LENGTH-WEIGHT RELATIONSHIP AND RELATIVE CONDITION IN THE PEANAEID *PENAEUS PENICILLATUS* (ALCOCK)

R. I. Patel, M. N. Prasad and A. P. Mansuri

Dept. of Biosciences, Saurashtra University, Rajkot 360005.

ABSTRACT

Length-weight relationship for *Penaens pencillatus* (Alcock) from the Mindsar estuary of Saurashtra (Gujarat) shows that there is no sex difference in length-weight relationship, which is expressible as \( \log W = -4.5623 + 2.71 \log L \). The relationship between the length and weight for *P. pencillatus* is found to be significant \((r = 0.97; P 1\%)\). The relative condition factor showed monthly fluctuations, highest peak denoting the spawning period and the trough and the small peak representing the cyclic gonadial development. Sexual maturity was attained when the prawn measured 66-70 mm length.

The study is based on the penaeid prawn *Penaens penicillatus* (Alcock) collected from the Mindsar estuary of Saurashtra coast, where its fishery occurs during the monsoon (July-December) period. The length-weight relationship is based on the measurements of fortnightly samples from the commercial catch.
The total length of the prawn was measured from the tip of the rostrum to the tip of the telson, to the nearest mm on a metre scale. Weight of the individual prawn was measured to the nearest g on a physical balance. Since length is a linear measure and weight a measure of volume, the length-weight relationship was determined by using the formula \( W = CL^n \) (where \( W \) = weight, \( C \) and \( n \) are constant and \( L \) = length) and expressed in its Logarithmic form. The value of correlation coefficient (\( r \)) was calculated as per Bailey (1959).

The length-weight relationship for the individuals ranging in size from 45 mm to 110 mm was estimated. The length weight relationship of \( P. \) penicillatus was found to be \( \text{LOG } W = -4.5623 + 2.71 \text{ LOG } L \) from the relationship. Similar observations have been made by Rajyalakshmi (1961), Thomas (1975) and Patel et al (1984) for \( M. \) brevicornis, \( P. \) semisulcatus and \( P. \) malcolmsonii, respectively.

Hile (1936) and Martin (1949) showed that the exponent 'n' usually lies between 2.5 and 4.0. According to Allen (1938) 3.0 is the ideal value. In the present case, the exponent lies between the values mentioned by Hile (1936) and Martin (1949) but is below the ideal value of Allen (1938).

It is observed from the scattered diagram (Fig. 1) that weight bears a curvilinear relationship with the length which becomes linear after logarithmic transformation (Fig. 2). In order to assess the significant difference between the functional relationship of the two sexes the two regression co-efficient have been subjected to a significant 't' test as per Bailey (1959). The difference between two co-efficient was non-significant since the scattered diagram of weight-length indicated no sexual difference. Therefore, sex was not taken into account. The log length and log weight of the prawn linearly related with a very high co-efficient of correlation (\( r = 0.97 \)).

Relative condition factor (Kn), which is a ratio between observed and calculated mean weight, was calculated for different months as well as for each size class at 5-mm interval. The mean value for Kn was plotted for each month (Fig 3). Similarly, the mean value of 'Kn' was plotted against the different size classes (Fig. 4). The highest peak is at 46-50 mm length followed by a clear lowest trough at 66-70 mm. A marked decline in 'Kn' at 66-70 mm and subsequent recovery after 66-70 mm were observed. Such rapid change and recovery is generally associated with the attainment of sexual maturity, which has also been observed by Rajyalakshmi (1961). A similar change in Relative condition has been observed by Pantulu (1962) in fishes, Rao (1967) on \( M. \) rosenbergii, Thomas (1975) on \( P. \) semisulcatus, and and Patel et al (1984) on \( P. \) malcolmsonii. The ratio between weight of food ingested and body weight is negligible (Thomas, 1975) and, therefore, the food cannot affect the Kn value.
Studies on the monthly fluctuations in the 'Kn' value indicate that the relative condition is low during July, which decline might be due to the adverse environmental conditions in the form of sudden fluctuations in salinity and the resultant stress, consequent to the floods during late June. The high (Kn) value during December may indicate the spawning period which agrees with the earlier observations of Thomas (1975).

FIG. 1. Length-weight relationship of *Penaeus penicillatus*.

FIG. 2. Log (length) and Log (weight) relationship of *Penaeus penicillatus*.

FIG. 3. Mean Kn values during different months.

FIG. 4. Mean Kn values per each 5 mm length intervals.
The authors are thankful to Prof. S. C. Pandeya, Head, Department of Biosciences, for providing laboratory facilities. The authors are also thankful to the Govt. of Gujarat and UGC for financial assistance.

REFERENCES


