Cocoa is the main ingredient in making chocolate. Small-scale producers in the Philippines process their cocoa beans into “tableya,” which is a native chocolate confection.

Pili nut products dominate world export market with Bicol supplying 80% of the total output volume. Limited technology on its commercial production led to the products innovation for wider consumer reach.

**OBJECTIVES**

1. Develop a chocolate-enrobed pili nut bites
2. Determine the nutrient composition
3. Analyze proximate and microbial content or prototype products
4. Conduct physico-chemical activities: Water Activity, Moisture content, Color
5. Determine sensory properties
6. Conduct shelf-life study using moisture sorption isotherm
7. To estimate product cost for suggested packaging
**METHODOLOGY**

**Sourcing out raw materials**
Pili nuts were produced from Bulan, Sorsogon and chocolate blocks were purchased from Chocolate Lover’s, Mandaluyong.

**Screening**
Screening was done using general factorial with the following parameters: Chocolate type, freezing time and tempering temperature.

**Optimization**
Pili nuts were coated in three types of chocolates and was optimized using Response Surface Methodology D-optimal experimental design.

**Shelf-life**
The products were subjected to proximate, water activity, color, microbial and shelf-life analyses. Sensory acceptability was evaluated by thirty (30) sensory panelists using 9-point Hedonic Rating Scale and Quantitative Descriptive Analysis (QDA) using fifteen (15) trained panelists.

**Technology Transfer**
Product cost was estimated based on the proposed type of packaging for selling price recommendation.

---

**RESULTS**

Table 1. Microbial content of chocolate-enrobed pili bites

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Premium</th>
<th>Dark sweet</th>
<th>Bitter sweet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerobic Plate Count (CFU/g)</td>
<td>8.3 x 10²</td>
<td>3.0 x 10²</td>
<td>&lt;250 est.</td>
</tr>
<tr>
<td>Coliforms (MPN/g)</td>
<td>&lt;1.8</td>
<td>&lt;1.8</td>
<td>&lt;1.8</td>
</tr>
<tr>
<td>Yeasts and Molds (CFU/g)</td>
<td>&lt;10 est.</td>
<td>&lt;10 est.</td>
<td>&lt;10 est.</td>
</tr>
<tr>
<td>E. Coli (MPN/g)</td>
<td>&lt; 1.8</td>
<td>&lt; 1.8</td>
<td>&lt; 1.8</td>
</tr>
<tr>
<td>S. Aureus (CFU/g)</td>
<td>&lt;10 est.</td>
<td>&lt;10 est.</td>
<td>&lt;10 est.</td>
</tr>
</tbody>
</table>

Aerobic plate count are high but samples were negative for Coliforms and E. coli and no Yeast and Molds and S. aureus were detected. Microbial analysis revealed that product was acceptable, safe and fit for human consumption.

Table 2. Proximate analyses of chocolate-enrobed pili bites

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Premium</th>
<th>Dark sweet</th>
<th>Bitter sweet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Carbohydrates, g/100g</td>
<td>57.3</td>
<td>47.5</td>
<td>54.8</td>
</tr>
<tr>
<td>Ash, g/100g</td>
<td>1.6</td>
<td>2.3</td>
<td>1.6</td>
</tr>
<tr>
<td>Moisture, g/100g</td>
<td>1.3</td>
<td>1.2</td>
<td>1.3</td>
</tr>
<tr>
<td>Protein (N x 6.23), g/100g</td>
<td>5.0</td>
<td>6.2</td>
<td>31.0</td>
</tr>
<tr>
<td>Total Fat, g/100g</td>
<td>34.8</td>
<td>42.8</td>
<td>39.2</td>
</tr>
</tbody>
</table>

Test for quality descriptive analysis shows that all three chocolate samples product are positively accepted with an average general acceptability of 10.5.

Figure 1. Qualitative descriptive analysis test of chocolate pili bites.
RESULTS

Moisture sorption isotherm test shows that bittersweet chocolate had a longer shelf-life of 253 days in contrast to premium and dark sweet for 167 and 173 days, respectively.

NUTRITIONAL INFORMATION

10 g of chocolate-enrobed pili bites contains:

- 60 kcal energy
- 4 g Total fat
- 2 – 2.5 g Saturated fat
- ≤ 5 g Sodium
- < 1 g Dietary Fiber
- 5 g Total carbohydrates
- 4 g Sugar

Figure 2. Predicted shelf-life of three products

Figure 3. Chocolate-coated pili bites packed in stand-up pouches

CONCLUSION AND RECOMMENDATION

Chocolate-coated pili nut bites were successfully produced and found to be acceptable to the general consumers.

A scale up production is recommended to determine its feasibility for commercial production.

To improve the method of tempering to achieve a glossier appearance of chocolate bites.

Determine beforehand the shelf-life of the chocolate blocks from the retail market.

ACKNOWLEDGMENT

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