Physicochemical properties of lipids extracted from Tenebrio molitor larvae

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Introduction

Nutrients Richness

1. Protein content of insects ranges from 15% to 81% (dry basis), which is of good quality and high digestibility (Ramos-Elorduy et al., 1997).
2. They are also rich sources of fat, vitamins and minerals, especially iron and zinc (Akinnawo & Ketiku, 2000).

Lipid Content

1. Fat content among various edible insects ranges from 1.0% (Coleoptera) to 77% (Lepidoptera) (Rakakantong et al., 2010).
2. Insects often establish metabolic reserves, such as fats, especially during immature stages, for example larvae.

Unsaturated Fatty Acids

1. Polysaturated fatty acids were most predominant fatty acids, followed by saturated fatty acids and monounsaturated fatty acids in all the investigated insects (Rakakantong et al., 2010).
2. Insects are good source of important fatty acid, which should be considered for human consumption.

Results and discussion

<table>
<thead>
<tr>
<th>Protein &amp; Fat Content (% dry matter) of Tenebrio molitor larvae</th>
<th>Commercial</th>
<th>Lab reared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fat content</td>
<td>30%</td>
<td>30%</td>
</tr>
</tbody>
</table>

Fatty Acid profile of Tenebrio molitor larvae

<table>
<thead>
<tr>
<th>Fatty Acids</th>
<th>0%</th>
<th>5%</th>
<th>10%</th>
<th>15%</th>
<th>20%</th>
<th>25%</th>
<th>30%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturated</td>
<td>10%</td>
<td>15%</td>
<td>20%</td>
<td>25%</td>
<td>30%</td>
<td>35%</td>
<td>40%</td>
</tr>
<tr>
<td>Monounsaturated</td>
<td>50%</td>
<td>45%</td>
<td>40%</td>
<td>35%</td>
<td>30%</td>
<td>25%</td>
<td>20%</td>
</tr>
<tr>
<td>Polyunsaturated</td>
<td>40%</td>
<td>35%</td>
<td>30%</td>
<td>25%</td>
<td>20%</td>
<td>15%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Thermal profiles (DSC curves)

Material and methods

Samples

1. Two batches of mealworms were purchased from a local supplier.
2. Three batches reared in lab were considered.

Methods

1. All the larvae were freeze dried during 48h before analysis and stored at 4°C before analysis.
2. Protein estimation was done using dumas method.
3. Lipid extraction was done by a cold extraction technique using 2:1 chloroform/methanol as solvent.
4. Fatty acid compositions were determined by gas chromatography on a HP 6890 Series GC System apparatus fitted with a HP 7683 Series injector and flame ionization detector.
5. Thermal profile was analyzed by differential scanning calorimetry Q1000 DSC connected to refrigerated cooling system utilizing aluminum SFI pans.

Objectives

1. Quantify the level of fat content in Tenebrio molitor larvae (mealworms) which are potential oil substitute.
2. To investigate the effect of diet on the fat composition.

Conclusion

The level and quality of lipid content could be considered as sufficient & it offers potential for oilseed substitute.

Tenebrio molitor larvae (mealworms) are potentially important source of unsaturated fatty acids specially oleic and linoleic acids.

The chemical composition and the thermal properties of the samples varied according to their origin. It should be interesting to further investigate the effect of diet on the fat composition.

References