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Organoleptik And Chemical Quality Characteristics Of Rucah Fish Products

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Abstract: *This study aims to determine the effect of adding trash fish with different concentrations (25%, 50% and 75%). The parameters tested were hedonic organoleptic characteristics which included texture, appearance, color, aroma and taste which were analyzed using the Kruskal Wallis test. Chemical characteristics, namely the content of water, ash, fat, protein, and carbohydrates were analyzed using RAL (Completely Randomized Design), the treatment which had a significant effect followed by Duncan's further test. The results of the Kruskall Wallis test showed that the addition of trash fish with different concentrations had no significant effect on the hedonic organoleptic (appearance, texture, aroma, color and taste) and the test results (ANOVA) showed that the addition of trash fish with different concentrations on the chemical quality of Empek- Empek did not have a significant effect on the content of water, fat, carbohydrates and ash content. However, it did have a significant effect (Fcount > Ftable) on the protein content. The results of the Empek-empek chemical test averaged the range of water content, namely 43.46-48.08%, protein content 12.52-15.50%, fat content 1.16-1.34%, ash content 0.61-1 .17%, and carbohydrates 35.55-38.09%. All hedonic organoleptic parameters met SNI requirements except for texture parameters*

Keywords: Empek-empek, Trash Fish, Organoleptic, Chemistry

1. Introduction

Indonesian marine products that are most widely used and consumed by the public are fish. In general, fish are the most widely known compared to other fishery products, because this type is dominant. caught and consumed by the public at large, besides that fish is also a source of protein needed by humans. At the auction, fish are classified by size and type. Large fish are traded the most because their economic value is high compared to small fish because their economic value is very low.

Small fish are usually called trash fish. Trash fish is caught by fishermen which is a mixture of various types of fish, the size of which is approximately 10 cm. those caught include peperek fish, anchovies, selar, chair, seluang, tembang,. cut, kuniran. Etc. (Kaswinari, 2015). In TPI, Gorontalo City, the most common types of trash fish were anchovies (*Stolephorus sp*) and sardines (*Sardinella sp*). Trash fish. caught can reach 50%, this catch has low economic value but is rich in nutritional value. (Jeyansanta and Jamila 2014). The utilization of trash fish as a processed product from commercial fisheries is still lacking, which is usually limited to being processed as salted fish (Suparno and Dwiponggo, 1993). One way that can be done to overcome this problem is to process trash fish into empek-empek products made from trash fish, because this needs to be done in order to increase the economic value of trash fish.

Empek-empek is a traditional food product that can be classified as fish gel, like otak-otak and kamabako. According to Sugito and Ari Hayati (2006) Empek-empek is a processed fish meat product whose shape resembles a homogeneous protein gel, with a white color, has a chewy and elastic texture. While Karneta (2013) Empek-empek is made by a mixture of the basic ingredients of mashed fish meat, tapioca flour, water, salt, and spices as a flavor enhancer. This mixture can be made in various forms and then cooked through the process of boiling, steaming, frying, or baked.

Talib and Marlena (2015) conducted research on fish empek-empek using skipjack tuna with the addition of skipjack tuna (0%, 50%, and 70% and 90%) through chemical analysis results showing that the addition of skipjack meat 70% can increase the value (moisture content, protein, fat and carbohydrates). In a study by Afriani et al (2015) Empek-empek snakehead fish with the addition of broccoli namely concentration (0%, 5%, 10%, 15% and 20%) through the results of physical parameters (elasticity) and sensory obtained that the treatment by adding broccoli 5% as the best treatment with a moisture content of 40.89%, ash content of 1.15%, fat content of 0.16%, protein content of 7.39%, carbohydrate content of 48.14%, crude fiber content of 2.24 %, calcium content of 106.5 mg/100 g, and antioxidant activity of 202 ppm.

Based on the previous research above, the authors conducted research on the organolpetic and chemical quality characteristics of empek-empek products by adding trash fish with different concentrations (25%, 50% and 75%) with the aim of knowing the hedonic organoleptic quality characteristics of Empek-empek products. empek addition of trash fish meat with different concentrations and to determine the effect of adding trash fish with different concentrations on the chemical quality of Empek-empek products.

2. Research Methodolotools And Materials

a. Empek-empek tools and materials

In making Empek-empek the tools used are cutting boards, basins, bowls, plates, spoons, scoops, measuring cups, blenders, stoves, pots, pans, beakers, thermometers and analytical scales. While trash fish meat is the raw material used and additional ingredients are iodized salt, garlic, tapioca flour, ice water, and cooking oil. The raw material for trash fish is obtained through the Fish Auction Place (TPI) in Gorontalo City.

b. Tools and materials for organoleptic and chemical tests

The tools for the organoleptic test are spoons, plates and hedonic score sheets and the samples used are fried empek-empeks. For proximate or chemical tests on empek-empek samples that have not been fried are as follows:

Moisture testing tools include ovens, cups, desiccators, thermometers, digital scales, clamps (pliers), while the materials used are empek-empek samples that have been mashed.

1. Instruments for testing for fat content include digital scales, measuring flasks, soxhlets, ovens, timers (hours), desiccators, filter paper, pipettes, measuring cups, while the materials used are mashed samples, distilled water and petroleum ether.
2. The Kjeldahl method for testing protein content includes digital scales, paper, boiling stone destruction flasks, acid chambers, timers (hours), distilled water, Erlenmeyer, steam destillators, pipettes, measuring cups, while the materials used are samples that have previously been refined. Concentrated H_2SO_4, HgO, H_2SO_4, NaOH, $Na_2S_2O_3$, distilled water, H_2BO_3, indicator (a combination of methyl blue and red), and HCl.
3. Testing for carbohydrate content by difference does not use tools because the calculation of carbohydrate content is obtained based on the results of subtracting the total protein content, fat content, ash content, and water content.

Research procedure

This research was carried out in 2 stages, namely the process of preparing raw materials and the process of making empek-empek trash fish. Empek-empek Making Process. The process for making Empek-empek trash fish, namely the meat is mashed using a blender then add salt, garlic, eggs, and ice water to the mixture and knead until smooth. Tapioca flour is added a little continuously so that you get a smooth dough. The dough is then made into lenjer with a length of approximately 10 cmi with a diameter of 3 cm and boiled in a pot filled with boiling water at ±800C-1000C for 20 minutes. You can tell when the empek-empek is cooked by floating on the surface of the water and then draining it. After cooling, the empek-empek is fried with a frying temperature of ±80˚-1700C for 1-2 minutes and then drained.

Hedonic Organoleptic Test

Organoleptic Test (SNI 01-2346-2006)

In the hedonic (liking) test, each panelist was asked to give a score to Empek-empek which is based on the level of preference with a value according to a scale of 1-9, where the higher the number obtained, the better the quality of the product. According to BSN (2006), the hedonic test is a test used in an effort to measure the level of liking for a product through the use of a score sheet. According to Soekarto (1995) in Aprilianingtyas (2009), the hedonic test was carried out using 6-25 panelists who assessed the parameters of appearance, color, aroma, taste and texture. The panelist gives a value by adjusting the assessment in the hedonic test score sheet. The hedonic score has a value based on a scale of 1 (one) as the lowest value, while number 9 (nine) is the highest value. The value of each level of preference is:

9= Really like it
8= Really like
7= Like
6= Somewhat like it
5 = Neutral / normal
4= Somewhat don't like it
3= Dislike
2= Really don't
1= Really really don't like it

Empek-empek Proximate Tests

In all treatments, proximate analysis was carried out which included analyzing carbohydrate content, ash content, fat content, protein content and water content.

1. Analysis of Moisture Content (AOAC, 2005)

In determining the water content, a comparison was made of the difference in sample weight before and after drying. Through the analysis of water content, namely:

First, dry the empty cup which will be used in the oven for 15 minutes or until the weight remains constant, then cool it in a desiccator for 30 minutes and weigh it. Weigh a sample of 2 grams and then place it in a cup which is then heated in the oven for 5-6 hours and at a temperature of 105-110^{0}C. The cup is then cooled in a desiccator and then re-weighed. The percentage of water content using a wet basis uses the formula, namely:

$$\text{water content} = \frac{B - C}{B - A} \times 100\%$$

Information:
A=Empty cup weight (g)
B=weight (sample+cup) before drying (g)
C = weight (sample + cup) when it is dry (g)

2. Analysis of Protein Content (AOAC, 1995)
The process of testing the protein content of the Empek-empek product uses the (Kjehdal) method, namely, the mashed sample is poured into the Kjehdal flask, then given two catalyst tablets 3.5 g catalyst mixture, put 15 milliliters of H_2SO_4 and 3 ml of H_2O_2 and then let stand for 10 minutes, then destructed at 415ºC and then cooled. The second is the distillation stage. Add 50-57 ml of distilled water to the results of the digestion, followed by 50-57 ml of NaOH, then distilled. The distillation results were collected in an Erlenmeyer containing 25 ml of 4% H_3BO_3 which had been added with indicator methyl red and bromcresol green. Distilled until the distillate volume reaches 150 ml. Distillate until the distillate volume fills up to 150 ml. The third stage is the titration stage. The sample was titrated through 0.2 N HCI until the color changed from green to neutral gray. Next, work on blanks.

$$N = \frac{(VA\text{-}VB)\ HCl \times N\ HCl \times 14{,}007 \times 6{,}25}{W \times 1000} \times 100\%$$

Where :
VA = Milliliters of sample titration HCl
VB = Titration volume of blank form (ml)
N = HCL concentration used
W = sample weight (mg)

3. Analysis of Ash Content, Furnace Method (AOAC, 1995)
At this stage, 2 to 3 grams of sample is weighed, put in a porcelain cup, then baked in the oven for 30 minutes. The sample is then put into the furnace at 500-550 for 4 to 5 hours, and cooled in a desiccator within 30 minutes. Proceed to the process of weighing the cup and not again until the weight is constant.

$$\text{Ash content} = \frac{\text{ash weight}}{\text{sample weight}} \times 100\%$$

4. Analysis of Fat Content (AOAC, 1995)
This analysis was carried out using the Sokhlet method approach. In general, the fat present in the sample is extracted through the use of non-polar fat solvents. Add 2 grams of sample on cotton with filter paper and then roll it to form a thimble, then put it in a Soxhlet flask. Then the sample was extracted within 6 hours which was added with 150 ml of hexane fat solvent. The extracted fat is then dried in an oven at 100 ºC for 1 hour. At least 2 tests are carried out, and the fat content is calculated using the formula:

$$\text{Fat content} = \frac{\text{extracted fat weight}}{\text{sample weight}} \times 100\%$$

Analysis of Carbohydrate Content (AOAC 2005)

The procedure for analyzing carbohydrates refers to the analysis of carbohydrate content (AOAC 2005) which is carried out with a by difference, namely the acquisition of a 100% reduction in fat content, protein content, ash content and water content, so that carbohydrate content greatly influences other nutrients. Carbohydrate levels can be calculated through the use of the formula:

%Carbohydrate Content = 100%-(%ash+%water+%fat+Protein)

5. Data Analysis
The Kruskal-Wallis test is used to analyze non-parametric statistical data. The hedonic test data obtained is non-parametric data (Wallpole, 1993 in Suradi, 2007). For chemical analysis (proximate) using data analysis with completely randomized design. (RAL) one single factor using 2 repetitions.

3. Results And Discussion

Hedonic Empek-empek Organolpetic Quality
The hedonic test carried out in this study used a sample of fried empek-empek. He did a test. organoleptic. This hedonic aim is to find out the panelists' acceptance of a Empek-empek product with the addition of trash fish with different concentrations in each treatment. The hedonic organoleptic assessment of Empek-empek includes appearance, color, aroma,. taste and texture too. Quality test. hedonic organoleptic. carried out by 25 semi-trained panelists.

Appearance

As a parameter that the panelists value through their sense of sight which includes size, shape, texture and the nature of the surface (flat, wavy, homogeneous, shiny, rough or smooth). Data from hedonic organoleptic test results on the appearance of Empek-empek with the addition of trash fish with different concentrations which were divided into 3 treatments namely treatment A. (25%), B. (50%), and C. (75%) can be seen in the appendix (3). The histogram of the hedonic test results for Empek-empek appearance can be seen in Figure 1.

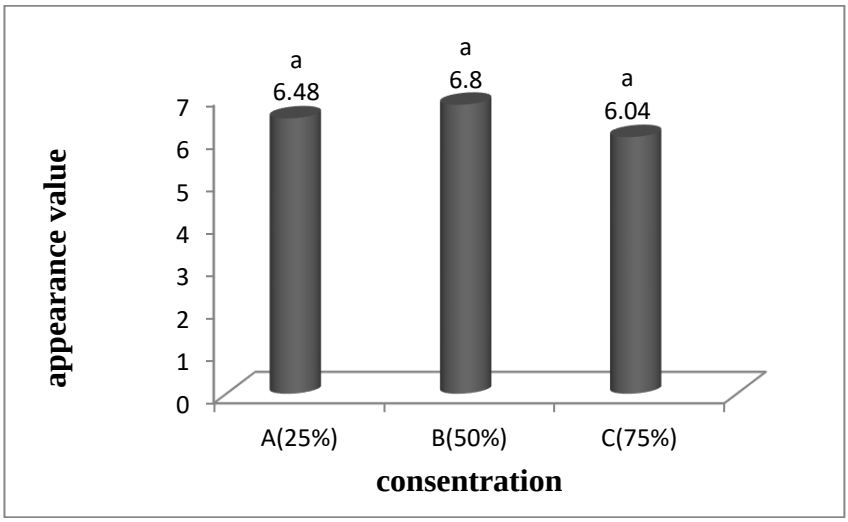


Figure 1. The results of the organoleptic test for Empek-empek appearance. The same letter in the histogram shows results that have no significant effect (p>0.05)

Note : A = Trash fish 25%
B = Trash fish 50
C = Trash fish 75%

The histogram in Figure 1 shows that the highest average gain of organoleptic appearance of empek-empek is in treatment B (50%), namely 6.8 with the criteria of "like", having a intact, neat, flat surface appearance, while the lowest value is in treatment A (25%) is 6.48 and treatment C (75%) is 6.04 with the criteria of "rather like". Treatment A (25%) and treatment C (75%) had almost the same appearance, namely the appearance of intact, neat, rather flat surfaces. This is due to the formation of empek-empek using only the hands so that it produces different shapes.

In this study, Empek-empek complied with the SNI standard (766.1: 2013) with a minimum Empek-empek hedonic value of 7. Based on the kruskal wallis test (Appendix 4) it shows treatment A (25%), B (50%) and C (75 %) did not have a significant effect (p>0.05) on the appearance of Empek-empek, meaning that the appearance of Empek-empek was liked by the panelists. The appearance of Empek-empek with the addition of different concentrations of trash fish can be seen in Figure 2.

A=25% B=50% C=75%

Figure 2. shows the addition of trash fish through different concentrations giving the same color appearance to the Empek-empek product. This is thought to be caused by the cooking or frying process so that the appearance that they produce is all the same. Supported by Wellyalina et al, (2013) frying food ingredients in cooking oil can cause all food surfaces to get the same level of heat, thereby making the appearance and color produced uniform.

According to Winarno (1997), by adding fish meat. Can give a slightly brown color change and this is due to the presence of protein contained in it, so if the heating stage takes place the Mailard reaction will take place. This reaction is something that takes

place between carbohydrates, especially reducing sugars and primary amino acid groups which are contained in the material which can consequently produce products with a brownish color.

Color

Color is the main parameter that can be observed directly from the reviewer in researching a product, color plays an important role in giving direction related to chemical changes in food (De Man, 1997, in Chirita, 2008). Organoleptic testing of the color of the trash fish empek-empek was carried out to determine the panelists' preferences. Data from the hedonic organoleptic test results for Empek-empek color with the addition of trash fish with different concentrations, namely treatment A (25%), treatment B. (50%), and treatment. C. (75%) can be seen through attachment (3). The histogram of the gain from the Empek-empek color hedonic test can be seen in Figure 3.

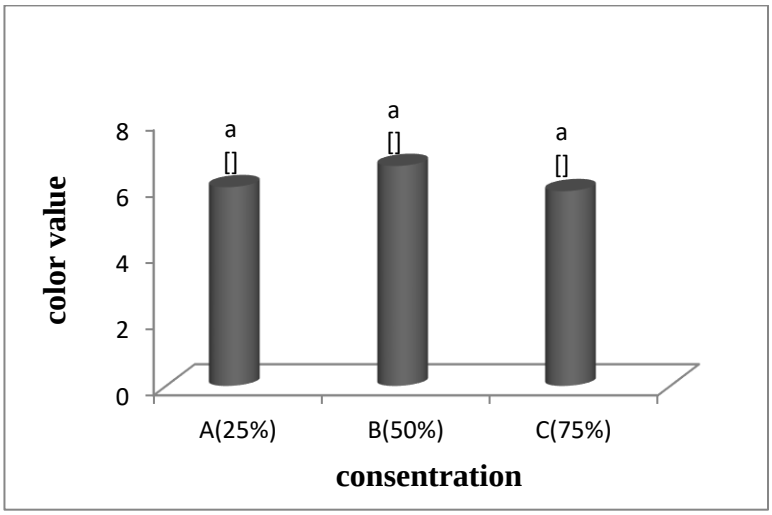


Figure 3. The results of the empek-empek color organoleptic test. The same letter in the histogram shows results that have no significant effect (p>0.05)

Description: A=25% trash fish
B=50% trash fish
C=75% trash fish

The histogram in Figure 3 shows the organolpetic average value for empek-empek color. The highest was in treatment B (50%), namely 6.64 with the criteria of "liking", having a brownish yellow color, while the lowest value was treatment A (25%), namely 6 and treatment C (75%), namely 5.88 with the criteria of "rather like", statistically having the same criteria, namely a slightly yellow-brown color. In treatment C (75%) it has a slightly brownish yellow color while Empek-empek in treatment B (50%) has a brownish yellow color. However, in this case treatment A (25%) had a slightly brownish yellow color than Empek-empek treatment B (50%). This is thought to be caused by the frying time in treatment A which was not the same or longer than treatment B, causing the color in treatment A to be slightly brownish yellow compared to treatment B.

According to Trisnawati (2007), the type of fish can affect the color of a product, with the increasing concentration of fish meat, the darker the product it produces. The color of the empek-empek in this study complied with the SNI standard (766.1: 2013) with a minimum hedonic value of 7.

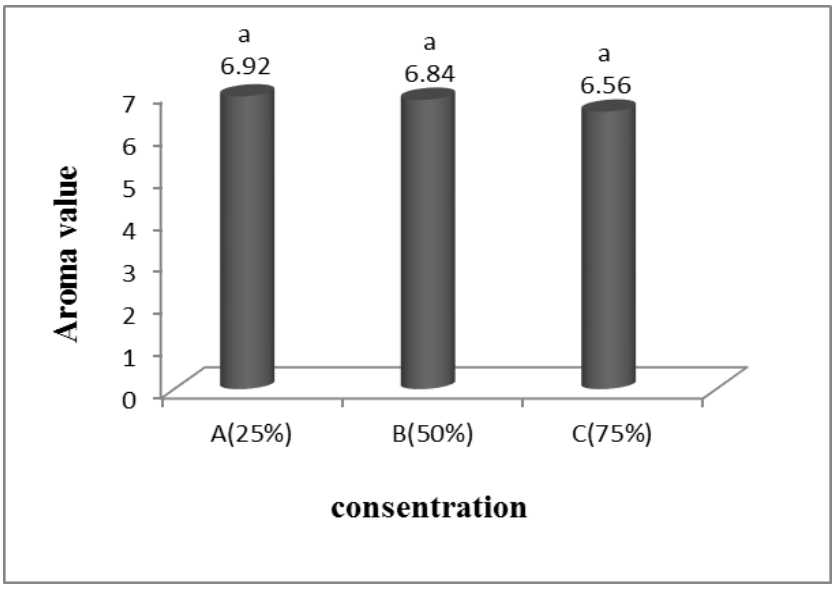
The results of the Kruskal Wallis test (Appendix 4) show that treatment A (25%), treatment B (50%) and treatment C (75%) had no significant effect (p>0.05) on the color of Empek-empek. Trash fish with different concentrations of the three treatments could not affect the color of Empek-empek even though the concentration of trash fish used was different but the raw materials used were the same so that the colors of Empek-empek produced from the three treatments were almost the same. In addition, Junaidi and Irene Yulientin (2006) white meat has a low myoglobin content which can make the color of the product lighter, while red meat is predominantly dark in color.

The color of the Empek-empek produced from the three treatments was almost the same, this was also caused by the frying process. During the frying process it can cause a non-enzymatic browning reaction process or what is called the Maillard reaction. According to Mustar (2013), during frying fish will experience a color change in the product to brown which is caused by groups of amino acids in amino acids, proteins or peptides. to the glycosidic hydroxyl in sugar. Nitrogen polymer with a brownish color means it is the last reaction. In addition, Suman & Joseph (2013) suggested that the stages in cooking can cause denaturation of myoglobin hemochrome (ferrihemochrome) as a cause of the appearance of an unclean brown color in cooked products.

Aroma

Aroma. is a determining parameter of the taste of food. Generally, aroma is used as an attraction when deciding the taste of a food

product that is made. According to. Soekarno. (2007), at. industry. material. food. test. scent. is said to be the most important part because it can quickly give value to the production results, whether the product will be in demand or vice versa. Obtain hedonic organoleptic testing on Empek-empek aroma through addition. fish. trash. with. concentration. that is different. treatment. A (25%), B. (50%), and C (75%) can pay attention to attachment (3). The histogram of the hedonic aroma test results can be seen in Figure 4.



Ficture. 4. Results. test. organoleptic. aroma. Empek-empek. Letter. Which. The same. on. histogram.showingresults. Which. No. Influential. real.(p>0.05)

Note : A = Trash fish 25%
B= Trash fish 50%
C = Trash fish 75%

The histogram in Figure 4. Shows values. average. aroma organoleptic. The highest empek-empek is in the treatment. A (25%), namely the average value of 6.92 and the criterion "likes", while the lowest average organoleptic score is in treatment C (75%), namely 6.56 with the criteria "likes". This is caused by the influence of the fish used. In treatment A (25%), using trash fish produced little Empek-empek with a non-fishy aroma, while in treatment C (75%), it used too much fish, causing the Empek-empek product to smell slightly fishy. This is influenced by the substances present in the fish so that the higher the addition of the trash, the specific empek-empek aroma smells of fishy fish. The smell of fish is caused by the smell of fish / fish. Which. generated. in seafood raw materials caused by the acid content. amino acids found in fish (Sadiyah and Kristianti 2014). According to. Govin (1985) in Fellow (1988). In this study the aroma of Empek-empek. has met the SNI standard (766.1: 2013). with a minimum hedonic value of 7.

The test results in Kruskal-wallis (appendix 4) show that treatment A (25%), B (50%) and C (75%) had no significant effect ($p>0.05$) on panelists' preference for the Empek-empek aroma parameter . The use of trash fish with different concentrations in each treatment had no significant effect on the aroma of the empek-empek produced. This was caused by the use of the same raw material so that it did not affect the aroma of Empek-empek even though it used a different concentration for each treatment, but the aroma of Empek-empek produced from the three treatments was almost the same. Researchers also suspect that the use of tapioca flour can mask the specific smell of fish so that the increased concentration of fish meat does not affect the aroma of Empek-empek. Astuti (2009) states that the addition of tapioca flour can also mask the smell of fish, so it can reduce the fish's distinctive aroma.

Nofitasari et al (2015) explained that empek-empek for the treatment of using different types of fish, for example skipjack tuna, catfish and snakehead fish did not have an effect on the aroma. In addition, the Maillard reaction which takes place in the frying stage of the product changes the color and aroma of the product (Hidayati, 2002).

Flavor

Taste sensing is divided into 3 parts namely sour, bitter, salty and sweet. Taste, namely how the tongue can respond to stimuli given from food. consumers can make a decision by rejecting or accepting through the 4 flavors (Winarno, 1997; Soekarno and Hubeis, 2000). Data obtained from hedonic organoleptic tests on Empek-empek flavor with the addition of trash fish with different concentrations, namely treatment A (25%) , B (50%), and C (75%) can be seen in appendix (3). The histogram of taste acquisition in Empek-empek can be seen in Figure 5.

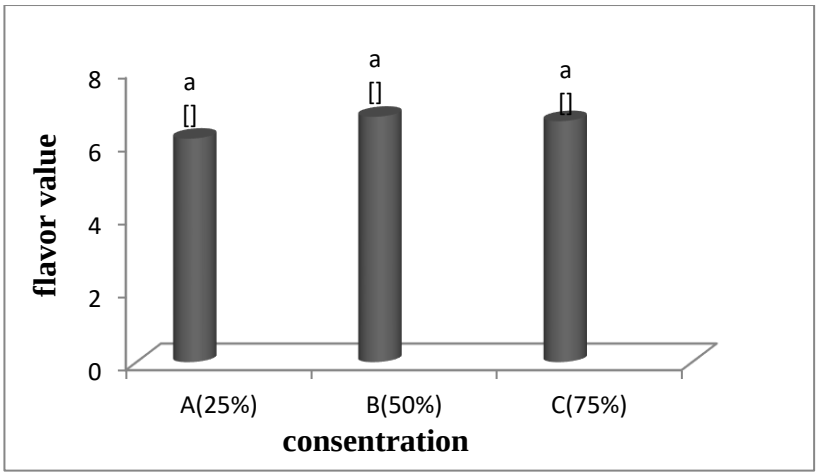


Figure 5. The results of the organoleptic test for Empek-empek taste. The same letter in the histogram shows results that have no significant effect (p>0.05)

Note : A = Trash fish 25%
B= Trash fish 50 %
C = Trash fish 75%

The histogram in Figure (5), shows that the highest average organoleptic value for the Empek-empek taste was found in treatment B (50%), namely 6.72 and treatment C (75%), namely 6.6 with the criteria "like", (delicious , tastes fish) while the lowest score is in treatment A (25%) where the average value is 6.12 and falls into the "rather like" category (tasty, lacks fish taste). Panelists preferred treatment B (50%) and treatment C (75%) because they contained amino acids. The most dominant composition of amino acids is aspartic acid and glutamic acid. Glutamic acid can function as a compound to enhance the taste of food or dishes with savory taste criteria (Febriyanti, 2011). However, the panelists did not like the Empek-empek flavor due to a lack of glutamic acid. This is in accordance with the statement of Setapdina (2014), glutamic acid can produce a delicious taste but in the use of excessive concentrations it can actually reduce the delicious taste. In this study, the empek-empek trash fish product met the SNI standard (766.1: 2013) with a minimum henonic value of 7.

Based on the results from the kruskal wallis test (Appendix 4), it shows that the addition of trash fish with different concentrations in each treatment did not significantly affect (p>0.05) the taste of empek-empek. This is thought to be due to the use of the same raw materials so that it does not affect the taste of Empek-empek even though different concentrations are used in each treatment. In the research on the savory taste of Empek-empek from the three treatments, this was almost the same, this was influenced by the protein content in trash fish, so that when boiling, the protein could experience hydrolysis to an amino acid, namely glutamic acid, which could give rise to a savory taste. This is according to the opinion of Winarno (1998), the savory taste is due to compounds present in fish, namely amino acids, which form flavors, for example alanine, lysine and glycine, especially glutamic acid which can make the taste even more delicious.

According to Winarno (2008) whether food tastes good or not is due to the amino acids in protein and fat present in the food itself, then it can be influenced by various factors such as concentration, temperature, chemical compounds and interactions from other parts of the taste. Purwanto et al., (2013) suggested that the taste of the product is greatly influenced by the ingredients it is composed of, with the addition of composition it can also have an effect on the taste of the product.

Texture

Texture is a part that determines consumer acceptance of Empek-empek. Texture assessment can be observed through its elasticity and hardness. The preference test on empek-empek is carried out by looking at the aspects of the elasticity and compactness of the material. According to Soekarto and Hubies (2000) texture is all things related to touch, taste, mechanics, sight which includes the assessment of the product which is divided into roughness, smoothness, oily, dry, hard and wet. Data from the hedonic organoleptic test results on Empek-empek texture in the treatment of the addition of trash fish with different concentrations, namely treatment A (25%), treatment B (50%), and treatment C (75%) can be seen in Appendix 2. Histogram of test results The hedonic texture of Empek-empek can be seen in Figure 6.

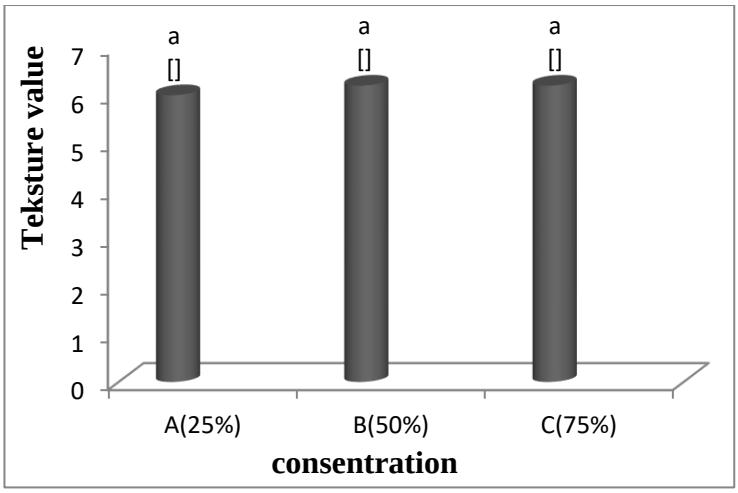


Figure 6. The results of the empek-empek organoleptic test. The same letter in the histogram shows results that have no significant effect (p>0.05)

Note : A = Trash fish 25%
B= Trash fish 50 %
C = Trash fish 75%

The histogram in Figure (6), shows that hedonic organoleptic texture Empek-empek in treatment A (25), B (50%), C (75%) has the same criteria, namely "rather likes", with a chewy texture, less compact , less dense. The results of the Kruskal Wallis test (Appendix 4) show that by adding trash fish through different concentrations in the three treatments the results did not have a significant effect (p>0.05) on the panelists' preference for Empek-empek texture, it can be concluded that the sensory parameter values texture in each treatment was not significantly different. This is due to the starch gelatinization stage which causes the water to evaporate during the frying process, so the water content in Empek-empek after being fried in each treatment gives the same relative number.

The formation of the texture is caused by gelatinization of starch during the boiling process so that the starch undergoes a gelatinization process so that the starch granules expand and the proteins are denatured. The development of starch granules is caused by water molecules penetrating into the granules and being trapped in the arrangement of amylose and amylopeptin molecules (Simpon 2012).

Chemical Characteristics of Empek-empek

Determination of the characteristics of Empek-empek with the addition of trash fish, namely A (25%), B (50%) and C (75%). In this study, the proximate test was carried out by using empek-empek samples that had not been fried. Chemical analysis which includes protein content, fat content, ash content, moisture content and carbohydrate content (by difference).

Water content

The water content greatly affects the quality of food ingredients, because its durability is closely related to the water content it contains. The moisture content of foodstuffs also plays a role in determining the ability of microbes to grow and develop (Winarno et al 1993). The histogram of the average value of the Empek-empek moisture test results can be seen in Figure 7.

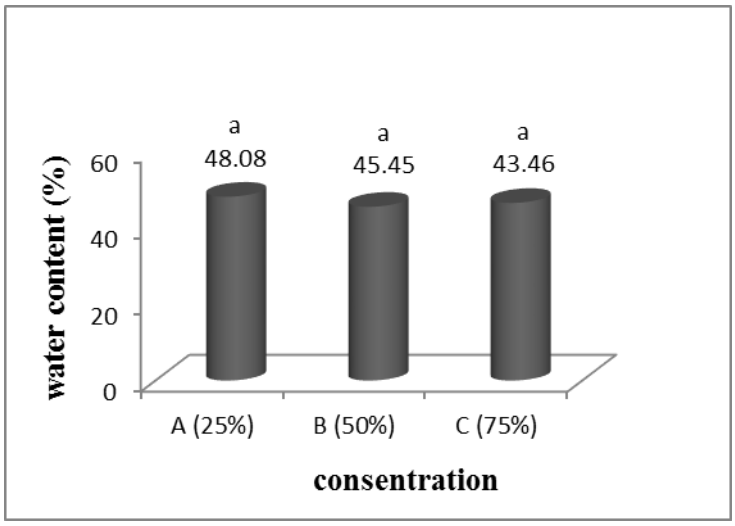


Figure 7. Empek-empek water content histogram. The same letter in the histogram shows results that have no significant effect (F count < F table)

Note: A = Trash fish 25 %
B= Trash fish 50 %
C = Trash fish 75 %

Based on the results of the water content test, the empek-empek in treatment A (25%) had a higher water content, namely 48.08%, while the lowest value was in treatment C (75%), namely 43.46%. Based on the test results (ANOVA) showed that the use of trash fish meat with different concentrations of the three treatments had no significant effect (Fcount <Ftable) on the empek-empek water content. It is suspected that the value of the water content in each treatment has no difference. In the study, there was a decrease in water content along with the addition of trash fish concentration. This is suspected because the water content has a relationship with protein, the higher the protein content, the lower the water content in Empek-empek products. In accordance with the opinion of Buckle et al (1987) which states that protein content has the opposite relationship to water content, where the higher the protein content, the lower the water content value.

In addition, the water content decreased as the concentration of trash fish increased, this was due to heat penetration and high temperatures during the cooking stage. Penetration of heat into the product makes the protein denatured so that there are water molecules coming out due to reduced water (Kramlich in Nurhahayati, 1996). In this study, the water content of Empek-empek was higher than that of Talib and Marlena (2015) which had a low water content of 15.21%.

Ash Content

Ash is an organic residue in the combustion of inorganic materials Ash remaining from combustion in the analysis of ash content shows the amount of inorganic substance in the product, while that which evaporates shows the content of organic matter. Usually these components consist of calcium, potassium, sodium, iron, manganese, magnesium, and iodine (Apriansyah, 2015). The histogram of the Empek-empek ash content test results can be seen in Figure 8

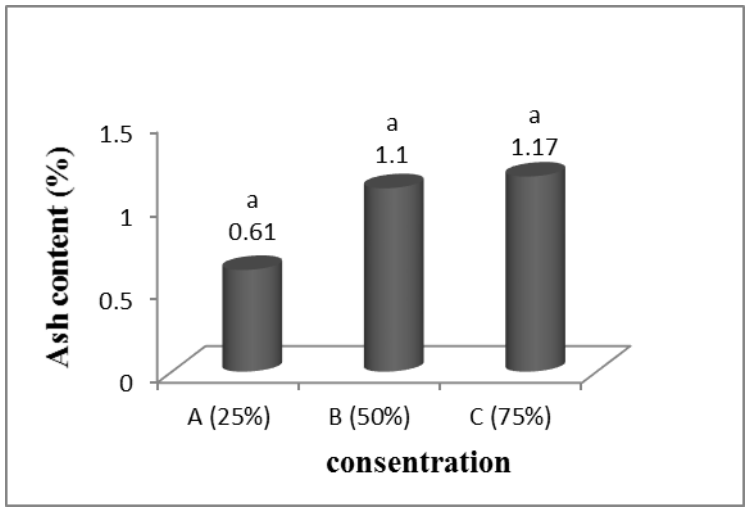


Figure 8. Histogram of Empek-empek ash content. The same letters on the histogram indicate results that have a significant effect (F count < F table)

Note : A = Trash fish 25%
B= Trash fish 50%
C = Trash fish 75%

Based on the results of the ash content test, the highest empek-empek was found in treatment C (75%), which had an average ash content value of 1.17%. Meanwhile, the lowest ash content was in treatment A (25%) with an average value of 0.61%. The test results (ANOVA) in appendix (7) show that the addition of trash fish through different concentrations in the three treatments had no significant effect (F count <F table) on Empek-empek ash content. This is because the ash content values in treatments A (25%), B (50%), and C (75%) are not much different.

In the study, there was an increase in ash content along with the increase in the concentration of trash fish meat. This is also thought to be influenced by trash fish which contains an ash content of 2.3-3.2% (Subagio et al., 2004), so that the increase in the amount of trash fish meat also increases the ash content in Empek-empek. This is in line with a study conducted by Fadhallah et al, (2012) in the manufacture of Empek-empek mussels, there was an increase in the ash content with the continued increase in the mussel meat formulation.

Then Sudarmaji, et al (1989) revealed that there is a high ash content in food of animal origin, this is due to the presence of many minerals from calcium, phosphorus, iron present in animals. Therefore, the higher the concentration of trash fish given, the higher the ash content in Empek-empek. In the research, the ash content of Empek-empek was lower when compared to the research by Talib and Marlena (2015) with an ash content of Empek-empek, which was 10.52% and Tisminaamijaya et al, (2018), namely an ash content value of 2.24%.

Protein Content

Protein as a nutrient plays a very important role for the body, protein also has a function as a builder and regulator. Protein can be used as a backup energy source if the body's energy needs cannot be met by fats and carbohydrates. According to winarno, (1997) in Apriansyah, (2015). The results of the protein content test on Empek-empek with the addition of trash fish with different concentrations, namely treatment A (25%), B (50%), and C (75%). Histogram of Empek-empek protein content test results Empek can be seen in Figure 9.

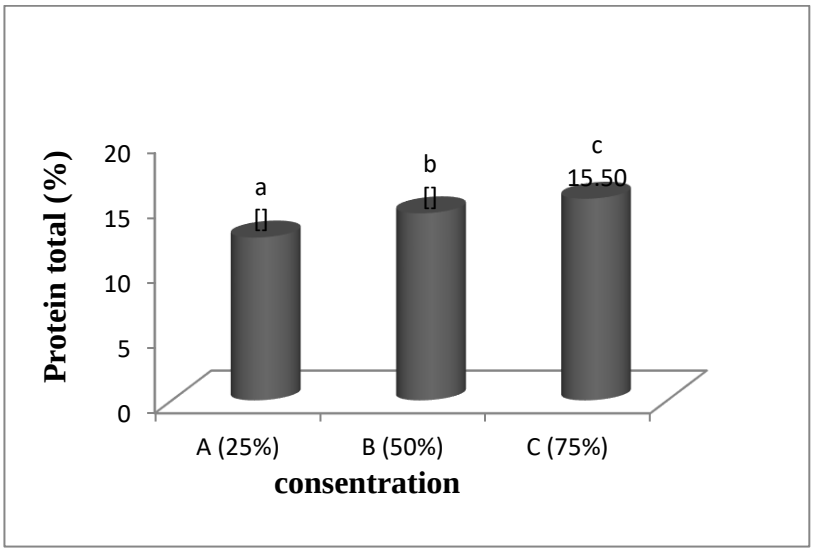


Figure 9. Histogram of Empek-empek protein levels. Letter. which" is not the same on the histogram showing the results have a significant effect (F count > F table)

Note : A = Trash fish 25%
B= Trash fish 50%
C = Trash fish 75%

Based on the results of protein content testing on Empek-empek, namely the highest protein content was in treatment C (75%) had an average protein content value of 15.50%, while the lowest protein content value was treatment A (25%) with a value an average of 12.52%, the value of Empek-empek protein content in each treatment has a different value. This is due to the influence of differences in the concentration of the trash used.

Based on the results (ANOVA), it showed that the addition of trash fish with different concentrations in the three (3) treatments in making empek-empek trash fish had a significant effect (F count > F table) on protein content. The next test, Duncan Appendix (8), showed that treatment A (25%) was significantly different from treatment B (50%) and C (75%). Treatment B (50%) was significantly different from treatment A (25%) and C (50%), treatment C (75%) was significantly different from treatment A (25%) and B (50%). This was due to the addition of trash fish through different concentrations in the three treatments having different protein levels.

The results of the protein content test showed that the high or low protein content was thought to be influenced by the amount of trash fish meat used, the more trash fish meat was added, the higher the protein content of empek-empek because trash fish has a protein content of 12.14 (Subagio et al, 2003). This is in line with the statement of Sugianto and Hayati, (2006) the more fish added, the higher the Empek-empek protein produced. The addition of raw materials that have a high protein content can make the resulting product have a high protein, and vice versa (Paranginang, 2000).

In this study, the protein content was higher when compared to Talib and Marlena's research (2015) with empek-empek protein levels of 10.92% and Afriani et al (2015), namely protein content values of 7.39%.

Fat level

Soediaoemoto (2004), fat is a group of organic bonds consisting of carbon (C), hydrogen (H) and oxygen (O) components which are soluble in certain solvents (ether, benzene and petroleum). Fat as a source material that forms energy and as a material that produces the most energy when compared to other parts of nutrition (Adawayah, 2006). The results of the test for fat content in

Empek-empek with the addition of trash fish with different concentrations, namely treatment A (25%), B (50%) and C (75%). Histogram of the average Empek- Empek can be seen in Figure 10.

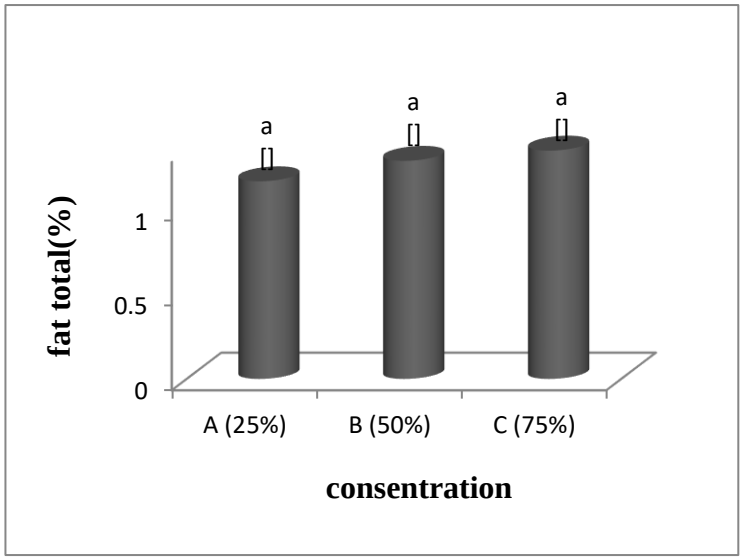


Figure 10. Empek-empek fat content histogram. The same letter in the histogram shows results that have no significant effect (F count < F table)

Note: A = Trash fish 25%
B= Trash fish 50%
C = Trash fish 75%

Obtained from analyzing the average value of Empek-empek fat content, the highest was in treatment C (75%), namely through an average fat content value of 1.34%, while the lowest value was in treatment A (25%), namely having a the average fat content is 1.16. The value of Empek-empek fat content in each treatment has a different value which is caused by the addition of trash fish with different concentrations. Based on the test results (ANOVA) in appendix (7) it shows that the addition of trash fish with different concentrations has no significant effect (F count < F table) on Empek-empek fat content. This was due to the presence of fat content in each treatment was not different.

In this study, the higher the concentration of trash fish, the empek-emk fat content would increase. This is presumably from the influence of the raw materials used in the empek-empek manufacturing process, namely trash fish which has a fat content of 1.39% (Subagio et al, 2003), so that the fat content increases as the concentration of trash fish increases. This is in line with the study of Hidayah et al, (2014) which found that the fat content increased through the addition of mussel meat in Empek-empek. In line with what was stated by Astawan (2005), the use of more and more fish can increase the levels of fat and protein in pempek.

According to research by Talib & Marlena (2015) high levels of fat can also result from cross-contamination between air and other food ingredients stored in the same place. This was described by Buckle et al, (1987) that fat can absorb volatile substances obtained through other materials, for example odor pollution in vegetables, eggs, fruit and meat which are stored in the same place. In research, the fat content is lower when compared to Talib Marlena's research (2015) with empek-empek fat, which is 79.93%.

Carbohydrate Content

Carbohydrates have the most important role in determining the characteristics of food ingredients, such as color, texture, taste and so on. Carbohydrates are the most dominant constituent after protein (Winarno 2008). Data on the results of the Empek-empek moisture test with the addition of trash fish with different concentrations, namely treatment A (25%), B (50%), and C (75%) . Histogram of the average value of the test results Empek-empek water content can be seen in Figure 11.

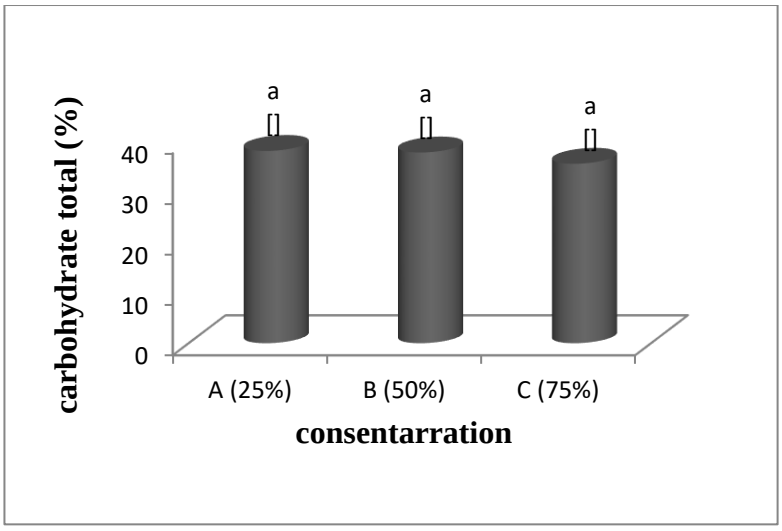


Figure 11. Empek-empek carbohydrate content histogram. The same letter in the histogram shows results that have no significant effect (F count < F table)

Note: A = Trash fish 25%
B= Trash fish 50%
C = Trash fish 75%

Obtained from analyzing Empek-empek carbohydrates showed that the average value of the three treatments with the highest score was obtained by treatment A (25%), namely the average value of 38.09%, while the lowest value was obtained by treatment C (75%)) namely the average value of 35.55%. Based on the test results (ANOVA) in the appendix (7) it shows that the addition of trash fish with different concentrations did not have a significant effect (F count <F table) on the carbohydrate content of Empek-empek. This happened due to the effect that the addition of several trash fish with different concentrations in treatments A (25%), B (50%) and C (75%) could not have an effect on the carbohydrate content in Empek-empek. The histogram of the empek-empek carbohydrate content shows that the highest amount is found in concentration A (25%). This is because in this analysis only the by difference calculation method is used. Because the water and ash content increased, the nutritional content of carbohydrates decreased proportionally. This is because the calculation of carbohydrate content in this study was carried out using the by difference method so that it is very dependent on the moisture, ash, fat and protein content of empek-empek

Carbohydrates in food usually come from plants and only a few are from (animals). Carbohydrate content in the fish body is very small which can be divided into polysaccharides and glycogen (Winarno 1992; Poernomo 2002). In the study, carbohydrate levels were higher when compared to Talib and Marlena's (2015) study with empek-empek carbohydrate levels of 15.58%.

4. Conclusion

Based on the research results, it can be concluded that the organoleptic testing showed that the addition of trash fish with different concentrations of the three (3) treatments for making empek-empek did not significantly affect the parameters (appearance, aroma, taste, texture and color). All hedonic organoleptic parameters have met the requirements of SNI (766.1: 2013) except texture parameters. The results of the Empek-empek proximate test with the addition of trash fish at a concentration that did not have a significant effect on moisture, fat and carbohydrate content, and ash content. However, it has a significant effect on protein levels. In addition, the higher the concentration of trash fish, the higher the fat content, protein content and ash content in Empek-empek products. On the other hand, the lower the concentration of trash fish, the higher the water and carbohydrate content in Empek-empek.

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