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Children's Responses to the Addition of Indian Scad (Decapterus russelli) Fish Protein Concentrated and Flavor to Traditional Food

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ABSTRACT

Nutrition improvement efforts are by providing additional food in addition to food eaten daily with the aim of restoring nutrition and health for children aged 3-6 years. Additional food can be local or factory food. The purpose of this study was to determine the response of children to traditional food with a gapit cake with the addition of Indian scad (decapterus russelli) protein concentrated and flavor with sensory value analysis. The data design and analysis used are completely randomized design, analysis data with Kruskall wallis method. Using sensory parameters applied through hedonic tests, the determination of the best formula was carried out involving 30 panelists of untrained 3-6 years old children from 3 regions in Blora District. Research result organoleptic test of fresh indian scad fish averaged 7.204-7.548 and floating fish protein concentrate produced 33% of the raw material weight of fresh fish. The results of chemical tests on the protein concentrate of Indian scad fish are water content of 10.27%, ash content of 6.21%, fat content of 2.33%, protein content of 45.38%, carbohydrate content of 35.81%. The best organoleptic test result for the gapit cake formula is the addition of 10% concentration of indian scad fish FPC and 0.3% durian flavor which is preferred by children aged 3-6 years in Blora area with an average organoleptic odor value of 1.96, taste 1.97, colour 1.97, and texture 1.93 approach the like score 2. Nutrition-wise, the product has the composition of 7.29 % moisture, 0.85 % ash, 12.88 % protein, 5.36 % fat, and 35.81 % carbohydrate.

Keywords : *fish protein concentrate; fortification; gapit cake; children respons; proximate content*

Introduction

Children are the success or to the nation and development capital, so the health level of children must be maintained. One health effort that can be done is improving nutrition with the right quality (Kurdanti, Khasana, & Fatimah, 2019; Listryarini, Asriani, & Santoso, 2018). Nutrition improvement efforts are by providing additional food in addition to food eaten daily with the aim of restoring nutrition and health. Additional food can be local or factory food (Iskandar, 2017; Retnowati, Syamsianah, & Handarsari., 2013).

Indian scad fish (*Decapterus sp.*) are pelagic fish, and based on their size are classified as small pelagic fish (Prihartini, 2006). Fly fish have good quality with high nutritional content, protein at 22.0%, low fat content at 1.7% so it is more beneficial for health (Wibowo, Syamdidi, Assadad, & Muhamad, 2016). For the availability of fish, it can be seen from the spread of indian scad fish that are very spread in the waters of Indonesia Nugroho, Boesono, & Bambang, 2013). Flying fish production in 2017 reached 17.12% ranging from 195.96 million tons The price of indian scad fish was included in fish with a low selling price of around Rp. 19,000.00 to Rp. 20,000.00 the cheapest among other fish (BPS, 2017).

Protein concentrate is a product that is produced by removing as much as possible of fat and water so as to produce a high amount

of protein (Windsor, 2001), making Fish Protein Concentrate by cooking, pressing, and drying (Widyaningsih, Lawalata, & PS, 1986). Flavor is a combination of material characteristics in the form of sensation of taste and aroma. One way to get flavor in foods is by adding food flavors (BPOM, 2016)

Gapit cake is a traditional cake that is currently still popular in the community because of its sweet taste, dry texture, crisp and durable. Gapit cake is made from basic ingredients of glutinous rice flour, tapioca flour, granulated sugar, and liquid coconut milk (Nova & Kristiastuti, 2017).

Research on the fortification of indian scad fish protein concentrates into Gapit cake has not been done much so this research is very important to know the best concentration formula of indian scad fish protein concentrate and flavor in making traditional products of Gapit cake.

The purpose of this research is as one source of scientific information, about the utilization of fish protein concentrates that have high protein content and flavor added to the Gapit cake, with the hope of becoming an alternative source of supplementary feeding for children aged 3-6 years in Blora district.

MATERIALS AND METHODS

Time, location and type of data

This research was carried out from August 2019 - January 2020. The raw material used in the manufacture of fish protein concentrates is indian scad fish meat obtained from the Pasar Minggu fish market in South Jakarta.

The ingredients used in the loading of Gapit cake are glutinous rice flour, tapioca flour, coconut milk, sugar, salt, cooking oil. The flavoring material used by the brand of Red Bell is flavor of ambon banana, durian, and strawberry.

Research on making gapit cakes and the making of protein concentrates from Indian scad fish is done at the Fisheries Products Processing Laboratory at Fisheries College, proximate testing at the Chemical Laboratory of the Fisheries Polytechnic of Jakarta.

Tools and Materials

The study began with observations on the raw material of Indian scad fish. The raw material of the Indian scad fish is observed by using the organoleptic test of the freshness of the fish according to the Indonesian National Standard of fresh fish SNI 2729: 2013 (BSN, 2013), and making the protein concentrate of the Indian scad fish. In making the protein concentrate of the Indian scad fish quoted from a previous study Widyaningsih, Lawalata, & PS, (1986) can be seen in Figure 1. Making protein protein concentrates of fish starting from the taking of fish meat, grinder, steaming, pressing, drying, grinder become flour.

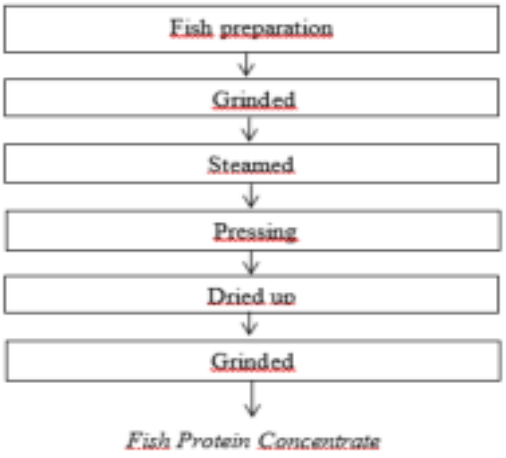

Figure 1. Steps for FPC preparation

In the main research, making a gapit cake was made by the addition of concentrated fish protein with various concentrations and the addition of flavor. Gapit cake quality analysis with organoleptic tests to get the selected formula. In making this cake, Gapit is quoted from a previous study of Kristiastuti, & Nova. (2017) the modification can be seen in Figure 2.

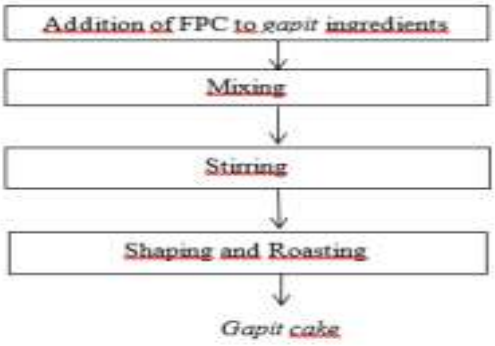

Figure 2. Steps for gapit preparation

The study began with the addition of FPC for gapit, mixing, stirring, shaping and baking to become a gapit cake. The initial ingredient formulation of making gapit cake before adding fish protein concentrate in Table 1.

Table 1. Initial formulation of making Gapit cake

Ingredients	Weight
Glutinous rice flour	1000 g
Tapioca flour	125 g
Salt	5 g
Garlic	10 g
Sugar	300 g
Coconut milk	150 g

Experimental design

This research was conducted by an experimental method. The experimental design used was a completely randomized design (CRD) consisting of six variable and three replications. The formulation of the addition of indian scad fish protein concentrate with a concentration of 10% and 20% of the weight of glutinous rice flour while the flavorings added are ambon banana, durian, and strawberry as much as 0.3% of the weight of the material, hoping to provide more benefits for the nutritional fulfillment of those who consume them. The types and description of variable used in this study can be seen in Table 2.

Tabel 2. Description of variable used

Treatmen	Description
A	10% FPC + 0.3% Ambon banana flavor
B	10% FPC + 0.3% Durian flavor
C	10% FPC + 0.3% Strawberry flavor
D	20% FPC + 0.3% Ambon banana flavor
E	20% FPC + 0.3% Durian flavor
F	20% FPC + 0.3% Strawberry flavor

Organoleptic testing of indian scad fish aims to determine the freshness of fish that will be used as a basis for making fish protein concentrate. The response to the general nature of fresh fish is the eyes, gills, mucus, meat, odor, and texture of the fish. Organoleptic tests were carried out on rather trained panelists, with 30 panelists with 5 observations of Indian scad fish.

Gapit cake test in this study uses a sensory test (BSN, 2006), this test aims to determine the panelist's response to the general quality properties, namely, aroma, taste, color, and texture. In this test panelists were asked to express their personal assumptions about their likes or vice versa. The hedonic test (aroma, taste, color, and texture) was carried out on 6 types of gapit cake formulas in Table 2. It aims to determine the level of addition of fish protein concentrations and flavor that can be accepted by children. The organoleptic test was carried out using 30 untrained panelists of kindergarten schoolchildren aged 3-6 years drawn randomly from 3 regions in Blora distric. Three replications was adopted so that in total there were 90 data. Panelist responses to organoleptic tests with criteria for liking and disliking the gapit cake.The results of the hedonic test in this study serve as the basis for determining the selected product.

Biochemical test

Proximate analysis Fish Protein Concentrate and of the final product gapit cake The proximate analysis consisted of moisture content analysis using the oven evaporation method following the Indonesian National Standard (SNI) 01-2891-1992 (BSN, 1992), ash content analysis using dry ashing method following the SNI 01-2891-1992 (BSN, 1992), protein content analysis using the Kjeldahl method (BSN, 2011), fat content analysis using the Soxhlet method SNI 01-2891-1992 (BSN, 1992), and carbohydrate content analysis using the by difference method (Nielsen, 2010).

Analysis data

The data obtained was tabulated using Ms. Excel 2016, data were analyzed by using Kruskal Wallis test at 95% confidence interval to determine whether the treatment had a significant influence on organoleptic responses of gapit cakes. If the treatment has a significant effect then proceed with the Duncan test to determine the best treatment. If the treatment has no significant effect, then a descriptive analysis is performed. Direct

descriptive analysis is also used to explain the parameters of odor, taste, color, and texture of the cake gapit.

Results And Discussion

Preliminary research included organoleptic testing of fresh fish raw materials, manufacture of Indian scad fish protein concentrates, and direct testing of Indian skad fish protein concentrates. Raw material for making FPC using Indian Scad fish can be seen in Figure 3, Organoleptic interval values of fresh Indian scad fish have an average freshness of 7,204-7,548, the organoleptic values of these fresh Indian scad fish meet the quality and product safety standard requirements of at least 7 (BSN, 2013).

Figure 3. Raw materials of fresh Indian scad fish

The production of FPC with raw materials of Indian scad fish fresh 10 kg which is processed produces an FPC of 3.33 kg or 33% of the initial weight. Steps for FPC preparation can be seen in Figure 1 and product indian scad fish FPC can be seen in Figure 4.

Figure 4. Indian Scad fish protein concentrate

The proximate composition of the Indian Scad fish FPC, which moisture 10.27%, Ash 6.21%, Fat 2.33%, Protein 45.38, Carbohydrate 35.81is presented in Table 3. The results of the 2.33% fish protein concentrate fat test showed that the concentrate made was type B FPC (Widyaningsih, Lawalata, & PS, 1986).

Tabel 3. Proximate analysis resultof composite gapit cake

Analysis	Wet based (%)
Moisture	10.27% ± 0.0701
Ash	6.21% ± 0.6480
Fat	2.33% ± 0.1440
Protein	45,38% ± 0.4977
Carbohydrate	35.81% ± 1.1799

The main research includes the stage of making a gapit cake with the addition of FPC and flavor, and the organoleptic testing stage to obtain selected products gapit cake with additional FPC and flavor can be seen Figure 5.

Description: A = 10% FPC+0.3% ambon banana flavor, B = 10% FPC+0.3% durian flavor, C = 10% FPC+0.3% strawberry flavor, D = 20% FPC+0.3% ambon banana flavor, E = 20% FPC+0.3% durian flavor, F = 20% FPC+0.3% strawberry flavor.

Figure 5. Gapit cake.

Organoleptic test gapit cake

The response to Gapit cake uses organoleptic test with odor, taste, color and texture parameters can be seen Figure 6 and analysis data to determine whether the treatment had a significant influence on

organoleptic responses of gapit cakes with Kruskall wallis test.

Odor

Odor has a key role in food delicacy (Boesveldt & Graff, 2017) and quickly gives the results of an assessment of the production of their likes or dislikes (Anwara, Aprita, & Irmayanti, 2019). Food odors occur when panelists capture volatiles in food by smelling the food (Kotthoff & Bücking, 2017).

Organoleptic test results showed that the average value of the level of panelists' preference for the odor of gapit cake ranged from 1.73-1.96. The highest favorite value in gapit cake with the addition of 10% FPC and durian flavor of 1.96 and the lowest favorite value in the gapit cake with the addition of 20% FPC and 0.3% durian flavor 1,73 can be seen in Figure 6. The results obtained based on the analysis of variance showed that the treatment did not have a significant effect on panelist ratings on the smell of Gapit cake ($p > 0.05$). Panelists did not question the odor of the gapit cake with the addition of FPC and flavor, this was also suspected because the odor of the FPC on the gapit cake had been minimized by adding flavor according to research conducted by Kholilah (2002), the smell of FPC and the flavor used has been minimized through a process.

Taste

Food taste occurs when panelists eat the food (Maina, 2018), from the taste also explains the nutrients in food (Briand, Behaviour, & Salles, 2016). Flavors that can be felt by humans are flavor, bitter, sweet, sour, salty, and umami (Aulia, Sunariani, & Arijani, 2016).

Organoleptic test results showed that the average value of the level of panelists' preference for the taste of gapit cake ranged from 1,76-1.97. The highest favorite value in gapit cake with the addition of 10% FPC and durian flavor of 1.97 and the lowest favorite value in the gapit cake with the addition of

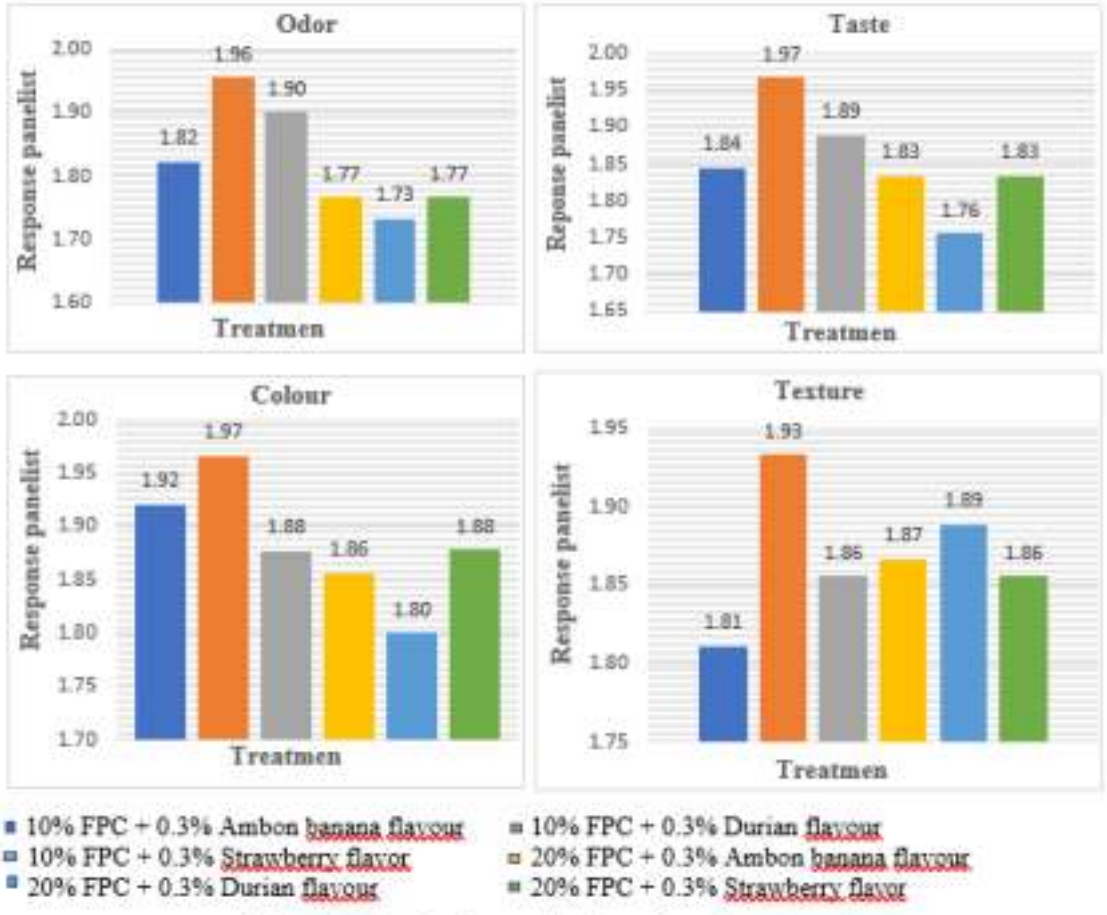

Figure 6. Graph of organoleptic values of gapite cake

20% FPC and 0.3% durian flavor 1,76 can be seen in Figure 6. The results obtained based on the analysis of variance showed that the treatment did not have a significant effect on panelist ratings on the taste of gapit cake ($p > 0.05$). Panelists did not question the taste of the gapit cake with the addition of FPC and flavor, this was also suspected because the taste of the FPC on the gapit cake had been minimized by adding sugar. Sugar added to making cake gapit causes a sweet taste that covers the fish taste from FPC Jayasinghe, Kruger, Cao, & Richter, 2017), the sweet taste of the cake made the panelists of the children liked it (Liem, 2004; Mccrickerd & Forde, 2016).

The taste from the 20% addition of FPC panelist preference level tends can be seen in Figure 6 to decrease it shows the flavor can not cover the distinctive taste of FPC, so that the panelist preference level for taste also decreased as the statement Bunta *et al*. (2013) , that the more FPC concentrations of fish were added, the more special FPC flavors were felt.

Colour

Color becomes very important because of visual factors in making decisions before buying and consuming food (Capule & Barcelon, 2016; Amsteus, Al-shaaban, Walin, & Sjoqvist, 2015; Huang & Lu, 2015)

Organoleptic test results showed that the average value of the level of panelists' preference for the colour of gapit cake ranged from 1.80-1.97. The highest favorite value in gapit cake with the addition of 10% FPC and durian flavor of 1.97 and the lowest favorite value in the gapit cake with the addition of 20% FPC and 0.3% durian flavor 1.80 can be seen in Figure 6. The results obtained based on the analysis of variance showed that the treatment did not have a significant effect on panelist ratings on the colour of gapit cake ($p > 0.05$). Panelists like the color of the cake gapit, colorful food products attract the attention of children (Stevens, Burgess, Stochelski, & Kuczek, 2013), but at 20% FPC concentration the panelists' preference for the color of the cake tends to decrease. The higher the FPC concentration, the color that will be generated will be increasingly brownish, the roasting process accelerates the mailard reaction process that occurs (Siguemoto, Bastos, & Monar, 2014; Teodorowicz, Neerven, & Savelkou, 2017).

Texture

Food texture is our perception of food ingredients derived from the structure of products that affect the perception of food in the mouth (Rosenthal, 1999; Liu, Deng, Sha, Hashem, & Gai, 2017).

Organoleptic test results showed that the average value of the level of panelists' preference for the texture of gapit cake ranged from 1.81-1.93. The highest favorite value in gapit cake with the addition of 10% FPC and durian flavor of 1.97 and the lowest favorite value in the gapit cake with the addition of 100% FPC and 0.3% ambon banana flavor 1.81 can be seen in Figure 6.

The results obtained based on the analysis of variance showed that the treatment did not have a significant effect on panelist ratings on the texture of gapit cake ($p > 0.05$). Panelists did not mind the gapit cake texture with the addition of FPC and flavor, allegedly in making cake gapit has added sugar. The addition of sugar in the cooking process also plays a role in reducing free water content causing low product water content and causing total sugar in the product to increase so that the texture is denser and sturdier. (Nilasari, Susanto, & Maligan, 2017; Zaitoun, Ghanem, & Harphoush, 2019).

Determination of the best product

Determination of the best product is obtained from the combined value and averaged all the parameters of odor, taste, color, and texture of each treatment, obtained the best treatment of making a cake with a mean value of 1.95, namely the addition of 10% FPC and 0,3% durian flavor.

Proximate composition of final product

The proximate composition of the gapit cake with the addition of 10% FPC and 0.3% flavor durian which moisture content 7.29%, ash 0.85%, fat 5.37%, protein 12.88%, and carbohydrate 73.61% is presented in Table 5. Gapit cake protein content is 12.88%. The protein content of gapit cakes with the

addition of FPC and flavor durian is greater than gapit cakes 100% glutinous rice flour which ranges from 4.37% (Uller, Sumual, & Nurali, 2007). The value of protein gapit cake with the addition of FPC and flavor durian is 12.88% greater than the protein content required for SNI 2973: 2011 (BSN, 2011) for pastry products or biscuits, which is a minimum of 5% (BSN, 2011). Tabel 4. The proximate composition of the gapit cake with the addition of 10% FPC and 0.3% flavor.

Tabel 4. The proximate composition of the gapit cake with the addition of 10% FPC and 0.3% flavor

Analysis	Wet based (%)
Moisture	7.29% ± 0.0330
Ash	0. 85% ± 0.0686
Fat	5.37% ± 0.3347
Protein	12.88% ± 0.2478
Carbohydrate	73.61% ± 4.0942

CONCLUSION

Fresh Indian scad fish used as raw material for making fish protein concentrate has an average freshness of 7,204-7,548 and floating protein concentrate produced 33% of the weight of fresh fish raw material containing 10.27% water content, ash content 6.21%, fat content 2.33%, protein content 45.38%, and carbohydrate content 35.81%. The best organoleptic test result for the gapit cake formula is the addition of 10% concentration of Indian scad fish FPC and 0.3% durian flavor which is preferred by children aged 3-6 years in Blora area with an average organoleptic odor value of 1.96, taste 1.97, colour 1.97, and texture 1.93 approaching score like 2. Nutrition-wise, the product has the composition of 7.29 % moisture, 0.85 % ash, 12.88 % protein, 5.36 % fat, and 35.81 % carbohydrate. High protein content of 12.88% makes the addition of 10% FPC cake and durian flavor can be used as additional food for children aged 3-6 years.

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