Length-Weight Relationships of *Penaeus monodon* Reared in Semi-Intensive Culture Systems of Kerala, India

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Abstract

The results of a study on length-weight relationships of *Penaeus monodon*, reared in fertilized ponds and fed three different supplementary feeds are presented.

Introduction

A review of the literature reveals a fairly large amount of information on various aspects of the biology and culture of the common penaeid shrimps of India. However information on the length-weight relationships of shrimp in culture conditions is very limited. A study was therefore conducted to investigate the length-weight relationships of *Penaeus monodon* in fertilized farming systems of Kerala, fed three different supplementary feeds: clam meat with dough ball and farm-made pelleted feed. Three regions were selected for the study: Pallithode in Alleppey district and Chellanam and Kannamaly in Ernakulam district. Three ponds with similar management practices were chosen for each region. In the three regions selected, sufficient salinity prevailed for 8-10 months enabling two culture operations per year. Altogether 36 culture operations each extending over a period of 120 days were studied. The salinity in Pallithode ranged from 9.30 to 23.16 ppt, in Chellanam from 9.52 to 21.13 ppt and in Kannamaly from 9.64 to 16.92 ppt.

The area of the ponds selected ranged from 0.5 ha to 1.0 ha. Drying of the pond bottom, eradication of pests and predators, liming, fertilization, and water management were carried out in all the ponds. Only hatchery produced seed of *P. monodon* of size PL20 was used for stocking. Three types of supplementary feeds were used by the farmers: clam meat, clam meat with dough ball and farm-made pelleted feed. The composition of the dough ball was: ground nut oil cake 45%, wheat flour 25%, rice bran 20%, tapioca flour 10% and fish oil 2 ml/kg. The composition of the pelleted feed was Squilla powder 54%, rice bran 10%, shrimp head waste 10%, ground nut oil cake 10%, wheat flour 10%, tapioca flour 5% and vitamin + mineral mix 1%. Both feeds also contained 2 ml/kg each of cod liver oil and palm oil. The water exchange rate was about 5-10% per day and this was increased to about 20% towards the end of the culture period.

Analysis

Two hundred post larvae (PL20) were collected from a hatchery and their average length and weight were determined. On the 30th day of stocking and thereafter every 15 days, 200 specimens were collected randomly from each pond and their average length and weight were determined. Length-weight relationships of shrimps fed the three supplementary feeds were worked out by simple linear regression analysis using the equation $\log W = \log a + b \log L$.

Fresh clam meat was used in all the three regions studied and hence, the length-weight relationships of shrimps fed this feed were worked out separately for the three regions.

Pallithode :

$\log W = \log 0.0332 + 2.4573 \log L$

($t = 36.833$; $P < 0.001$)

Chellanam :

$\log W = \log 0.0183 + 2.71712 \log L$

($t = 38.253$; $P < 0.001$)

Kannamaly:

$\log W = \log 0.0061 + 3.0311 \log L$

($t = 21.940$; $P < 0.001$)

The slopes of the three regression lines differed significantly (analysis of covariance: $F = 7.604$; $P < 0.001$). The results of the multiple range test (SNK) showed that the length-weight relationships of shrimps fed only clam meat in the three regions differed significantly from each other.

Fresh clam meat with dough ball was used both in Chellanam and Kannamaly. The regression equations derived for these two regions were as follows:

Chellanam:

$\log W = 0.0216 + 2.6531 \log L$

($t = 56.242$; $P < 0.001$)

Kannamaly:

$\log W = 0.0040 + 3.2234 \log L$

($t = 14.902$; $P < 0.001$)

The slopes of these two regression lines were significantly different ($F = 2665.879$; $P < 0.001$). Pelleted feed was used only in Pallithode. The length-weight relationships of shrimps fed this feed was,

$\text{Log } W = \log 0.0159 + 2.7664 \log L$

($t = 44.322$; $P < 0.001$)

In all the foregoing six cases, the dependence of weight on length was statistically highly significant.

Since three different supplementary feeds were used by the shrimp farmers, an attempt was made to study the length-weight relationships of shrimps fed the three feeds, ignoring the regional differences within the treatments (feed types). The multiple range test (SKN) revealed that the slopes for the three regression lines were similar; their elevations were also not significantly different. Since the three regression lines were coincident, the common or weighted regression coefficient (b_c) was calculated; $b_c = 2.7387$.

If the regional differences in the length-weight relationships within the feed types are ignored, the common regression equation for the length-weight relationships of the shrimps cultured in the small-scale, semi-intensive, monoculture systems of Kerala is,

$\text{Log } W = \log 0.0154 + 2.7399 \log L$

($t = 53.586$; $P < 0.001$). The 95% confidence interval for the regression coefficient was 2.7399 ± 0.1006 and the standard error for the Y intercept was, $\log 0.0154 \pm 0.0523$.

Conclusion

The highest regression coefficient values, i.e 3.0311 and 3.2234 were observed in Kannamaly region. In this region the deepest water (120 cm) and highest primary production were observed. The highest b value of more than 3 may be attributed to better ecological factors, including depth and primary productivity which prevailed in that area.

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