

ACCEPTABILITY AND TEST THE LEVELS OF PROTEIN AND CALCIUM IN A CHEESE STICK WITH THE SUBSTITUTION OF MACKEREL

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ABSTRACT

Mackerel is a deepwater fish contains many minerals than freshwater fish. One is the mineral content of calcium is good for bones and teeth. Utilization mackerel widely used by the general public as pufferfish contains omega-3 and omega-6 is good for disease prevention and intelligence. The purpose of this study to determine the acceptability and analysis of proteins and calcium in cheese sticks with flour substitution mackerel. This study was conducted in laboratory studies of food technology laboratories Nutrition Department of Health Polytechnic of Ministry of Health in Makassar and Makassar Center for Health Laboratory. Protein analysis used micro kjeldahl and calcium analysis by atomic absorption spectrophotometry method. The results of the study using Friedman test showed that the best concentration of 5% (an aspect of color, texture, aroma, and flavor). The protein content of cheese sticks with flour substitution mackerel 5% which was an average of 11.15 grams / 100 grams of material weight and calcium content of cheese sticks with flour substitution mackerel 5% with an average of 47.545 mg / 100 grams of material. It is advisable to conduct an analysis of other nutrients in cheese stick with flour substitution mackerel and use garlic during the process of making cheese stick mackerel because of the benefits of garlic as food seasonings that make dishes into flavorful and contain appetite and improve durable foodstuffs.

Keywords: cheese stick, acceptability, mackerel, levels of calcium, protein content

INTRODUCTION

Currently, there are many children with impaired nutritional status, especially lack protein and calcium, as a result, do not like to consume foods that contain protein and calcium so with their snacks cheese stick with flour substitution mackerel (flesh and bones), it can help reduce the problem of their nutrition demand.

Riskesdas 2018, showed that there were 13,8% of children under five suffering from malnutrition and 3.9% severely malnourished. While the prevalence of short toddlers are very meager 19.3% and contained 3.5%. Makassar City Health Department in 2014 noted that the number of infant nutritional status according to weight/age malnutrition respectively 2.3% and 8.35% malnutrition.

Mackerel are known as mackerel fish which include economically important fish and catch potential rise each year. These fish have a quite delicious and savory taste so much loved by the people (Tariq et al, 2014). In the processing of products or foods derived from fish, meat is usually only used alone so that the production activity discarded fish bones. Fishbone is a component that hard. This causes the fish bones are not easily broken down by decomposers so that the bone becomes waste. The nutritional value of the fish bones very much because of the major elements of a fishbone is calcium, phosphorus, and carbonates (Astrina, 2010).

According to research Siswanti, et al (2016) sticks pufferfish meat protein

content site, followed sticks whole fish (meat and bone) and the protein content is the smallest bone sticks mackerel. While the calcium level was biggest with the fishbone sticks, fish sticks continued intact (meat and bone), and the smallest calcium levels exist in the flesh of fish sticks.

Based on the above-mentioned problems, the researchers were interested in making cheese stick with flour substitution mackerel. This study aims to determine the acceptability A panelist on sensory characteristics (color, texture, aroma, and flavor) with a flour substitution mackerel 0%, 5%, and 10% as well as knowing the chemical characteristics (levels of protein and calcium) on a cheese stick with substitutions flour mackerel.

METODE

This study was conducted in the laboratory. This study was held in food technology laboratory Nutrition Department of Health Polytechnic of Ministry of Health in Makassar and Makassar Center for Health Laboratory from January to April 2019.

Materials used in this study were mackerel, lemon, water, flour, tapioca flour, butter, cheese, egg yolks, baking powder, salt, pepper and cooking oil. Research equipment used are ovens, blenders, cutting boards, trays, basins, sieve size of 60 mesh, stove, frying pan, Sutil iron, pot steamer, basins, spoons, knives, digital scales, baking rectangular, grate, rolling pin, and blenders.

The type and manner of data

collection:

1. Data types
 - a. Food acceptability obtained from a form filled out by the panelists. The form contains four aspects of the assessment of the color, texture, aroma, and taste.
 - b. Researchers calculate the nutritional value of protein and calcium contained in the cheese stick with flour substitution mackerel
2. Data collection
 - a. Food acceptability obtained from a form filled out by untrained panelists total of 30 people. This assessment uses the hedonic scale.
 - b. The nutritional value of cheese sticks obtained from protein and calcium content tests conducted by the researchers.
3. How to vote
 - a. Panelists were given a rating form that must be filled in accordance with the information on the form on each aspect: color, texture, aroma, and taste.
 - b. Determination of protein content test methods and test micro kjeldahl

calcium levels by spectrophotometric method.

Data were grouped and processed using a computer program namely Microsoft Excel and Statistical Product and Service Solutions (SPSS), Organoleptic test result data with the hedonic test (Test A) to acceptability tabulated in tables and analyzed using SPSS computer program with Friedman test and Wilcoxon test. Data that had been analyzed were presented in table form accompanied by narration.

RESULTS

Organoleptic test processed to determine the acceptability of panelists were 30 people on the cheese stick from mackerel fish meal substitution using the five senses as a measuring tool that determines the A panelist. A level panelists from the aspects of color, texture, aroma, and taste. The level of each panelist varies according to individual taste.

a. Color

A test result of analysis of the color aspect cheese stick with flour substitution mackerel can be seen in the following table:

Table 1
Distribution Analysis of Aspect Color Test passions Cheese Stick with Fish Meal Substitution Bloating

The sample group							
Acceptability	O2A		O2B		O2C		p
	n	%	n	%	n	%	
Like	29	96.67	28	93.33	10	33.33	0,000
Do not like	1	3.33	2	6,67	20	66.67	
Total	30	100	30	100	30	100	

Table 1 shows that the preference level panelists for the most preferred color aspect panelist were O2A concentration from 0% to 29 panelists (96.67%) which is a cheese stick without flour substitution mackerel. Friedman test results showed that the best concentration was O2A concentrations of 0% and showed a difference ($p < 0.05$) acceptance cheese stick with flour substitution mackerel to the aspect of color. Further, the Wilcoxon test showed that cheese stick flour substitution

mackerel O2B concentration of 5% to 10% concentration O2C different and O2A concentration from 0% to 10% concentration O2C different.

b. Texture

A test analyzes the results of texture aspect cheese stick with flour substitution mackerel can be seen in the following table:

Table 2
Distribution Analysis of Aspect Texture Test passions Cheese Stick
with Fish Meal Substitution Bloating

The sample group							p
Acceptability	O2A		O2B		O2C		
	n	%	N	%	n	%	
Like	24	80	25	83.33	25	83.33	0.741
Do not like	6	20	5	16.67	5	16.67	
Total	30	100	30	100	30	100	

Table 2 showed that the preference level panelists for the most preferred aspect panelist texture were O2B concentrations of 5% and 10% concentration O2C with 25 panelists (83.33%). Friedman test results

showed that the best concentration was O2C concentration of 10% and showed no difference ($p > 0.05$) each received power concentration cheese stick with flour substitution mackerel of aspects of texture.

c. Aroma

Results A test analysis of aspects aroma stick cheese with flour substitution mackerel can be seen in the following table:

Table 3
Distribution Analysis of Aspects Aroma Test passions Cheese Stick
with Fish Meal Substitution Bloating

The sample group							p
Acceptability	O2A		O2B		O2C		
	n	%	n	%	n	%	
like	28	93.33	21	70	13	43.33	0.038
Do not like	2	6.67	9	30	17	56.67	
Total	30	100	30	100	30	100	

Table 3 showed that the preference level panelists for aroma most preferred aspect panelists were O2A concentration from 0% to 28 panelists (93.33%) which was a cheese stick without flour substitution mackerel. Friedman test results showed that the best concentration was O2B concentrations of 5% and showed a difference ($p < 0.05$) acceptance cheese stick

with flour substitution mackerel of aspects of the aroma. Further, the Wilcoxon test showed that cheese stick flour substitution mackerel O2B concentration of 5% to 10% concentration O2C different and O2A concentration from 0% to 10% concentration O2C different.

d. Flavor
 Results A test analysis of aspects of
 flavor cheese stick with flour substitution

mackerel can be seen in the following
 table

Table 4
 Distribution Analysis of Aspect Taste Test passions Cheese Stick with Fish Meal Substitution
 Bloating

The sample group							
Acceptability	O2A		O2B		O2C		p
	n	%	n	%	n	%	
Like	19	63.33	20	66.67	18	60	0.623
Do not like	11	36.67	10	33.33	12	40	
Total	30	100	30	100	30	100	

Table 4 showed that the preference level panelists to taste the most preferred aspects of the panelists was O2B concentration of 5% to 20 panelists (66.67%). Friedman test results showed that the best concentration was O2C concentration of 10% and showed no difference ($p > 0.05$) each received power concentration cheese stick with flour substitution mackerel of aspects of flavor.

e. Total acceptability

Table 5

Total Score Rating Aspects Acceptability
Panelist Of Cheese Stick with Fish Meal
Substitution Bloating

Concentration	Total Score
O2A (0%)	308
O2B (5%)	312
O2C (10%)	262

Table 5 showed that the score of acceptability panelists to 4 aspects of color, texture, aroma, and flavor could be seen that O2B concentration of 5% was the most preferred product panelists followed O2A product concentration 0% and 10% concentration O2C product.

Based on the results showed that the protein content in cheese stick mackerel 5% obtained an average yield of 11.15 grams/100 grams of material whereas the levels of calcium in the cheese stick mackerel 5% obtained an average yield of 47.545 mg/100 grams of material.

DISCUSSION

Based on the research results indicates that the panelist preference level for the most preferred color aspect panelist was O2A concentration of 0%, followed O2B O2C concentration of 5% and 10% concentrations. This is due to the higher flour substitution mackerel will produce cheese stick color becomes less desirable, because it will produce a stick with a dull brown color. This is presumably due to the Maillard reaction (reactions between carbohydrates, especially reducing sugars with the primary amine group contained in the materials to produce materials brown (Winarno, 2004). The higher the mineral materials, namely the sticks of fish bones,

then color the darker the product (Prabowo, 2010).

The texture of a food product can be identified by chewing the food. The research result indicates that the panelist preference level for the most preferred aspect panelist texture was O2B concentrations of 5% and 10% concentration O2C followed O2A concentration of 0%. The third concentration variation on cheese stick material produces the same texture is crispy, cheese stick due to be printed in a thin sheet and fried with a small fire resulting texture is not that hard.

In line with research conducted by Gantohe ie formulations based functional cookies cork fish meal. The addition of fish meal cork gave effect to the texture of cookies. Formula with fish meal substitutes cork with the highest acceptance presentation (F2) with the addition of 15% as much as 73.33% (Gantohe, 2012).

Aroma plays an important role in the assessment of the product's favorite food because before tasting the food, people would inhale first. The results showed that the preference level panelists for aroma most preferred aspect panelists were O2A concentration of 0%, followed O2B O2C concentration of 5% and 10% concentrations.

This is because the flour mackerel have a scent the typical fishy so more flour substitution mackerel in cheese stick the panelists received power level is lowered. In line with the research concerning the use of meat meal Pratiwi fish float in the manufacture of fish sticks proves that more and more use of meat meal of fish makes the aroma of fish in the fish sticks were becoming increasingly apparent (Pratiwi, 2013).

Based on the taste aspects of the assessment of the cheese stick with flour substitution mackerel showed that the panelists preferred the O2B product concentration of 5%, followed O2A O2C concentrations of 0% and 10% concentrations. This is because the pufferfish flour substitution is not too high and the taste is not significant effects so it is still difficult compared with cheese sticks without flour substitution mackerel. In contrast to a concentration of 10% which is getting a lot of fish meals mackerel in a cheese stick, the panelists' acceptability level was lowered.

This is because the taste of flour mackerel which have a distinctive taste, in contrast with the cheese sticks generally have a sense that is common in the community that is the taste of cheese so that when added to flour mackerel with concentrations higher making cheese stick has a unique taste of fish and affect the acceptability of biscuits.

In line with Nuraini research on acceptability of the most preferred flavors are biscuits mackerel with pufferfish meat meal substitutes 5% with an average value of 5.43. While acceptance of the sense of the least preferred by the panelists was biscuit flour substitution mackerel with pufferfish meat 15% with an average value of 3.70 (Nuraini, 2017).

Based on the hacyl protein assay on a cheese stick with the substitution of 5% fish meal bloating conducted in the Center for Health Laboratory Makassar with 2 trials (Duplo) using micro kjeldahl which obtained an average yield of 11.15 grams / 100 grams of material. This is in line with research conducted by (Nuraini Fitri, 2017) Bloating Fish Meal Substitution Effect Against Protein Levels and Acceptability Biscuits which states that the higher flour substitution pufferfish meat, the higher the protein content of the biscuit.

Food and Drug Monitoring Agency (BPOM) stated food can be a good source of protein if it contains at least 20% protein of Nutrition Adequacy Score (AKG) (BPOM, 2004). Based on the nutritional adequacy rate (AKG, 2013), the daily requirement of protein for children increases with age that children aged 1-3 years are 26 grams per day then 20% of 26 grams were 5.2 grams which must be met serving. Cheese sticks with flour substitution mackerel 5% with a protein content of 11.15 grams/100 gram serving. To meet the criteria of high-protein cheese stick amount that should be consumed is 46.63 grams or 31 rods cheese stick. While children aged 4-6 years are 35 grams per day then 20% of 35 grams are 7 grams of grain that must be met, so as to meet the criteria of high-protein cheese stick amount that should be consumed is 62.78 grams, or about 42 rods cheese stick.

Product development cheese stick with flour substitution mackerel can be an alternative to providing additional food sources of protein in infants. Sources of protein are needed for infants and children

for cell growth and brain function as well as the protection against infection. The study states that there was a significant association between protein intake with gross motor development status of children aged 6-18 months (Sani, 2014)

Based on the test results conducted on the level of calcium cheese stick with flour substitution mackerel 5% in the Center for Health Laboratory Makassar with 2 trials (Duplo) using a spectrophotometric method which obtained an average yield of 47.545 mg / 100 grams of material. Meals can be claimed as a source of minerals if eligible 15% of the Reference Nutrient Labels (ALG) per 100 grams of material and may be claimed as the high mineral if eligible twice the amount of mineral resources (BPOM, 2011). Under these provisions, which can be claimed as a food source of minerals (calcium) are those that have a minimum level of 120 mg or 0.12 grams and can be claimed as a food high in minerals (calcium) are those that have a minimum level of 240 mg or 0.24 grams. Therefore, based on the findings that the cheese sticks with flour substitution mackerel 5% do not meet the minimum levels of calcium consumption standards that have been set. Based on the 2016 ALG calcium requirement for children aged 1-3 years is 650 mg, then 15% of the 650 mg that is 97.5 mg grain that must be met, so as to meet the calcium levels should be consumed 205.06 grams, or about 137 stems cheese stick.

CONCLUSION

Making the cheese stick with flour substitution mackerel showed that the higher the addition of flour mackerel increasingly affect the acceptability cheese stick in terms of color, texture, aroma, and taste. Cheese sticks mackerel with a concentration of 5% is the most preferred product and the best concentration by Friedman test results.

The protein content of the cheese stick mackerel 5% obtained an average yield of 11.15 grams/100 grams of material whereas the levels of calcium in the cheese stick mackerel 5% obtained an average yield of 47.545 mg / 100 grams of material.

For further research to analyze the content of other nutrients in cheese stick with flour substitution mackerel and use garlic during the process of making cheese stick mackerel, because of the benefits of

garlic as food seasonings that make dishes into flavorful and contain appetite and increase durability food material.

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