Introducing Eel Nugget as a Potential Alternative of High-protein Processed Food

Nenni Dwi Aprianti Lubis[1], Muhammad Ichwan[2] and Irina Keumala Nasution[3]
[1]*Department of Nutrition; Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia*
[2]*Department of Pharmacology and Therapeutic; Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia*
[3]*Department of Neurology; Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia*

Keywords: Eel, Nugget, Protein

Abstract: Consumption of healthy and nutritious food is necessary to fulfill one's need of energy and nutrition. Eel is a potential source of protein and other nutrients, however, its appearance does not look appealing for some consumers. Therefore, processing eel meat into a favourable processed food such as nugget is suggested to increase the utilization of eel as an alternative nutritious food. Nugget is one of the favourite processed food of all ages due to the savoury and palatable taste. Organoleptic test on eel nugget to a panel of respondents (using scale 1 to 5) showed the average score of 4.32, 4.28, 4.53, 4.37 and 4.42 for the color, smell, taste, texture and overall acceptability, respectively. Protein content estimation in eel nugget based on nutrients analysis and chemical analysis was 14,48% and 18.34%, indicating that the product fulfills Indonesian National Standard (SNI) requirement for minimal protein content in nugget (12%). We conclude that the eel nugget is a potential nutritious processed food to increase the consumption of eel meat as a source of protein in the community.

1 INTRODUCTION

Healthy and nutritious food consumption is essential to ensure adequate supply of energy and nutrients. Imbalance nutrients intake, especially in children, leads to suboptimal growth and development that will affect intelligence, immunity and overall health status (Almatsier, 2004). Protein is an essential part in daily food that can be obtained either from animal origin including meat, egg, fish and their processed forms or from plant origin such as soybeans and the processed form such as tofu, tempeh and soy milk. Generally, protein from animal origin is better from the plant origin due to the complete and rich content of amino acids and better digestibility (Muchtadi, 2010). Intake of protein is still relatively low in Indonesia i.e 4 %, compared to 15 % that was recommended by the Food and Agriculture Organization Regional Office for Asia and the Pacific (FAO/RAPA) (Hardinsyah, 2012).

Freshwater eel (Monophterus albus) is captured from the rice fields or cultivated to be sold as food source. It has tasty flavor and high protein content. Each 100 gram of gel contains 14,6-gram protein (PAGI, 2009). Moreover, eel aquaculture is easier, cheaper and not land-consuming, therefore it also potential for increasing income of the farmers than other fish culture (Anonimus). Due to its high nutrients value and availability, the freshwater eel was promoted as nutrients source in the 3rd Asian Congress of Nutrition in Jakarta in 1980 (Sarwono, 2003). However, its snake-like appearance does not so appealing for some people. Processing the eel meat into favourite processed food such as nugget can be a solution to increase the acceptance and consumption of this food source in the community. In the future, it is expected that this product can be developed as commercial processed food that can give positive economic impact for home industries and farmers. Moreover, the community is enriched with another alternative of healthy food from local source (Anonimus).

Lubis, N., Ichwan, M. and Nasution, I.
Introducing Eel Nugget as a Potential Alternative of High-protein Processed Food.
DOI: 10.5220/0010092008180820
In *Proceedings of the International Conference of Science, Technology, Engineering, Environmental and Ramification Researches (ICOSTEERR 2018) - Research in Industry 4.0*, pages 818-820
ISBN: 978-989-758-449-7

2 METHODS

Nugget was prepared following the home recipe that was adjusted following the formulation described by Bintoro (2008). The main ingredient in this recipe was the boneless-fillet of fresh-water eel that was bought in the local market. The fillet was crushed using food processor and then mixed with flour, onions, garlic, eggs, pepper, salt and sugar. The dough was then manually shaped and then steamed for 20 minutes. The steamed nugget was chilled in the fridge before being soaked in the egg white and covered with breadcrumbs. The nugget can be stored in the freezer or directly deep fried in palm oil until the color change to light brown.

2.1 Procedure of Food Acceptance Test

Palatability test was conducted to assess the consumers' acceptance to the product. Fifty-seven adult respondents were explained about the test and the parameters.The respondents were asked to determine their preference to the color, aroma, taste, texture and appearance of the eel nugget product into 5 level of preference ie. : dislike, quite dislike, neutral, quite like and like (Soekarto, 1985).

2.2 Nutrients Analysis and Chemical Properties

Nutrients analysis was performed based on the ingredients used in the formulation, by utilizing the program *Nutrisurvey 2007 for Indonesian.* Chemical analysis was performed by measuring the amount of crude protein by using Kjeldahl method.

2.3 Data Analysis

Data from palatability test, nutrients analysis and chemical analysis was analysed descriptively using simple tabultaion

3 RESULTS AND DISCUSSION

The result of palatability test about eel nugget product is shown in Table 1. Majority of respondents (>50%) gave highest score (score 5) indicating that the product is acceptable by the consumers. The nutrients value in 25-gram eel nugget is depicted in table 2 below.

Nugget is a processed meat product that has palatable taste and is accepted by the consumers of all ages (Badan Standarisasi Nasional, 2002). The commercially available nugget in the market are usually use chicken or saltwater fish as the main ingredients. Eel meat is a potential source of protein and other nutrients. Its calcium content is relatively higher than another fish species. Therefore the consumption of eel can support the growth of children and prevent osteoporosis in elderly (Almatsier, 2004; PAGI, 2009). It is usually sold as smoked or dried eel. Even though the delicious taste and high nutrients content, many people are reluctant to consume eel because of its creepy look. Developing an acceptable processed food with eel as the main ingredient can increase the utilization of this material to optimize the nutrition intake in the society.

Table 1: Palatability test of eel nugget product

Parameter	Skor 5		Mean	Std	95% Confidence interval for Mean	
	N	%			Lower bound	Upper bound
Color	33	57.89	4.32	1.003	4.05	4.58
Aroma	32	56.14	4.28	0.940	4.03	4.53
Taste	38	66.67	4.53	0.804	4.31	4.74
Texture	29	50.88	4.37	0.837	4.15	4.59
Overall Acceptance	29	50.88	4.42	0.778	4.21	4.63

Table 2: Nutrients value and chemical analysis.

Nutrients	Value		% of Energy	Chemical Analysis
Energy	257.78	Kcal		
Protein	9.33	g	14.48	18.34%
Fat	11.75	g		
Carbohydrate	28.79	g		
Fiber	1.33	g		
Vitamine A	604	µg		
Vitamine B1	0.06	mg		
Vitamine C	1.36			
Sodium	222.16	mg		
Calcium	30.96	mg		
Magnesium	33.64	mg		
Phosphor	109.36	mg		
Iron	0.93	mg		
Zinc	0.45	mg		

According to Indonesian National Standard (SNI), nugget product should contain minimal 12% protein. We have developed and tested the eel nugget product that contain higher protein content than standard (14.48%). Furthermore, the palatability test indicated that this product has good acceptability to the consumers. Hence this product can be marketed as an alternative high protein food to increase the animal origin protein consumption in Indoensia (Siagian). Moreover, this can also open new business sector for home industry to produce eel processed food and to give extra income to the farmers by doing aquaculture of freshwater eel.

4 CONCLUSIONS

Eel nugget is a potential high protein food product that can increase the protein intake to prevent nutrition problem in the society. Nugget is an acceptable form of processed food for all ages. The development of this product and its marketing bring up a potency for increasing economy sector in the society.

ACKNOWLEDGEMENTS

This work is funded by Non-PNBP and BPPTN USU 2018 grant, Community Service Council, Universitas Sumatera Utara (Ref. No. 330/UN5.2.3.2.1/PPM/2018)

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