Meat yield to total weight relationship in freshwater giant prawn
Macrophthalmus rosenbergii

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ABSTRACT

Meat yield to increasing total weight relationship of Macrobrachium rosenbergii was determined from less than 30 to 150 g. Regression analysis of percentage meat yield versus total weight for every 30 g interval showed that M. rosenbergii produces the maximum percentage of meat yield at 31.60 g interval, beyond which the values were not significantly different (P<0.05). Other body parts such as the head and head-off weight showed similar relationship. Moreover, length-weight relationship of M. rosenbergii indicated allometric pattern of growth.

Information on the meat yield in relation to total weight in freshwater giant prawn is important to both farmers and consumers in respect of marketing and processing aspects, but no report is available in this regard. The present study was undertaken to determine the changes in the meat yield to increasing total weight including carcass composition and length-weight relationship of Macrobrachium rosenbergii.

MATERIALS AND METHODS

Specimens (200) of M. rosenbergii were collected from 3 integrated chicken-raised ponds of Brackishwater Station, Paikgacha, Khulna. From each pond (0.1 ha) 20 M. rosenbergii were randomly sampled during November 1990 to February 1991 with the help of a cast net. Juvenile prawns were collected from the nearby river Sibsa. The polycultured ponds were stocked with M. rosenbergii (25%), silver carp (35%), Indian major carp (20%) and grass carp (20%). The average length and weight of prawn was 4.5 cm and 3 g respectively.

Immediately after harvest, the total length (from the tip of the rostrum to the end of the telson) and carapace length (base of the orbital notch to the posterior middorsal edge of the carapace) were measured to the nearest millimetre. Then the prawn was beheaded by pinching and peeled by hand. The total weight, head weight, head-off weight and meat weight were recorded using a triple beam balance with a sensitivity of 0.1 g.

The percentages of the various parts of the prawn were calculated from the total weight as follows:

\[
\% \text{ Body part} = \frac{\text{Weight of body part}}{\text{Total weight}} \times 100
\]

Regression analyses of these percentage figures versus the total weight for every 30 g interval were conducted using 'Student t-test'. Length-weight relationship was calculated by the method of least squares (Le Cren 1951).

RESULTS AND DISCUSSION

The percentage head weight gradually increased with the increase in total weight (Table 1). The maximum average percentage of head weight among the total weight in-
Table 1. Significance for body proportions and their percentages with different total weight intervals

<table>
<thead>
<tr>
<th>Total weight intervals</th>
<th>Head weight (Per cent head weight)</th>
<th>Head-off weight (Per cent head-off weight)</th>
<th>Meat yield (Per cent meat yield)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average+S.D.</td>
<td>*t-value</td>
<td>Average+S.D.</td>
</tr>
<tr>
<td>1-30</td>
<td>10.9±2.15</td>
<td>*</td>
<td>11.9±2.36</td>
</tr>
<tr>
<td>(22.9±4.4)</td>
<td>(47.6±1.59)</td>
<td>(NS)</td>
<td>(52.3±2.15)</td>
</tr>
<tr>
<td>31-60</td>
<td>24.7±5.03</td>
<td>*</td>
<td>23.14±3.9</td>
</tr>
<tr>
<td>(47.9±8.7)</td>
<td>(51.45±2.54)</td>
<td>(*)</td>
<td>(48.56±2.54)</td>
</tr>
<tr>
<td>61-90</td>
<td>38.8±4.61</td>
<td>*</td>
<td>34.4±3.57</td>
</tr>
<tr>
<td>(73.2±7.5)</td>
<td>(52.96±2.32)</td>
<td>(NS)</td>
<td>(47.04±2.32)</td>
</tr>
<tr>
<td>91-120</td>
<td>53.6±5.21</td>
<td>*</td>
<td>44.5±3.54</td>
</tr>
<tr>
<td>(98.2±6.2)</td>
<td>(54.61±3.2)</td>
<td>(NS)</td>
<td>(45.4±3.2)</td>
</tr>
<tr>
<td>121-150</td>
<td>77.7±4.56</td>
<td>*</td>
<td>56.2±2.78</td>
</tr>
<tr>
<td>(133.9±6.1)</td>
<td>(57.98±1.55)</td>
<td>(NS)</td>
<td>(42.0±1.52)</td>
</tr>
</tbody>
</table>

*Significant at 5%.

The percentage head weight increased with the increase of total weight at 31-60 g interval (P<0.05). These results clearly indicated that *M. rosenbergii* at 60 g total weight yielded the highest percentage of head weight. Beyond this there was no statistically significant increase. On the other hand, the head-off weight of freshwater prawn gradually increased with the increase of total weight but the percentage head-off weight gradually decreased with the increase of different total weight intervals. Due to the bigger size of the head of *M. rosenbergii* in comparison with that of *Panaeus monodon*, the weight conversion from head-on to head-off weight of these 2 species varied greatly (Chowdhury and Hossain 1980, 1981). In the present study, all of the percentage head-off weight were statistically insignificant except at 31-60 g (P < 0.05).

The meat yield rapidly increased with the gradual increase of total weight (Table 1). The t-values for the regression of average meat yield on total weight for the 31-120 g intervals were statistically significant (P<0.05). On the other hand, the percentage meat yield significantly decreased with the increase of total weight for the 31-60 g interval (P<0.05). These results clearly suggested that *M. rosenbergii* at 31-60 g yielded maximum percentage of edible tissue. Beyond this size there was no statistically significant increase.

Food conversion ratios for pond-raised prawn were not included in this study, but further investigation was strongly recommended to determine whether the culture of *M. rosenbergii* up to 60 g round weight is sound from the point of view of aquaculture economics. However, the marketable weight of 35 g was recommended for profitable prawn farming.

Regressions were calculated for the logarithm of total length on the logarithm of total weight and meat yield for *M. rosenbergii*. The equations thus obtained were:

For total length and total weight:

\[ \log W = -2.7416 + 3.5932 \log L \]

For total length and meat yield:

\[ \log Y = -2.6061 + 3.1258 \log L \]

For carapace length-weight relationship:

\[ \log W = -0.1042 + 2.8571 \log CL \]
For tail length-weight relationship:

\[ \log W = -2.2558 + 3.5677 \log TL \]

The values of the regression coefficient 'b' obtained by the method of least squares were more than 3 in all the cases except carapace length-weight relationship. This suggested that *M. rosenbergii* measured were heavier in form at the higher lengths but not so heavier at the longer carapace length. Moreover, the value of 'b' indicated that the growth of *M. rosenbergii* was allometric. Ibrahim (1962) stated that the value of 'b' in Indian prawns always lies above 3. The estimates of 'b' presented by McCoy (1968) was not significantly different from 3 for either Pink or Brown shrimp smaller than 16 cm. However, this value may vary in the same way for different stages of shrimp. The increase of total weight with the per unit increase of meat yield and tail length, respectively, were significantly different (t=51.1102 and t=6.8021 respectively) at P<1.0% from the hypothetical value of 3.

Similarly the increase of meat yield with the per unit increase of total length was significantly different (t = 10.8568), while the increase of weight with the per unit increase of carapace length was not significantly different (t = 1.3923).

REFERENCES

Head-on and head-off weight relationship of freshwater giant prawn and sea water tiger prawn. *Journal of Asiatic Society of Bangladesh (Science)* 6, 7: 49-52.

