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THE EFFECT OF SLANDER SCAD FLOUR (DECAPTERUS SP.) SUBSTITUTION ON ORGANOLEPTIC QUALITY AND PROTEIN CONTENT OF ONION STICKS

**Adawayah Rabiatul, Aisyah Siti, Puspitasari Findya*, Nazrah Siti,
Dekayanti Tri, Suhandha Juhana, Candra**

Study Program of Fishery Products Technology, Department of Fishery Products Processing,
Faculty of Fisheries and Marine, University of Lambung Mangkurat, South Kalimantan,
Indonesia

*E-mail: findya.puspitasari@ulm.ac.id

ABSTRACT

Slender Scads flour can be used as a substitute in the processing of onion sticks. The objective of this study was to analyze the effect of the percentage of fish meal on the quality of organoleptic properties and chemical tests (water content and protein content) of onion sticks. The research method used a completely randomized design (CRD) with four treatments and three times replications, the percentage of fish flour substitution on the treatment O (0%), A (2.5%), B (5%), and C (7.5%). The organoleptic and chemical tests results (water and protein ratio) obtained the best treatment, namely treatment B (5% Slender Scads flour substitution), 2.84% water ratio, and 11.81% protein ratio. The results showed that the substitution of Slender Scads flour could increase the protein content of brought sticks but had not increased the panelists' preference value.

KEY WORDS

Slender scads flour, onion sticks, protein ratio.

The Commodity of slender scads in South Borneo in 2014 has produced 7.267 tons/year (Statistic Centre Institution, 2016). Based on the economic value, this fish belongs as a low economic fish, but in macro, the production power is high (Genisa, 1999). Fish with low economic value is not utilized enough for long-term processed products. This kind of slender scads is available to process as an additional product as fish flour (Adawayah et al, 2020; Oktavia D., 2007).

Fish flour is a processed product of fisheries with low water content. This fish flour is available to use as a material for making a product that increases the source of protein content from fish meat. The slender scads flour will be utilized as the primary material in this research as a wheat flour substitution and increases protein in onion sticks (Sari Dk et al, 2019).

Any snacks as sticks are consumed by the public, for example, an onion stick. The onion stick usually has a flat shape long, around 8 cm to 15 cm with a width of 0,5 cm and a thickness of 2 mm, and has a distinctive aroma and flavor of onions. This onion stick is a processed product made from wheat flour with mixed spices and garlic with added scallions or celery, cooked by frying until it generates the flavorful and crunchy stick. The research aimed to analyze the effect of the substitution percentage of slender scads flour on the quality of organoleptic tests and chemical tests (water content and protein content) of onion sticks.

METHODS OF RESEARCH

The research is held in the Laboratory of Teknologi Hasil Perikanan, Fisheries and Marine Faculty. Sample testing of water content and organoleptic test are held in Laboratory of Pengujian Balai Penerapan Mutu Hasil Perikanan Banjarbaru and protein content test is held in Laboratory of Ilmu Nutrisi and Makanan Ternak, Faculty of Agriculture, Lambung Mangkurat University.



A steaming pot, stove, oven, coffee grinder, filter, knife, cutting board, and digital scales also slander scads fish, water, and oil absorbent tissue. A washbasin, stove, noodle grinder, wok, spatula stirrer, skimmer, cutting board, knife, and digital scales. The materials are wheat flour, tapioca flour, fish flour, garlic, shallot, celery leaves, salts, eggs, water, and cooking oil. The first research is a process of slander scads flour.

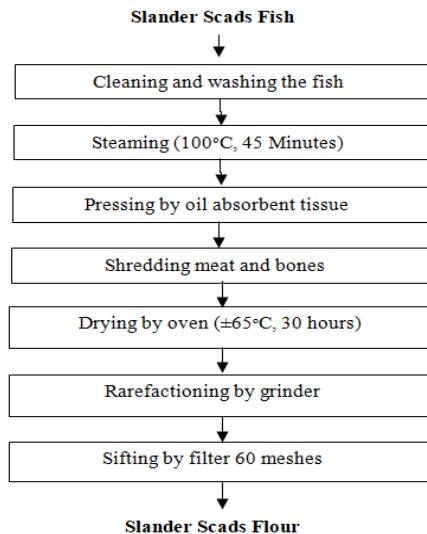


Figure 1 – The flow Diagram of Slander Scads Flour Process

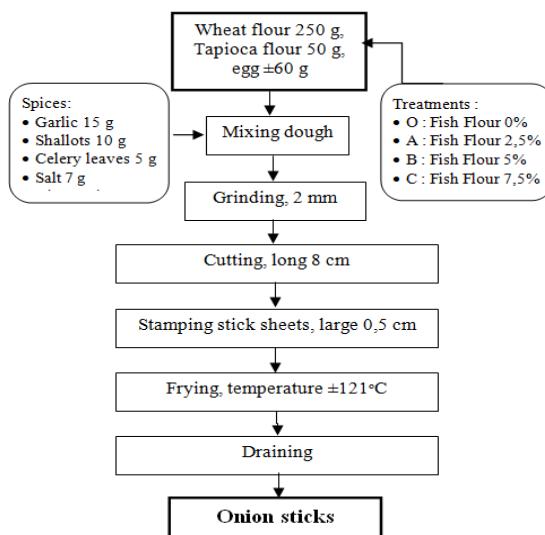


Figure 2 – Flow Diagram of Onion Sticks Process

This research uses Layout (RAL), with four trials and three times repetition until obtained 12 samples. Substitution treatments of fish flour are O (0%), A (2,5%), B (5%) and C (7,5%). A parameter in this research is the organoleptic test with a hedonic method and chemical tests (water content and protein content).

RESULTS AND DISCUSSION

The result of water content from slander scads flour is 12.25%. It indicates the water content of slander scads flour meets the quality requirement. According to SNI 01-2715-1996, the maximum water content quality requirement of fish flour is 10% (quality 1); 12% (quality 2); 12% (quality 3). The result of water content from slander scads flour is 12.25%. It indicates the water content of slander scads flour meets the quality requirement. According



to SNI 01-2715-1996, the maximum water content quality requirement of fish flour is 10% (quality 1); 12% (quality 2); 12% (quality 3). The result of protein content from slender scads flour is 73.46%. It indicates the protein content of slender scads flour exceeds the minimum quality requirement. According to SNI, the minimum protein content quality requirement of fish flour is 65% (quality 1); 55% (quality 2); 45% (quality 3). From the analysis, slender scads fish meal has high protein content. The nutritional content of slender scads flour, in general, can meet the quality standards of FAO (1972) except for the water content, which is a maximum of 10%, while the research results are 12.25%. Another requirement, according to FAO (1972) protein content of a minimum of 67.5% and a maximum of 0.75% fat.

The processing of slender scads flour is carried out by the steaming stage and then drying process using an oven for ± 30 hours at a temperature of $\pm 65^{\circ}\text{C}$. The emergence of low yield is affected by several factors like the initial state of the raw material and drying (Adawayah 2016).

Appearance and color can determine the assessment of food products and consumers' attractiveness and preferences in organoleptic tests of appearance specifications by the sense of sight or eyes.

Figure 3 shows that the average organoleptic value of the appearance of the onion sticks was highest under treatment O (without fish flour mixture), which was 8.3, and treatment A was 7.3, while for treatments B and, treatment C the score was 6.7.

The higher the substitution of fish flour in the manufacture of onion stick products will significantly differ in appearance. The addition of fish flour causes the color of the onion sticks to turn brownish. The heating process causes the brownish color on the onion sticks called the *Maillard* reaction, a non-enzymatic browning reaction due to reducing sugar (carbohydrate) with the primary Amino cluster. *Maillard* reaction may occur in foods that contain protein and carbohydrates. The results showed that substituting slender scads flour could increase the protein content of onion sticks, which are generally high in carbohydrates. Besides of *Maillard* reaction, another factor is caramelized reaction (occurs in sugar heating) in food or produced by hydrolysis of starch to be furfural and hydroxymethylfurfural, and so are sugar carbonized, lipid, and protein.

Food product has a specific scent.

Figure 4 shows that the highest average of organoleptic test valuation of onion sticks scent is O, the treatment O (mixed substitution fish flour 0%) 7.8 and the lowest is on the B and C (with fish flour substitution 5% and 7.5%) with valuation 6.8. According to fish flour substitution through onion sticks product more increased percentage flour gives natural difference scent with sticks product without fish flour substitution.

One of the factors that influence the aroma of onion sticks is the distinctive aroma of fish that comes from fish flour. The more flour used, the higher the fish's typical scent. Therefore, to decrease the characteristic smell, add the celery leaves on the onion sticks product research. Concerning the chemical result of the onion stick, it produces high enough protein content. According to (Agustini *et al.* 2015), the *Maillard* reaction involves browning in the heating process. It also influences the flavor, texture, and flavor of food by protein cross-linking.

The texture is a sensory property of the product related to the crispness of the onion sticks. The five senses that play a role in the organoleptic test of texture specifications are the sense of touch that can be observed with the mouth or fingers.

Figure 5 shows that the highest average of organoleptic test onion stick's texture is under treatment O (mixed substitution fish flour 0%) 7.5 and the lowest is under treatment C (with 7.5% fish flour substitution) with the valuation 6.3. Based on the research, this study's results indicate that different fish flour substitutions can affect the texture of onion sticks.

The texture of the onion sticks has a significant effect because of the addition of wheat flour and tapioca as a water binder. It affects the texture of the onion sticks. Besides that, the influence of protein from fish flour is strong enough, and so is the egg. One of the egg's functions is stabilizer/mixer and developing the dough to produce a crispy product. Both factors may be causing the heating process by frying from protein gelation character and *Maillard* reaction.

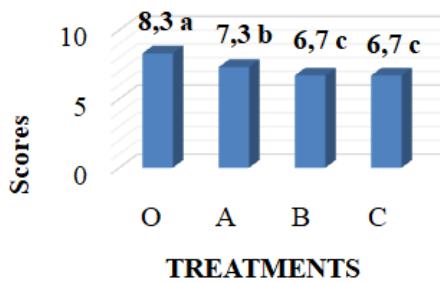


Figure 3 – Average of Organoleptic Test Valuation of Onion Sticks Appearance

Details:

- The number followed by different superscript letters (a, b, c, and d) in every treatment shows a real difference;
- The same letter doesn't show a real difference.

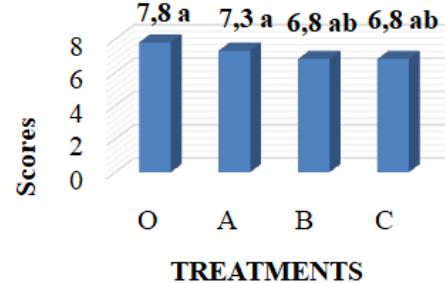


Figure 4 – Average of Organoleptic Test Valuation of Onion Sticks Scent

Details:

- The number followed by different superscript letters (a, b, c, and d) in every treatment shows a real difference;
- The same letter doesn't show a real difference.

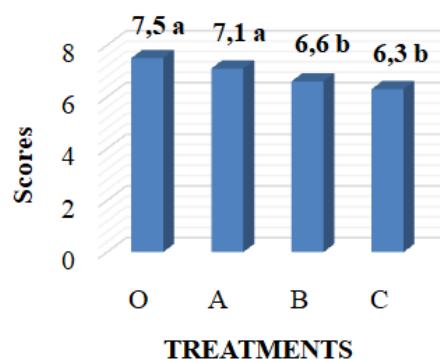


Figure 5 – Average of Organoleptic Test Onion Stick's Texture Specification

Details:

- The number followed by different superscript letters (a, b, c, and d) in every treatment shows a real difference;
- The same letter doesn't show a real difference.

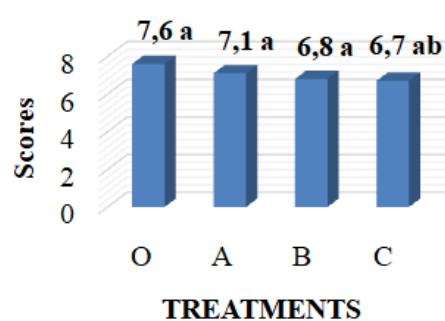


Figure 6 – Average of Organoleptic Test Specification Onion Sticks Flavor

Details:

- The number followed by different superscript letters (a, b, c, and d) in every treatment shows a real difference;
- The same letter doesn't show a real difference.

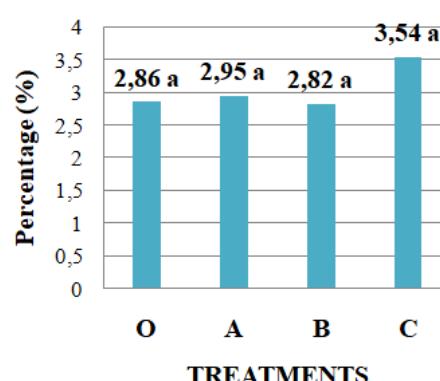


Figure 7 – Water Content Average of Onion Sticks

Details:

- The number followed by different superscript letters (a, b, c, and d) in every treatment shows a real difference;
- The same letter doesn't show a real difference.

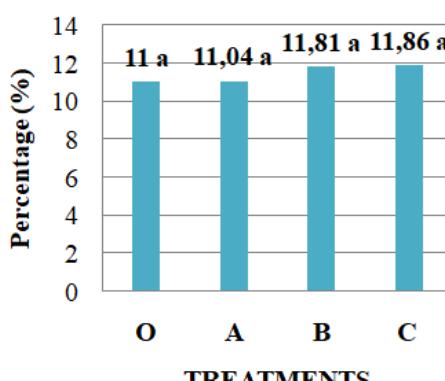


Figure 8 – Average of Protein Content Test of Onion Stick

Details:

- The number followed by different superscript letters (a, b, c, and d) in every treatment shows a real difference;
- The same letter doesn't show a real difference.



Proteins can form gels by forming polymers that bond through covalent/non-covalent bonds that trap water and other high or low molecular weight materials. The bond that occurs is hydrogen bonding. Flour also has a reasonably high protein and can affect the crispness, making the structure hard, tender, and bind water. Changes in the granular form of starch, gelatinization, and dehydration will produce a crunchy texture.

The flavor is an essential factor in determining the panelists' preference and acceptance decisions. There are five kinds of flavors known as sweet, sour, salty, bitter, and savory. The Organoleptic test specified the flavor may be observed by the sense of flavor.

Figure 6 shows that the highest average organoleptic value specification of onion sticks flavor in treatment O (mixed substitution fish flour 0%) 7,6 and the lowest is under treatment C (with 7,5% fish flour substitution) 6,7. Results of average value in every treatment show that onion sticks flavor may be liked by panelist/consumer observed by onion sticks scoresheet.

Fish flour substitution for panelist/consumer acceptance is still acceptable. Flavor can affect its constituent components, especially amino acids, providing a savory flavor in fish flour and egg. The flavor of food comes from the *Maillard* reaction, which is a product of the *Strecker* reaction. When used Slander Scads flour with a high concentration, the resulting flavor may be increasingly disliked by the panelist because it comes from the distinctive aroma of fish with a relatively high protein content of fish flour. The formation of flavor compounds in the *Maillard* reaction depended on the type of sugar and amino acid, thermal, pH, water content reaction, and time.

The amount of water in food is the water content. The factor of decreasing food quality is increasing water content. The highest water content test results on onion sticks are under treatment C (with 7,5% fish flour substitution), and the lowest is under treatment B (with 5% fish flour substitution). The chart of water content average is in Figure 7.

The water content in each treatment increased, but the water content decreased for treatment B (with 5% fish flour substitution). According to (Sari *et al.* 2019), the lower the water content in the ingredient indicates the quality of the food is getting better and able to reduce the microbial growth media so that the product becomes more durable. Besides that, it can also affect the texture and crunchiness of the onion sticks product.

According to SNI 2886:2015, the maximum water content on snacks as onion sticks is 4%. The water content on this onion sticks research has an average of 2,82, the lowest and the highest result is 3,54. It indicates the water content on snacks as onion sticks meet the quality requirement.

The average test results for the protein content of onion sticks between each treatment increased. The highest protein content is under treatment C (with 7,5% fish flour substitution), and the lowest is under treatment O (with 0% fish flour substitution). The chart of protein content average is in Figure 8. The 7.5% fish flour substitution has the highest protein content. It is due to slender scads flour used in this research has a 73,46% protein content.

Characteristics of protein content in the study of onion sticks with fish flour substitution seen from this average value have an outstanding deal with the highest protein content of 11.86% under treatment C (the highest fish meal substitution is 7.5%). This matter follows the quality requirements protein content on extrudate snacks from fish flour has a relatively high value of 10,772%. The high protein content in extruded food from the fish flour is due to the composition of fish flour in the extrudate formula mixture (Oktavia, 2007). In addition, mixing materials such as eggs with a reasonably high protein is also used to manufacture these sticks. Therefore the protein from each treatment has increased.

CONCLUSION

Based on the result of preliminary research, slender scads flour has several characteristics: yield 28%, water content 12,25%, and protein content 73,46%. The research result on onion sticks with fish flour substitution using organoleptic and chemical tests (moisture and protein content) obtained the best treatment, under treatment B (5% fish flour



substitution) with water content of 2.84% and a protein content of 11.81%. The results of the organoleptic research and chemical test (water content and protein content) obtained the best treatment, that is, treatment B (with 5% fish flour substitution), water content 2.84% and protein content 11.81%. The test result shows that slender scads flour substitution can increase protein content in onion sticks but cannot increase panelists' favorite score.

Further research is needed to prove durability and alteration during the shelf life of onion stick with slender scads flour for additional.

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