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CONDITION INDEX OF THE BLUE SWIM CRAB, *PORTUNUS PELAGICUS* L. FROM THE KARACHI COAST

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The present work reports the edibility or condition index of the crab, (*Portunus pelagicus* L.). Condition index is an approximation of the quantity of edible meat present in the whole animal. Values of condition index were relatively high in both male and female crabs. Condition index in male crabs remained high throughout the year and did not fluctuate as widely as it did in the females. Data also indicate an approximate size of the harvested crab and the seasons when the meat could be taken as maximum.

Key words: Condition index, Crab, Edible, Standard size class, Carapace length.

INTRODUCTION

Index of condition is an approximate measure of the proportion of meat existing in the whole animal. There is not much information available on the edibility or condition index crab or on crustaceans as a group. However the condition index has been reported in the bivalves, such as the oysters [1], and the mussels [2] from the Karachi Coast. A great deal of data is also available on the molluscs from all over the world [3-13], and particularly from the Arabian sea in which the condition index of rope grown mussels has been compared with that from the natural environment [14].

Exploitation of crab species on a commercial basis need the knowledge of the suitability of fishing time during the year. From the chemical studies [15,16], the quality of meat of an animal at different times of the year can be determined on the basis of its chemical composition. Generally the protein content or the organic matter as a whole, is taken as a measure for the quality. Since the people involved in the trade of crabs have little interest in the quality in terms of protein or their nutritive value, it is very desirable to obtain knowledge on this aspect. The main interest of fishermen lies in knowing how much meat would eventually be recovered from the total weight of the crabs they have fished. The weight of both edible and non-edible portions as the study indicates, varies with the size as well as with the seasons.

In the present study, condition index was studied to identify the best seasons in which high edibility value occurs. Therefore a prediction can be made using the results of the most suitable time for the harvest of crabs from the coastal waters of Karachi.

MATERIAL AND METHODS

Crabs, *Portunus pelagicus* L. were fished using baited lines from the backwaters of Karachi. Monthly collections were made commencing from December '84 through December '85. Crabs were sorted out into males and females. Carapace length between the anterior and posterior margin was noted to the nearest 0.1 cm. Meat was extracted from the body and the claws which also constitute edible tissue. The remaining non-edible part together with the edible tissues were dried separately at 110^{o}. Their dry weights were noted with two degree of precision after decimal.

Condition or the edibility index is the percentage ratio between the dry tissue weight and the total dry weight of the animal (crab). It was calculated using the following equation:

$$CI = \frac{\text{Dry tissue weight (DTW)}}{\text{Total dry weight (TDW)}} \times 100$$

Where DTW = claws meat (dry) + body meat (dry) and TDW = DTW + non-edible portion (dry.)

Conditions values of each individual crab were subjected to the powered regression analysis to observe its linerity with the carapace length (L) in both males and females (separate and pooled data). Regression equation used was $CI = a.L^{b}$, where a is a constant and b is a regression coefficient.

To study the monthly variation in the condition index of "standard animals", calculations to determine the

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size of the standard animals were made as follows: Size class in which males and females occurred in the highest frequency was designated as a "standard size class".

For males it was 6.0 – 7.0 cm (carapace length) and for females it was 7.0 – 8.0 cm. Values for the condition index were calculated for every 0.1 cm increase in the carapace length of the "standard size class" from the observed data using the power regression equation. The calculated values of the condition index at various lengths within the standard size class were averaged and the value were designated as the condition index of the standard animal.

RESULTS AND DISCUSSION

Condition index and carapace length. Value obtained from the analysis of power regression for the condition index on carapace length of the crabs are given in Table 1.

Table 1. Relationship between condition index and the size (carapace length) of male and female crabs. Data represent values for a, constant; be, regression coefficient; r, correlation coefficinet and n, total numbers of crabs.

Months	Male				Female			
	a	b	r	n	a	b	r	n
Dec 84	41.15	–0.23	–0.38	10	–	–	–	–
Jan	17.09	0.14	0.32	12	63.15	–0.70	–0.33	6
Feb	9.10	0.44	0.63	14	4.68	1.01	–0.90	5
Mar	10.56	0.46	0.73	16	29.38	–0.20	–0.49	11
Apr	10.68	0.45	0.65	16	14.58	0.23	0.27	11
May	15.54	0.23	0.23	10	0.59	1.94	0.73	10
June	33.53	–0.23	–0.20	14	61.30	0.55	–0.38	11
July	11.93	0.35	0.54	15	16.50	0.21	0.26	10
Aug	–	–	–	–	91.03	–0.69	–0.37	15
Sep	37.24	–0.25	–0.29	8	11.80	0.23	0.31	11
Oct	17.81	0.17	0.56	6	111.42	–0.83	–0.55	14
Nov	16.88	0.23	0.63	6	23.67	–0.008	–0.013	6
Dec 85	–	–	–	–	23.23	0.01	0.044	12

It can be seen from the table that males of *P. pelagicus* exhibit a negative relationship in the constant "a" with the regression and correlation co-efficients during the months of December, June and September. In the month of August, the males were fished in quite low numbers and thus no reliable regression analysis was possible. The female crabs, on the other hand, show a similar relationship during January, March, June, August, October and November. This gives an anamolous picture of the variation in the condition index. In order to counteract the existing discrepancy, the data of regression analysis for the male and female crabs were pooled. The results thus obtained (Table 2) showed that there is a negative relationship, between the condition index and carapace length, in the month of June, August, September and October. Thus, it can be concluded that the large size crabs would contribute more edible portion (meat) from November to May and July, where as in the remaining months small sized crabs would give a larger quantity of meat as compared to large sized crabs.

Table 2. Relationship between condition index and the size (carapace length) of male and female crabs (pooled). Data represent values for a, constant; be, regression coefficient; r, correlation coefficient and n, total number of crabs for the year 1985.

Months	a	b	r	n
Jan	17.10	0.14	0.28	18
Feb	12.10	0.30	0.42	19
Mar	11.12	0.42	0.67	27
Apr	10.70	0.45	0.61	27
May	3.3	1.06	0.57	20
June	46.59	–0.41	–0.35	25
July	16.86	).19	0.31	25
Aug	96.53	–0.72	–0.35	18
Sep	57.58	–0.53	–0.39	19
Oct	39.39	–0.24	–0.35	20
Nov	19.07	0.14	0.23	12
Dec	20.80	0.10	0.28	22

The results can more clearly be shown graphically by plotting the values of males and females in Fig. 1. A close examination of Fig. 1 would reveal that the females, although showing negative relationship in the months of January, March and November, have a high condition index in crabs with less than 4 cm carapace length as compared to the male crabs. A similar reltionship also exists in the month of June and October, but in this case at the carapace length of 6 cm. Thus, it is evident from the regression analysis of pooled data (Fig. 2) that small sized crab, collected during the month of June and from August to October, have a considerably high condition index, even higher than the crabs with large carapace which showed a positive relationship between the condition index and the carapace length. Thus it seems probable that harvesting small sized crabs during these months would appear to be profitable from the view point of meat content.

Condition index of crabs of standard size class. The monthly fluctuations in the condition index of male and

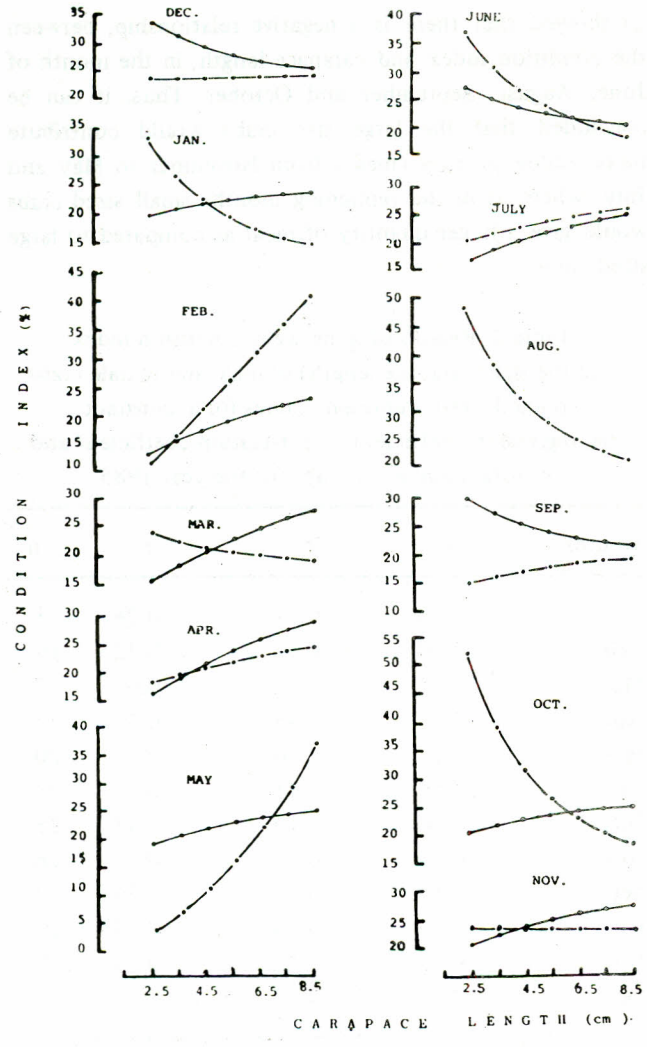

Fig. 1 Relationship between the condition index and carapace length of male (—●—) and female (—• —) crabs.

female crabs of standard size class (6-7 cm (males), 7-8 cm (females) is shown in figure 3-D. It is evident from the figure that the condition index of female crabs has a larger variation. On an average about 23.81 percent (in the males) and 23.17 percent (in the females) edible meat can be extracted. This agrees well with the findings of Edward [17]. According to him the recovery of 20-25 percent meat from the crab makes their fishing a viable commercial proposition.

Variations in the values of condition index could be attributed to the highly fluctuating values of body meat and the non-edible parts of the crabs (Fig. 3-A and C). Claw meat (Fig. 3-B) showed little fluctuation in both males and females. The annual average shown in Table 3 suggests that the male crabs have more claw meat and less trash (non-edible parts) and body meat than that of females Edward [17] has also pointed out that males have larger

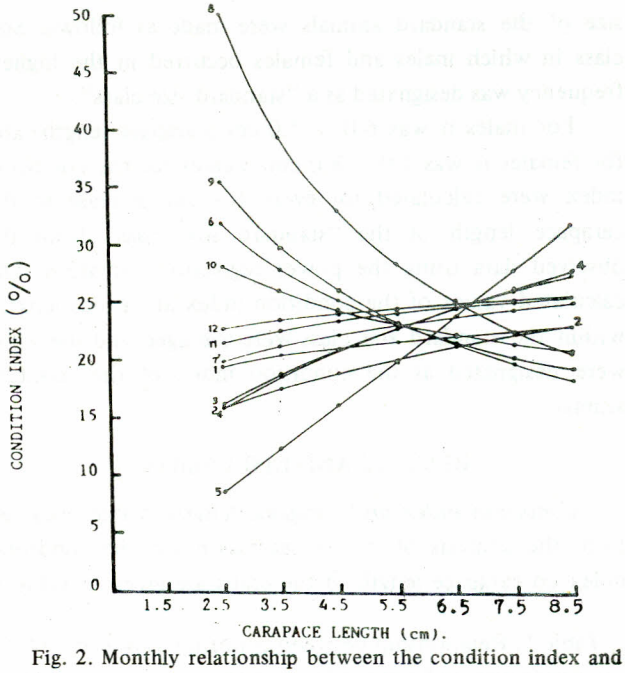

Fig. 2. Monthly relationship between the condition index and carapace length of male and female crabs (pooled data). Numbers 1-12 represent months from January through December 1985.

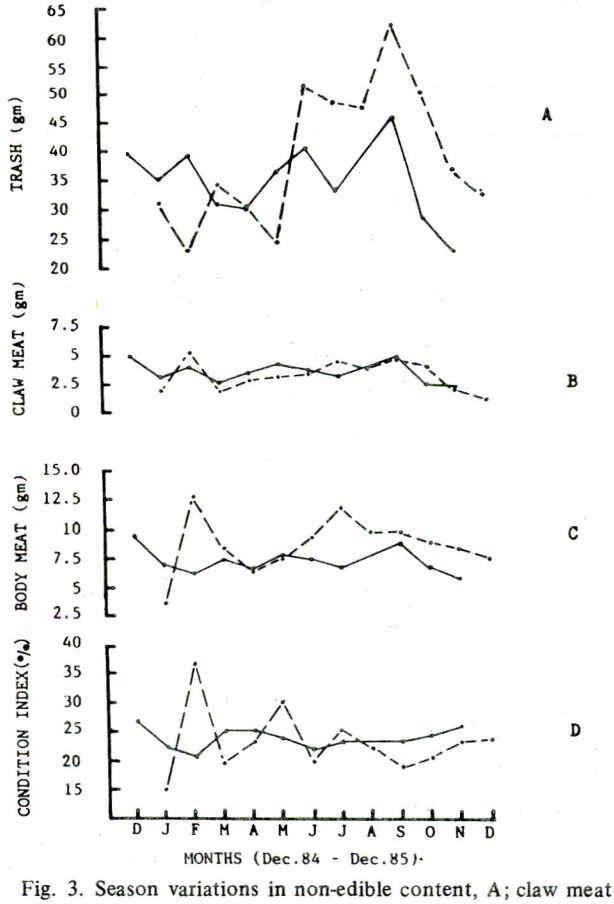

Fig. 3. Season variations in non-edible content, A; claw meat content, B; body meat content, C; and condition index, D, of male (—●—) and female (—•—) crabs. Data points represent values calculated for the standard animal.

Table 3. Annual averages of the condition index, body meat, claw meat and non-edible part of *P. pelagicus* male and female.

	Male crab				Female crab			
	Condition index %	Body meat (gm)	Claw meat (gm)	Non-edible part (gm)	Condition index %	Body meat (gm)	Claw meat (fm)	Non edible part (gm)
Annual Average	23.81	7.27	3.64	35.01	23.20	8.67	3.32	39.62
± Standard error	± 0.51	± 0.31	± 0.27	± 1.88	±[9] 1.67	± 0.64	± 0.36	± 3.41

claws and therefore have more claw meat whereas the females have more body meat.

Fluctuations in the condition index has also been regarded as a function of seasons. Barkati [18] has demonstrated this fact in the mussel, *Mytilus edulis*. Physiological and chemical states of the individuals at different times of the year can also affect the variation in the condition index. For instance, changes in the glycogen content have been correlated with the seasonal variation in the condition index of the oysters [19]. Although the present data do reveal that fluctuation exists in the condition index as a function of size and in seasons, the status of our present knowledge on the condition index of crustaceans is for too inadequate to be able to answer some of the fluctuations noticed. There is every possibility that the condition index of crabs may alter significantly as a result of maturation of gonads in a particular season or during the moulting cycle, in which soft newly formed shells are expected have a low weight. The condition index may also be affected by the chemical composition as has been found in the oysters. Evidently, further studies on this subject are clearly needed in crustaceans.

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