PREFACE

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PREFACE

The International Symposium on Agricultural and Biosystem Engineering (ISABE) has been growing to be one of high-quality international symposiums in Indonesia in the field of Agricultural and Biosystem Engineering. Hence, this year, Department of Agricultural and Biosystems Engineering, Universitas Gadjah Mada in collaboration with Department of Agricultural Technology, Hasanuddin University proudly present **The 3rd ISABE 2019**.

The theme of The 3rd ISABE 2019, The Role of Agricultural and Biosystem Engineering towards Sustainable Development Goals 2030: Food, Water, Energy and Environment, has been carefully chosen to emphasize our role in achieving Sustainable Development Goals 2030. Through this meeting, we provide great opportunities to deliver and discuss your research to broader audiences. Moreover, this symposium offers an occation to extend our network among academia, government and industry which increases the possibilities for collaboration.

Our symposium is rich and varied with 1 keynote speech and 7 invited talks. I am very pleased to welcome the keynote speaker: Dr. Ir. Andi Amran Sulaiman, MP (Minister of Agriculture of the Republic Indonesia) and invited speakers: Prof. Jong Hoon Chung (President of Asian Agricultural and Biological Engineering Association, President of Korean Society for Agricultural Machinery), Assoc. Prof. Dr Rosnah Shamsudin (President of Malaysian Society of Agricultural and Food Engineers), Prof. Bart Nicolai (KU Leuven, Belgium), Prof. Armando Apan (University of Southern Queensland, Australia), Prof. Yu Pin Lin (Associate Dean of College of Bioresources & Agriculture, National Taiwan University, Taiwan), Dr. Katharina Keiblinger (University of Natural Resources and Life Sciences Vienna, Austria), Dr. Bayu Dwi Apri Nugroho (Universitas Gadjah Mada, Indonesia). We thank you for your valuable contribution. I would like also to express my sincere gratitude to Indonesian Society of Agricultural Engineering (ISAE) and Korean Society for Agricultural Machinery (KSAM) for their support in this event.

Prior to the acceptance, all papers submitted were subjected to peer reviews. We would like to appreciate all authors who have contributed to this proceeding. We hope this proceeding will have a significant contribution to the field of Agricultural and Biosystems Engineering.

Arifin Dwi Saputro, Ph.D
Chair of Organizing Committee of The 3rd ISABE 2019.

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Premix Flour for Preparation of Empek-Empek Based on Surimi Technology

Premix Flour for Preparation of Empek-Empek Based on Surimi Technology

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Abstract. Empek-empek is one of signatured food from Indonesia which made from fish paste, tapioca starch, and other additional ingredients. The objective of this present work was to develop premix flour for making empek-empek using mackerel surimi and to evaluate their chemical characteristic and sensory attributes of the product. The mackerel fish was made into surimi, powdered, then mixed with tapioca starch and other additional ingredients. The following aspect were characterized including moisture, fat, protein, ash, carbohydrate content, and sensory acceptability of the premix product. The results showed that mackerel surimi flour at level of 66,67% is the recommended formula. The empek-empek which made from this premix flour presented hedonic score "like" for color and "like moderately" for aroma, texture and flavor. In conclusion, our premix can be used for preparing empek-empek with less complicated process and the product did not have any negative results on sensory acceptability.

1. Introduction

Surimi refers to a fish protein product consisting primarily of the myofibrillar protein fraction from one or more fish species. Surimi is made from minced fish that has been washed to remove fat and undesirable substances (such as blood, pigments, and odorous substances), and then mixed with cryoprotectants (such as sugar or sorbitol) to improve its frozen shelf life [1].

Indonesia has a potential resource from marine because the geographical condition that is surrounded by the sea. One of the most potential marine resources is fish. Based on the statistic data, Indonesia has reached 295239.20 tonnes when it comes to fish production [2]. Empek-empek is one of popular fish-based product in Indonesia.

Empek-empek is an indigeneous food from Indonesia, which served with sweet and sour sauce. This product is made from fish paste, tapioca starch, and spices. Empek-empek has a sharp flavor that comes from its main ingredients, the fish paste. Commonly, mackerel fish is used in empek-empek production because it has a good quality to forming a gel. The preparation of empek-empek takes a quite long time. On the other hand, the availability and quality of the product were a problem that

often occur in empek-empek production. Therefore, premix technology can be an one of the alternative solution In addition, the availability of raw mackerel is not always available in and product quality were also a problem in empek-empek production.

Premix is a mixture of several different types of flour [3]. The purpose of the premix technology itself is to make a product with balanced formula that is easy to use and has a long shelf life. In this present study, we aimed to develop premix for making traditional food "Empek-empek" using mackerel surimi and to evaluate their chemical characteristic and sensory attributes of the product.

2. Materials and Methods

2.1 Mackerel 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 $^{\circ}$C. The leaching process was repeated for four times then filtered using filtered cloth. The surimi was dried using blower for 12 hours at 65^{0}C until the water content reach 4%. The dried surimi then grinded using grinder and sieved using a 100-mesh sieve.

2.2 Premix preparation

Two premixes were formulated by mixing the ingredients in the following proportions. The formula of two premixes could be seen in table 1.

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

Material	Formula (%)	
	Premix I	Premix II
Tapioca flour	16.67	41.67
Surimi powder	66.67	41.67
Wheat flour	13.33	13.33
Salt	1.33	1.33
Garlic powder	1	1
Flavor enhancer	1	1

2.3 Empek-empek preparation

The empek-empek was made by kneading the formulated premixes and cold water (2:4) into dough. The dough was formed into oval shape, then boiled for 20-25 minutes at 100^{0}C. Freshly prepared empek-empek was subjected to sensory and chemical analysis.

2.4 Sensory Analysis

Sensory analysis are important equal as physical measurements, especially when developing new products. The empek-empek premix product were subjected to sensory analysis for the attributes of appearance, aroma, texture and taste using Hedonic Scale Scoring [4]. The scoring scale used 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 30 panelist. The analysis of empek-empek from premix formula was done on three different days. The samples were presented under white light at room temperature and members were asked to sip water in between to minimize the possibility of carry over taste, if any. No accompaniment was given with samples.

2.5 Chemical Analysis

The chemical compounds of the empek-empek premix best formula was measured using AOAC methods [5] with three replications for each parameter. Ash content was measured by weighing and

furnace methods at 600°C for 3-5 h (AOAC method 942.05, 4.1.10). The protein content was measured using kjeldahl distillation and the nitrogent value was converted to protein value using conversion factors (AOAC method 960.52, 12.1.07). Oven drying and weighing methods (AOAC method 926.12, 41.1.02) were used to measure the moisture content. Fat extraction using sohxlet distillation and chloroform as a solvent was used to measure the fat content (AOAC method 948.22, 40.1.05). The carbohydrate content was measured by difference method.

3. Result and Discussion

3.1 Sensory analysis

Organoleptic test is a test which carried out by using human senses through sensory stimulation. This test is performed on samples empek-empek to determine the best formulation of premix for making empek-empek. The number of panelists who participated were 30. The results are summarized in table 2.

Table 2. Sensory analysis of empek-empek that prepared from premix formula

Formulation	Color	Aroma	Flavor	Texture
Premix I	4.07	3.90	3.88	3.94
Premix II	2.91	3.07	3.44	2.06

The quality of food products generally depends on several factors. Color is one of the attributes that often determine the level of consumer acceptance of the product as a whole. The natural color of empek-empek is gray and the gray color was caused by gelatinization reaction.

Hedonic test showed that premix I formula presented hedonic score “like” color and “like moderately for aroma, texture and flavor, while the premix II formula presented “like moderately” only on flavor and aroma attributes. The texture and color of premix II formula showed hedonic score “dislike”. This may have been due to the ingredients which are used, such us tapioca starch. The texture of empek-empek tend to decrease with the decreasing of surimi powdered consentrations. This shows that this is related to the ability of surimi powder to form a gel that is sufficiently robust and transparent strongly supported as a component of the filler and adhesive. So that when the amount of surimi powder in the dough-empek empek reduced, the texture will decrease.

3.2 Chemical composition of premixes

The moisture content of the premix was 11.45%. Those indicated that our products does not meet the SNI requirements. The standard of the premix flour refers to the standard of the fish flour. According to the SNI number 01-3709-1995 [6], the water content of the fish flour is maximum of 10%. Drying process of the mackerel surimi and other dried materials which used were the determinant factors of the moisture content of the premix flour.

Table 3. Chemical composition of Premix-I formula

Contituents	Quantity (%)
Moisture	11.45
Ash	2.65
Protein	17.63
Fat	1.72
Carbohydrate	66.55

The ash content contained in empek-empek of flour premix of 1.60%. The ash content of meat is closely linked to its water content and protein content on a fat-free tissue. Insoluble minerals associated with proteins for minerals mainly associated with the non-fat part, lean meats often contain

high mineral or ash, in general has met the SNI for fish balls ash content, this is because the ash content of flour empek-empek premix is less than 3%, while the ash content at a maximum of 3% fish balls [7]. The protein content of the premix-I formula was high at 17.63% which contributed by mackerel surimi powder which has high level of protein. Mackerel fish has high protein content and low fat. The fat content that contained in premix-I formula was 1.72%.

Carbohydrate levels in Premix-I formula was 66.55%. Carbohydrate levels in premix-I formula can be influenced by the concentrations of tapioca flour. The carbohydrate content is also can be influenced by other components such as water, protein, ash and fat because of the *by different* used methods.

4. Conclusion

In conclusion, the mackerel surimi flour at level of 66,67% is the recommended formula to be used in making empek-empek from premix. The empek-empek which made from this premix presented hedonic score "like" for color and "like moderately" for aroma, texture and flavor. Therefore, our premix can be used for preparing empek-empek with less complicated process and the product didn't have any negative impact on sensory acceptability.

5. References

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