Nutritive values of fresh water mussels *Lamellidens marginalis* from Nanded region, Maharashtra

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**ABSTRACT**

In the present investigation, the nutritive value showed changes in total protein, glycogen and lipid content from foot, mantel, gill and hepatopancreas of *Lamellidens marginalis* were studied from Jan 2013 to Dec 2013. In *L. marginalis* maximum protein content was found in hepatopancreas 304± 0.0065 mg/gm minimum from foot 20± 0.0104. Glycogen content was more during the summer season in all tissues. The maximum glycogen was found during the summer season in hepatopancreas (309.62± 0.5184 mg) and mantel tissue (309.62± 0.0079 mg). The minimum amount of glycogen was found in foot 31.32± 0.0023 in the winter season. Values of lipid observed from foot 14.74 ± 0.6228 and from mantel it is 6.5± 1.1401.

**INTRODUCTION**

Bivalves are economically important animal known for food considered important next, to fish and prawns from the nutritive point of view. They have been consumed for thousands of years (Zhang & Sinclair 2007). Protein is the most important organic compound of animal tissue. Protein occurs in the body in the form of amino acids and other metabolites, which serve as building blocks of the body (Vijayavel et. al., 2007). Carbohydrates are the primary source of various metabolic processes. Carbohydrates in the tissues of aquatic animals are existing in the form of glycogen. It is well-known that the glycogen serves as an energy reserve for various metabolic processes. Changes in glycogen content are due to temperature, size, growth, reproductive status and availability of food. Accumulations of glycogen take place during their growing season and use them during rest of life.

During study period *Lamellidens marginalis* shows maximum carbohydrates content in summer and minimum in winter because of availability of adequate quantity of food during summer. Plankton is the main food item of mussel and its production is more in summer. Lipid is very important dietary constituent. it serves as an energy source when food supply is low. Changes in lipid contents are due to temperature, size, growth, reproductive status and availability of food. The decline in Lipid content was observed during breeding season.

**MATERIALS AND METHODS**

Biochemical constituents such as protein, glycogen, and lipid were estimated monthly from *L. marginalis* for biochemical analysis, bivalves were dissected and soft body tissue like a mantle, hepatopancreas, gills, and foot were removed and stored in deep freezer at 0°C temperature.

**Estimation of protein**

Protein was estimated by using the Lowry method (Lowry et al., 1951). Standard solution of protein albumin (10 mg/ml) was prepared freshly. From this solution, different dilutions were made ranging from 1 mg/ ml to 10 mg/ ml in distilled water to prepare a standard graph. Estimation was done by taking a measurement on O.D. at 540 mu. Amount of protein calculated by using formula

\[
\text{Amount of protein} = \frac{\text{amount of protein obtained from standard graph}}{\text{weight of tissue g}} \times 100 \text{ mg} = \text{mg of protein per 100 mg of tissue}
\]

**Estimation of glycogen**

Glycogen is estimated by using anthrone reagent method (De-Zwaan and Zandee (1972). Standard graph was used to estimate glycogen from unknown sample. Amount of glycogen is calculated by using formula.

\[
\text{mg of glycogen / 100 mg} = \frac{100 \times U \times S}{1.11} \text{ mg}
\]
Whereas, \( U \) = Optical density of unknown sample.
\( S \) = Optical density of unknown glycogen concentration,
1.11 = factor for conversion of glucose to glycogen.

**Estimation of lipid**

Lipid content was estimated by using Menthol-Chloroform method by (Bligh and Dyer, 1959). In this method one gram of tissue was taken in mortar and pestle with anhydrous sodium sulphate, and few ml of chloroform methanol mixture was added in it. After stirring mixture is filtered in to another test tube. Then few drops of 0.05N KCL solution is added in filtrate. This removes non lipid content and releases the bound acidic lipids. Two phages developed upper and lower. Lower phase is transferred in to another container and allow to dry. The amount of lipid present in the samples is determined by using following formula.

\[
\text{Amount of lipid} = \frac{\text{weight of lipid (g)}}{\text{weight of tissue (g)}} \times 100 \text{ mg}
\]

**RESULTS AND DISCUSSION**

Nutritive value of *L. marginalis* were studied from Jan 2013 to Dec 2013 and expressed as mg of lipid per gm weight wet tissue. *L. marginalis* shows maximum protein content in summer and minimum in winter. Maximum protein content was found in hepatopancreas that is 304± 0.0065 mg/gm and minimum in winter in foot 20± 0.0104 mg/gm (Table 1). Glycogen content was more during the summer season in all tissues. It was increased gradually from March to May and from July onwards it was decreased gradually and reached the lowest level in winter. It was again gradually increased. *L. marginalis* showed maximum glycogen in hepatopancreas and in the mantel. Maximum glycogen was found during summer season in hepatopancreas (309.62± 0.5184 mg) and mantel tissue (309.62± 0.0079 mg). The minimum amount of glycogen was found in foot 31.32± 0.0023 in the winter season (Table 2).

Lipid content in the foot, mantel, gill and hepatopancreas. The lipid content was maximum in foot and mantle during summer and minimum in monsoon and winter seasons. *L. marginalis* showed maximum values of lipid in foot 14.74± 0.6228, in mantel, it is 6.5± 1.1401, in gill 7.87± 0.1528 and in hepatopancreas 4.4± 0.5477. The minimum value of lipid observed in foot 2± 0.4472, in mantel 2.6± 0.5477, in gill 2.1± 0.2683 and in hepatopancreas 0.92± 0.0043 (Table 3).

**Table 1:** Month wise variations in total protein content from foot, mantel, gill and hepatopancreas of *L. marginalis*

<table>
<thead>
<tr>
<th>MONTHS</th>
<th>FOOT (mg/gm)</th>
<th>MANTEL (mg/gm)</th>
<th>GILL (mg/gm)</th>
<th>HEPATOPANCREAS (mg/gm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 2013</td>
<td>26± 0.0178</td>
<td>26± 0.0294</td>
<td>29± 0.0054</td>
<td>41± 0.0148</td>
</tr>
<tr>
<td>Feb</td>
<td>26± 0.0228</td>
<td>26± 0.0151</td>
<td>41± 0.0089</td>
<td>50± 0.0650</td>
</tr>
<tr>
<td>Mar</td>
<td>103± 0.0924</td>
<td>136± 0.1868</td>
<td>187± 0.6507</td>
<td>287± 0.0258</td>
</tr>
<tr>
<td>Apr</td>
<td>271± 0.0367</td>
<td>287± 0.0258</td>
<td>298± 0.0030</td>
<td>304± 0.0065</td>
</tr>
<tr>
<td>May</td>
<td>263± 0.0206</td>
<td>263± 0.0121</td>
<td>295± 0.0657</td>
<td>298± 0.0083</td>
</tr>
<tr>
<td>Jun</td>
<td>261± 0.0155</td>
<td>263± 0.0206</td>
<td>288± 0.0499</td>
<td>294± 0.0532</td>
</tr>
<tr>
<td>July</td>
<td>164± 0.0576</td>
<td>165± 0.0958</td>
<td>200± 0.0310</td>
<td>229± 0.1353</td>
</tr>
<tr>
<td>Aug</td>
<td>180± 0.1175</td>
<td>120± 0.0206</td>
<td>133± 0.0593</td>
<td>162± 0.6035</td>
</tr>
<tr>
<td>Sep</td>
<td>55.8± 0.0106</td>
<td>80± 0.1253</td>
<td>123± 0.0011</td>
<td>142± 0.0025</td>
</tr>
<tr>
<td>Oct</td>
<td>46.5± 0.0136</td>
<td>57± 0.0661</td>
<td>65± 0.0853</td>
<td>88± 0.1790</td>
</tr>
<tr>
<td>Nov</td>
<td>20± 0.0104</td>
<td>32± 0.0205</td>
<td>45± 0.0193</td>
<td>88± 0.1790</td>
</tr>
<tr>
<td>Dec 2013</td>
<td>20± 0.0104</td>
<td>26± 0.0013</td>
<td>29± 0.0452</td>
<td>29± 0.0054</td>
</tr>
</tbody>
</table>

**Table 2:** Month wise changes in glycogen content in *L. marginalis*

<table>
<thead>
<tr>
<th>MONTH</th>
<th>FOOT (mg/gm)</th>
<th>MANTEL (mg/gm)</th>
<th>GILL (mg/gm)</th>
<th>HEPATOPANCREAS (mg/gm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 2013</td>
<td>36.27± 0.0079</td>
<td>38.63± 0.0148</td>
<td>36.27± 0.0136</td>
<td>50.59± 0.0230</td>
</tr>
<tr>
<td>Feb</td>
<td>46.00± 0.0005</td>
<td>51.29± 0.0068</td>
<td>47.29± 0.0035</td>
<td>53.37± 0.0029</td>
</tr>
<tr>
<td>Mar</td>
<td>71.32± 0.3687</td>
<td>79.37± 0.3498</td>
<td>58.32± 0.2429</td>
<td>93.40± 0.1714</td>
</tr>
<tr>
<td>Apr</td>
<td>121.14± 0.1959</td>
<td>201.08± 0.2688</td>
<td>143.98± 0.4481</td>
<td>214.77± 0.4548</td>
</tr>
<tr>
<td>May</td>
<td>137.22± 0.0009</td>
<td>309.62± 0.0079</td>
<td>275.57± 0.0778</td>
<td>309.62± 0.5184</td>
</tr>
<tr>
<td>Jun</td>
<td>71.27± 0.0181</td>
<td>135.51± 0.0527</td>
<td>80.34± 0.0151</td>
<td>285.11± 0.0277</td>
</tr>
<tr>
<td>July</td>
<td>36.27± 0.0131</td>
<td>39.20± 0.0017</td>
<td>36.27± 0.0048</td>
<td>50.29± 0.0004</td>
</tr>
<tr>
<td>Aug</td>
<td>34.59± 0.1046</td>
<td>38.63± 0.009</td>
<td>35.72± 0.0005</td>
<td>40.40± 0.0004</td>
</tr>
<tr>
<td>Sep</td>
<td>34.59± 0.0016</td>
<td>36.86± 0.0010</td>
<td>34.59± 0.1046</td>
<td>36.27± 0.0005</td>
</tr>
<tr>
<td>Oct</td>
<td>33.48± 0.0011</td>
<td>38.02± 0.0015</td>
<td>33.48± 0.001</td>
<td>38.02± 0.0010</td>
</tr>
<tr>
<td>Nov</td>
<td>33.48± 0.001</td>
<td>36.86± 0.0138</td>
<td>32.95± 0.0038</td>
<td>39.20± 0.0005</td>
</tr>
<tr>
<td>Dec 2013</td>
<td>31.32± 0.0023</td>
<td>34.40± 0.0014</td>
<td>26.23± 0.0081</td>
<td>32.39± 0.0048</td>
</tr>
</tbody>
</table>
CONCLUSION

Nutritive value showed Changes in total protein, glycogen and lipid content from foot, mantel, gill and hepatopancreas of *L. marginalis* was studied from Jan 2013 to Dec 2013. In *L. marginalis* maximum protein content was found in hepatopancreas 304± 0.0065 mg/gm minimum in winter from foot 20± 0.0104 mg/gm. Glycogen content was more during summer season in all tissues. Maximum glycogen was found during summer season in hepatopancreas 304± 0.0065 mg/gm and mantel tissue (309.62± 0.0079 mg). The minimum amount of glycogen was found in foot 31.32± 0.0023 in the winter season. The lipid content was maximum in foot and mantle during summer and minimum in monsoon and winter seasons. Values of lipid observed from foot 14.74 ± 0.6228 and from mantel it is 6.5± 1.1401.

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