

## Premix formulation for making the Indonesian otak-otak

A B Tawali<sup>1</sup>, N Wakiah<sup>1</sup>, A R Ramli<sup>2</sup>, M Mahendradatta<sup>1</sup>, S Tawali<sup>3</sup> and S Made<sup>4</sup>

<sup>1</sup>Department of Food Science and Technology, Hasanuddin University, Jl. Perintis Kemerdekaan KM 10, Makassar, 90245, Indonesia.

<sup>2</sup>Centre of Information, Dissemination and Property Rights, Hasanuddin University, Jl. Perintis Kemerdekaan KM 10, Makassar, 90245, Indonesia.

<sup>3</sup>Department of Medicine, Hasanuddin University, Jl. Perintis Kemerdekaan KM 10, Makassar, 90245, Indonesia.

<sup>4</sup>Department of Marine Science and Fisheries, Hasanuddin University, Jl. Perintis Kemerdekaan KM 10, Makassar, 90245, Indonesia.

E-mail: *andi.rahmayanti28@gmail.com*

**Abstract.** Otak-otak is one indigenous foods from Indonesia which made from fish paste, tapioca flour and spices. The aim of this research was to produce premix flour for making otak-otak using mackerel surimi, tapioca flour and spices and to evaluate their chemical properties and sensory acceptability of the product. Mackerel surimi was first dried, milled into powder form then mixed with tapioca flour and spices. The result showed that, otak-otak which made from Premix-B formula (40% mackerel surimi powder and 60% tapioca flour) was the best result for all sensory attributes. It presented “like moderately” for hedonic score. Protein, ash, moisture, carbohydrate, and fat contents of the premix-B formula were 23.51%, 2.44%, 7.31%, 71.02%, 4.28%, respectively, which met the SNI requirements. Overall, this study clearly showed that it was possible to make otak-otak with less complicated process and the product did not have any negative results on sensory perception.

### 1. Introduction

Fish is one of the most abundant natural resources in South Sulawesi, Indonesia. South Sulawesi has a favorable geographical conditions because it is surrounded by the sea. According to the 2015 Statistics Indonesia, the fish production from marine reached 295 239.20 tonnes [1]. These potential resources must be managed properly so that the protein needs of Indonesian people can be fulfilled.

Fish-based diversification product is done continuously, one of the most popular fish product in Indonesia is otak-otak. Otak-otak is an indigenous food from Indonesia which made from fish paste, tapioca flour and spices. This product can be served as snack or as part of meal. In Malaysia, otak-otak is a popular street food among tourist and locals [2]. The type of fish used to make otak-otak vary, but the most commonly used in Indonesia is mackerel because it contains low fat and has a good capability for gel forming.

The preparation of otak-otak from fresh mackerel takes quite a long time. It takes several steps from preparing fish paste until otak-otak is ready to eat. In addition, nowadays, the food processing are required to follow the trend and consumer taste who tend to prefer instant process and easy to serve product. On the other hand, the mackerel is not always available in the market and the quality is often the problems. Therefore, premix technology can be one of the alternative solutions.

Premix is a mixture of several different types of flour. This product is widely practiced in baking industries [3]. The purpose of the premix technology itself is to make a product consisting a balanced



formula that is easy to use and has a long shelf life. Moreover, premix technology can reduce the costs, quality and product standardization, optimization of labor, simply sanitization, and reduce the space of the raw material storage room [4]. In the present work, we described the premix production using mackerel surimi, tapioca flour and spices for making otak-otak and evaluated their chemical properties and sensory acceptability of the product.

## 2. Materials and Methods

### 2.1 Surimi Powder Preparation

The mackerel fish was cleaned from skin, bones, fins, and gill. The meat fish was washed with running water then minced into fish paste. The fish paste was leached with 0.3% NaCl solution with ratio of 1:4 (w/v) for 15 minutes at 5-10 °C. The leaching process was repeated for four times then filtered using filtered cloth. Surimi was dried using blower for 12 hours at 65 °C until the water content reach 4%. The dried surimi then grinded using grinder and sieved using a 100-mesh sieve.

### 2.2 Premixes preparation

There are three premixes were formulated by mixing surimi powder, tapioca flour and spices. Surimi powder was mixed with tapioca flour with the following ratio displayed in table 1. The spices then added into the mixture as much as 10% of the total volume of the mixture. The premix formulas and spices compositions could be seen in table 1 and table 2, respectively.

**Table 1.** Ratio of surimi powder and tapioca flour of premix formulas

Formula	Surimi Powder (%)	Tapioca Starch (%)
Premix-A	50	50
Premix-B	40	60
Premix-C	60	40

**Table 2.** Spices composition of the premix

Spices	Quantity (%)
Garlic powder	2.6
Onion powder	2.48
Coconut milk powder	64.00
Refined sugar	13.38
Refined salt	6.69
Flavor enhancer	10.51

### 2.3 Preparation of Otak-otak

Otak-otak was made by kneading each formulated premix and cold water (1:1) into dough. The dough was wrapped in banana leaves then steamed for 20-25 minutes at 90-100 °C. Freshly prepared otak-otak was analyzed for sensory attributes.

### 2.4 Sensory Analysis

Otak-otak made by premix formulas were subjected to sensory analysis for attributes of color, aroma, texture and taste using Hedonic Scoring Scale [5]. The scoring scale used was between 1-5 with the scores representing the hedonic attributes of 5,4,3,2,1 were “like very much”; “like”; “like moderately”; “dislike”; “dislike very much”, respectively. The samples were tested by 25 panelist.

### 2.5 Chemical Analysis

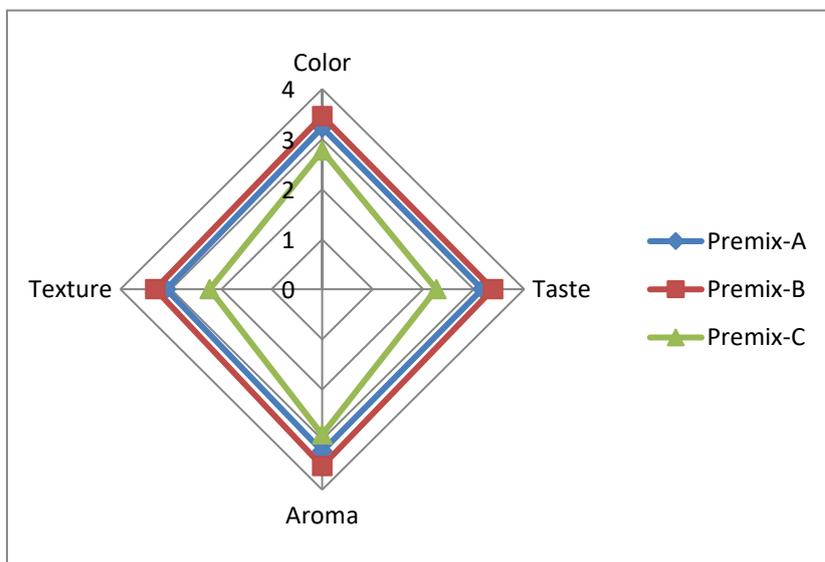
The chemical compounds of the premix best formula and otak-otak product were measured using AOAC methods [6]. Oven drying and weighing methods (926.12, 41.1.02) were used to measure the moisture

content. Ash content was measured by weighing and furnace methods at 600°C for 3-5 h (942.05, 4.1.10). Fat extraction using sohxlet distillation and chloroform as a solvent was used to measure the fat content (948.22, 40.1.05). The protein content was measured using kjeldahl distillation and the nitrogen value was converted to protein value using conversion factors (960.52, 12.1.07). The carbohydrate content was measured by difference method.

### 3. Result and Discussion

#### 3.1 Sensory analysis

Sensory analysis was an important test in the product development. Because, consumer point of view was always a predominant determinant of acceptability of a new product [7]. The best formula of the premix was evaluated by making otak-otak from each formula then subjected to sensory acceptability. The results was showed in figure 1.



**Figure 1.** Sensory analysis of otak-otak

Figure 1 showed that otak-otak which made from Premix-B formula has the highest score for all sensory attributes while Premix-C has the lowest. Product with Premix-B formula was scored 3.5 for color attributes. On a scoring scale, these corresponded to near “like” or “like moderately”. Similar trend was seen for the attribute of aroma wherein the score also 3.5 for Premix-B formula while Premix-C formula given the lowest score 2.9. This may be due to the ingredients used. The aroma was mostly influenced by mackerel surimi powder and spices. The spices could slightly hide the fishy aroma from fish but Premix-C formula contained the highest level of mackerel surimi powder resulting in strong fishy aroma. Meanwhile, color attributes contributed by the mackerel surimi powder. The color of otak-otak turned into slightly brown affected by Maillard reaction which occurred in drying process of mackerel surimi. Those indicated that higher level of mackerel surimi powder resulted more brown color of the product.

The score given for attribute taste and texture of Premix-B formula were 3.4 and 3.3, respectively. The texture of otak-otak was mostly contributed by tapioca flour. Tapioca flour gave a chewy mouth-feel to the products. This chewy texture was determined by the ratio of amylose and amylopectin which contained in starch. The taste of the otak-otak was mostly contributed by mackerel surimi powder and spices.

### 3.2 Chemical composition of premix

The chemical composition of premix-B formula and otak-otak product were presented in table 3. The moisture content was indicated the amount of water per unit weight of material and it was the most fundamental parameter because it affected the shelf life of the product. The moisture content of the premix-B formula was 7.27%. Those indicated that our products meet the SNI requirements. The standard of the premix flour referred to the standard of the fish flour. According to the SNI number 01-3709-1995 [8], the water content of the fish flour was maximum of 10%. Drying process of the mackerel surimi and other dried materials which used were the determinant factors of the low moisture content of the premix flour. In this study, the mackerel surimi was dried until the moisture content reached 4.03%. Moisture content from different premix have been reported. The moisture content of the premix for preparing flat breads and noodles were 4.05% [7]. The wide range of moisture content of the premix flour was affected by the moisture content of raw materials.

**Table 3.** Chemical composition of Premix-B and otak-otak products

Constituents	Premix-B (%)	Otak-otak (%)
Moisture	7.27	59.92
Fat	4.67	2.29
Protein	22.23	16.07
Ash	2.92	0.98
Carbohydrate	62.81	20.22

The fat content of premix was low (4.67%) due to leaching process in surimi production. The leaching process in surimi production increase the moisture content and reduce the contents of protein, fat and minerals [9]. The fat content of the premix was mostly contributed from coconut milk powder. Otherwise, the protein content of the premix was high at 22.23% which would have been contributed for almost all ingredients, particularly mackerel surimi which has high protein content. Fish was widely known as source of protein. Mackerel fish has high protein content and low fat. The protein and fat contents of mackerel fish were 27.6 % and 6.5%, respectively [10]. Similarly the carbohydrate content was also high at 62.81% which influenced by tapioca starch. On the other, the chemical composition of otak-otak which made by premix-B formula also meet the SNI requirements of otak-otak number 7757.2013 [8]. The standard of protein, ash, moisture and fat contents of otak-otak were 16%, 1.48%, 60%, and 5%, respectively.

## 4. Conclusion

It was concluded that the best formula of the premix for making otak-otak was Premix-B formula which consisted of 40% mackerel surimi powder and 60% tapioca flour. It was presented the hedonic score "like moderately" for all sensory attributes. Premix-B formula contained protein, ash, moisture, carbohydrate, and fat as much as 22.23%, 2.92%, 7.27%, 62.8%, and 4.67% of fat, respectively. Overall, this study clearly underlined that it was possible to make otak-otak with less complicated process and the product did not have any negative results on sensory perception.

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