an average, the highest fat accumulation was observed in the caudal peduncle region. The distribution of water followed an almost opposite pattern of distribution, indicating an inverse relationship with fat.

INTRODUCTION

It has long been recognized that the biochemical composition of the edible portion of fish flesh varies with many factors like size, sex, maturity stage, season and environment. It is only in later years that the variation in muscle from different parts of an individual fish has been emphasized (Brandes and Dietrich, 1953 a, b; Olley and Lovern, 1960; Thurston and MacMaster, 1960; Mannan et. al, 1961; Karrick and Thurston, 1964). Though a certain amount of work on the subject has been done in India, there is a real scarcity of data on the chemical composition of freshwater fish in general, and its variation in different parts of the individual fish in particular.

It is reported that of the various chemical constituents of tissue, fat and water, beside showing relatively large specific and individual variations, exhibit significant variations in different sections of the body of a fish (Love, 1970). In the present paper an attempt has been made to describe the variations in the total fat and water contents of the flesh of a popular cat-fish, *W. attu*, from different body regions. Seasonal variations in the biochemical composition of this species has previously been described by the present author (Jafri, 1969). It is hoped that these studies would be of interest to consumers and dietitians concerned with the nutritional value of the fish.

MATERIALS AND METHODS

Fishes of a particular size (50 c m

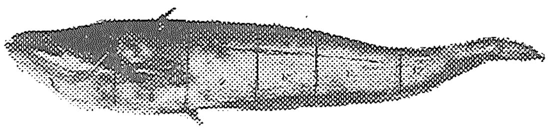

Fig. 1. Showing the regions and zones of the body selected for muscle sampling.

total length) were brought to the laboratory in fresh condition. The body of each individual was divided into two horizontal regions along the lateral line, each of these being further divided into six vertical zones, as shown in Fig. 1. The skin and bones were then carefully separated from the muscle samples, removed from the specified zones of the body. Estimations of the total fat and water in each sample were made using the methods as described elsewhere (Jafri et al., 1964). The results on all fishes were averaged, their SE calculated, and represented in Table 1.

Results and Discussion

In the cat-fish, *W. attu*, of 50 cm length, there were marked differences in fat and water contents between flesh samples taken from the various regions of the body (Table 1). The distribution of these two constituents followed an interesting pattern with reference to various body zones. Prominent variations in the general composition, including the fat and water contents, of the flesh from different anatomical locations have also been reported earlier in many fish species (Love, 1970) and many workers have observed the preferential accumulation of lipids in various body sections of fish (Brandes and Dietrich, 1953 a; Mannan et al , 1961.)

It would be evident from the data given in Table 1 that there is a definite dorso-ventral gradation in fat concentration in almost all the sections of the body of *W. attu.* Muscles of the ventral portions of the body, excepting those of zone 7, showed much higher fat values. Higher lipid values in ventral region were reported to be characteristic of many fish species like tuna, *Thinnus orientalis* (Igarashi et al., 1960), the Siscowet trout, *Salvelinues namacush siscowet* (Thurston, 1962), as also of certain Indian species namely, *Arius dussumieri* and *Ophicephalus striatus* (Alexander, 1970). It has further been observed in *W. attu* that the percentage of fat in the various ventral zones of the body register a gradual increase from the anterior (belly flap portion) to the posteriormost zone in the tail region, the latter portion of the body (zone 12) recording the highest fat percentage. In many other fishes including *Oncorhynchus kisutch*, however, it has been reported that the belly wall contains the highest concentration of lipids (Karrick and Thurston, 1964). It is probable that higher fat accumulation in the ventral region, as observed in the present fish, besides making a useful storehouse, may be associated with some sort of buoyancy maintenance during swimming.

As for the dorsal region of the body, the pattern of fat and water distribution was not a uniform one. Of the various zones of this region, zone 1, associated with the cephalic portion and located at the anterior aspect of the dorsal fin, and zone 2, below the dorsal fin, possessed fairly high fat values. The fat content in the back of the body, comprising zone 3, behind the dorsal fin, was, however, very low, though the other zones of the dorsal series showed higher fat values which, like the ventral zones, recorded a progressive accumulation of fat till the maximum was attained in the tail portion (zone 6). Higher fat accumulation in the caudal peduncle region, both in its ventral as well as dorsal aspect, may be associated with a greater demand of energy

TABLE I

Fat and water percentages (g/100 of wet tissue) in various body zones of *W. attu* (Bl. & Schn.)

	Zone Number	Fat%	Water%
Dorsal Series	1	0.628±0.0213	79.147±0.0624
	2	0.655±0.0291	78.771±0.0809
	3	0.311±0.0393	79.400±0.0323
	4	0.709±0 0543	78.097±0.0381
	5	0.727±0.0514	78.075±0.0474
	6	0.821±0.0127	73.858±0.0513
Ventral series	7	0.238±0.0341	80.081±0.0205
	8	0.723±0.0182	77.929±0.0497
	9	0.800±0.0549	77.590±0.0237
	10	0.899±0.0410	77.165±0.0768
	11	0.948±0.0128	74.022±0 0135
	12	1.395±0.0154	71.996±0.0287

± SE

for the muscular activity of tail during swimming which involves swift lashing of this portion of fish body. A similar possibility was pointed out earlier in other fishes (George et al., 1967 and Alexander, 1970).

As expected, there was a general inverse relationship between fat and water contents in the muscles of all the body zones of *W. attu*. The distributional characteristics of fat were, therefore, reflected in those of water (Table 1). The regions showing a higher concentration of fat showed a lower percentage of water and vice versa. As for example, the caudal peduncle region of this fish had the highest fat and the lowest water content, and the situation was reversed for zone 7 of the ventral region of its body. The classical analysis of fat and water in different body regions of *Clupea harengus* carried out by Brandes and Dietrich (1953 a) also emphasized the existence of such a relationship in fish tissue.

It may, however, be added that the pattern of the preferential accumulation of fat and water characteristic of the flesh of various body zones of *W. attu* may not be common even to individuals of closely allied species and, therefore, the problem merits further investigation on a large and comparative basis.

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