OPTIMIZING PRODUCTION PROCESS OF SEASONING POWDER MADE FROM FERMENTED FISH PRODUCTS

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Abstract

Flavor enhancer in form of seasoning powder is commonly made from meat or poultry, seldom found from fish. In this research, two kinds of seasoning powder were produced from fermented whole fish and fish paste with addition of some spices and other ingredients. The use of clove and cinnamon has been applied in combination with salt in fermentation process in order to inhibit the histidine decarboxylase (HDC) activity based on previous study.

The objective of this research was to optimize the production process of seasoning powder made from fermented fish products and to observe the change of moisture content during storage. The method of this research was carried out in two steps. The first step was to optimize the production of seasoning powder made from fermented whole fish and fish paste in small scale (4kg of raw material). The best technique was selected based on the sensory test of texture, odor and color. The product produced was then measured for its product and nutrition profile such as yields, proximate analysis, iodine, cobalamine, and iron content. The data obtained was processed through quantitatively descriptive. The use of clove and cinnamon in accordance to the production of fermented whole fish and fish paste and the use of other spices and ingredients such as garlic-shallot-pepper-sugar-tamarind-ginger by the production of seasoning were applied according to Mahendradatta et al. (2011). The next step was to determine the change of moisture content during eight weeks storage at room temperature with three different packaging materials, i.e: aluminum foil, polypropylene plastic and oil paper.

After optimizing of processing for making seasoning powder, the analyses of product and nutrition profile have been conducted. The result showed that the yields, moisture content, protein, lipid, carbohydrate, ash (proximate analysis), iodine, cobalamine, and iron of seasoning powder made from fermented whole fish were 47.98%, 6.38%, 32.52%, 4.37%, 20.29%, 36.47%, 172.20μg, 96.35ppm, and 10.99 μg respectively. Whereas the result of that made from fish paste was 39.49%, 5.7% 25.5%, 6.6%, 24.9%, 34.2%, 118.58μg, 139.72 ppm, and 14.66 μg, respectively. There was an increase of moisture content during storage of seasoning powder made from fermented whole fish and fish paste as well. Aluminum foil is suitable for packing of seasoning powder made from fermented whole fish and fish paste as well.

Keywords: fermented whole fish, fish paste, seasoning powder, spices

1. INTRODUCTION

Both synthetic and natural flavor as food additive are needed to enhance sensory characteristics. According to the Regulation of Indonesian Ministry of Health No. 722/Menkes/Per/IX/88, flavor enhancer is defined as food additive which can add, enhance and establish taste and flavor. Some dishes need flavor enhancer to increase or establish the sensory attributes particularly the taste and flavor of the dishes. Flavor enhancer in form of seasoning powder is commonly made from meat or poultry, seldom found from fish. In this research, food enhancer was produced from fermented fishery products with addition of some spices and other ingredients. The use of clove and cinnamon has been applied in combination with salt in fermentation process in order to inhibit the histidine decarboxylase (HDC) activity based on previous study. The high HDC-activity may accelerate the formation of histamine as a result of decarboxylation process from free amino acid histidine. Histamine (1H-imidazol-4-ethanamine) is a compound of biogenic amine group. Besides it is found naturally in foodstuffs, histamine can occur during processing of foodstuffs through decarboxylation of free amino acid histidine. High protein foodstuffs, which are spoiled by microorganism activity, could lead to high histamine content (Beutling, 1996). The use of
spice and herb can inhibit the HDC activity and histamine formation, as well, and also give the specific flavor of the product.

In this research seasoning powder was made from two kinds of fermented fish products, i.e.: fermented whole fish and fish paste. Fermented whole fish was processed from “kembung” fish or short bodied-mackerel. Short-bodied mackerel (Rastrelliger neglectus) is found in large amount and one of many important fish in Indonesian sea. This fish belongs to small pelagic fish group which relatively small in size and lives in sea surface like other pelagic fish such as “layang”, “lemuru”, “teri”, and “layur” (Purwaka, 1994). Gazza minuta or “peperek” was used to produce fish paste due to the overflow production and this fish is seldom exploited. All species of this fish are luminous. It is caused by bacteria which live symbiotically with this fish. Those are histamine-forming bacteria, such as Vibrio harveyi, Vibrio fisheri, and Photobacterium leiognathidae (Ramesh and Venugopalan, 1986).

2. MATERIAL DAN METHOD

2.1 Material

Raw material used in this research, i.e; “kembung” and “peperek” fish was bought from fish market, whereas spices and other ingredients were bought from traditional market in Makassar. Chemicals used for analyses were bought from chemicals distributor in Makassar.

2.2 Method

Research has been conducted in two steps, namely the optimizing production process of seasoning powder made from fermented whole fish and fish paste at the first step and the change of moisture content during storage of products under different packaging material.

2.2.2 Optimizing process

At the first step of research, the production process was optimized in order to produce the best seasoning powder. Each process was divided in two namely making of fermented whole fish or fish paste and production of seasoning powder by applying the spices and other ingredients with the concentration obtained from previous study. The differences between both processes were the fermentation step. Drying technique was carried out by using drying-machine (blower type) and drying under sunlight. The indicator of best process was observed qualitatively from texture, odor and color of end product.

After processing, the product profile was analyzed, i.e: the yields, proximate analyzes (moisture, protein, lipid, ash, carbohydrate), iodine, cobalamine, and iron. Proxymate analysis has been conducted according to AOAC (1980) and to determine nutrition content of products, Carbohydrate was determined by difference (James, 1999) Other nutrition content such as iodine (I) and cobalamine (vitamin B12) were analyzed in Laboratory of Physics, Faculty of Human Ecology, Bogor Agriculture Institute (IPB) whereas iron (Fe) was analyzed in Laboratory of Evaluation, Department of Agriculture Industrial Technology, Bogor Agriculture Institute (IPB). The data was processed quantitatively descriptive.

2.2.3 Change of moisture content

The optimized process was applied to produce seasoning powder which then packed by using aluminum foil, plastic polypropylene (pp) and oil paper. The products were stored for eight weeks and the change of moisture content was observed. The data was processed quantitatively descriptive.
3. RESULT AND DISCUSSION

3.1 Optimizing process

The best concentration of clove and cinnamon which gave the lowest HDC activity was applied based on previous study. It has been shown that combination of garlic-shallot-pepper-sugar-tamarind-ginger gave the lower HDC activity than combination of garlic-shallot-pepper (Mahendradatta et al., 2011). Other research has been carried out to observe the change of histidine decarboxylase (HDC) activity on fermented fish-based products, i.e. peda (fermented whole fish) and fish paste treated with salt only and combination of salt and clove-cinnamon. Result showed that there was a decrease of HDC activity during fermentation of these products (Mahendradatta and Adiansyah, 2007). It indicated that these ingredients have ability to inhibit the activity of histidine decarboxylase enzyme, which could support the formation of histamine. Histamine poisoning, which result from ingestion of foods that contain considerable amount of histamine, has been one of the most widely known incidents in food poisoning and reported to be one of the major illnesses among food-borne diseases (Wendakoon & Sakaguchi, 1995). The previous study reported that the sensory value of seasoning powder made from fish paste with combination of spices and other ingredients was acceptable by the panelist through Focus Group Discussion (FGD) (Mahendradatta et al., 2010).

Seasoning powder made from fermented whole fish was processed as displayed in Figure 1. Fermentation was conducted in two steps. At the advanced step fish was made half-dry to allow the activity of microorganism and autolytic process. Therefore it produced specially odor from propionic acid.

Figure 1. Processing of seasoning powder made from fermented whole fish
The other product was made from fish paste by different process. Fermentation step was conducted after drying of fish (mixed with salt, clove and cinnamon) in drying machine for 24 hr at 60°C. After application of other spices and ingredients the mixture was dried again under sunlight for 2 until 3 days. If this process was conducted by drying machine, the appearance of product was dark brown and the odor was too strong. Processing of seasoning powder made from fish paste could be seen in Figure 2.

During drying process, some changes are occurred specially change of color, texture and odor. By reducing moisture content, foodstuffs will contain protein, carbohydrate, lipid and mineral in high concentration, whereas vitamin-vitamin and color are usually lost or damaged (Belitz et al., 2001).

After processing, the product and nutrition profile was analyses. The result was displayed in Table 1.

Table 1. Product and nutrition profile of seasoning powder made from fermented whole fish and fish paste

<table>
<thead>
<tr>
<th>Composition</th>
<th>Amount</th>
<th>Fermented whole fish</th>
<th>Fish paste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture (%)</td>
<td></td>
<td>6.38</td>
<td>5.70</td>
</tr>
<tr>
<td>Protein (%)</td>
<td></td>
<td>32.52</td>
<td>25.50</td>
</tr>
<tr>
<td>Lipid (%)</td>
<td></td>
<td>4.37</td>
<td>6.60</td>
</tr>
<tr>
<td>Carbohydrate (%)</td>
<td></td>
<td>20.29</td>
<td>24.90</td>
</tr>
<tr>
<td>Ash (%)</td>
<td></td>
<td>36.47</td>
<td>34.20</td>
</tr>
<tr>
<td>Iodine (I) (µg)</td>
<td></td>
<td>172.20</td>
<td>118.58</td>
</tr>
<tr>
<td>Iron (Fe) (ppm)</td>
<td></td>
<td>96.35</td>
<td>139.72</td>
</tr>
<tr>
<td>Cobalamine (vit B12) µg</td>
<td></td>
<td>10.99</td>
<td>14.66</td>
</tr>
<tr>
<td>Yields (%)</td>
<td></td>
<td>47.98</td>
<td>39.49</td>
</tr>
</tbody>
</table>
During fermentation some compounds were produced such as glutamat acid, a main metabolit which acted as flavor and taste enhancer. Dominant flavor of seasoning powder came from fish paste and clove. Whereas seasoning powder made from fermented whole fish gave the dominant flavor from clove and cinnamon. Sulfur compound such as sulfide, mercaptan and disulfide contributed specific odor. Besides that, carbonyl compound gave perhaps stimulating odor in fishery product that processed through drying, salting and fermentation (Adawiyah, 2007). Clove affected flavor of food due to oleorecine compound which had strong flavor and heat stabile (Hirasa and Takemasa, 1998).

Seasoning powder produced contained enough amounts of I, Fe and cobalamine (Table 1). It indicated that this product was potential to be developed due to nutrition compound that contributed positive effect on human health. Although seasoning powder was applied only in few amounts the health benefit was important to be considered. Seasoning powder produced had low water content and it might show the stability of product during storage.

3.2 Change of moisture content

Water is present in practically every foodstuff, in a range that may vary from extremely low values in dried products to extremely high ones in beverages. The water content has significantly importance for a number of reasons. The determination of water content is therefore the most frequent general analysis performed on foodstuffs. The amount of water in food often determines its nutritive value and taste. The stability and shelf life of foods are highly dependent on water content, since it is crucial for microbiological life and most enzymatic activities (Isengard, H.-D., 2001).

Method used here for determination of water content was oven drying which measure a mass loss under certain conditions. The mass loss is not only caused by loss of water but by the loss of all volatile substances under the drying conditions, comprising those already contained in the original sample and those produce by the heating process. Based on this, the result of this drying method should not be called water content. The term “moisture” is often used, although it is commonly used as a synonym of water (Isengard, H.-D., 2001).

The change of moisture content in seasoning powder made from fermented whole fish and fish paste during storage was displayed in Figure 3 and 4 as follows.
The result showed that there was an increase of moisture content during storage in all type of packaging. Seasoning powder made from whole fermented fish which packed with aluminum foil gave the lowest moisture content until the end of storage time whereas that packed with oil paper gave the highest moisture content. Moisture content of the product packed by aluminum foil, plastic pp and oil paper at the end of storage time was 10.02%, 17.68%, and 40.35%, respectively. The same result was showed also by seasoning powder made from fish paste (Figure 4).

![Figure 4. Change of moisture content during storage of seasoning powder made from fish paste](image)

The moisture content of seasoning powder made from fish paste packed by aluminum foil, plastic popyprophylene and oil paper was 19.90%, 20.70%, and 41.50%, respectively. Both products showed that aluminum foil has good effect as packaging of seasoning powder especially on moisture content. Aluminum foil was thicker than other packaging material used in this research. The thickness of packaging material closely related to its permeability. The lower permeability of material the more difficult can be passed by gas and moisture. As a consequent, product packed is not easy to be damaged (Syarief et al., 1989).

4. CONCLUSION
Based on the research, it was concluded that

a. Processing of seasoning powder made from fermented whole fish was as follows: cleaning-washing, mixing with spices and salt, initial fermentation, crushing, mixing with other spices and sugar, advanced fermentation, drying, grinding, sieving

b. Product profile of seasoning powder made from fermented whole fish was as follows: the yields, moisture content, protein, lipid, carbohydrate, ash, iodine, cobalamine, iron were 47.98%, 6.38%, 32.52%, 4.37%, 20.29%, 36.47%, 172.20μg, 96.35ppm, and 10.99 μg respectively
c. Processing of seasoning powder made from fish paste was as follows: cleaning-washing, mixing with spices and salt, first drying, crushing, mixing with other spices and sugar, fermentation, second drying, grinding, sieving.

d. Product profile seasoning powder made from fish paste was as follows: the yields, moisture content, protein, lipid, carbohydrate, ash, iodine, cobalamine, iron, 39.49%, 5.70%, 25.50%, 6.60%, 24.90%, 34.20%, 118.58μg, 139.72 ppm, and 14.66 μg, respectively.

e. Aluminum foil is suitable for packing seasoning powder based on the lower change of moisture content during storage than plastic polypropylene and oil paper.

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