

CHARACTERISTICS OF TUNA SAUSAGE WITH THE ADDITION OF YELLOW PUMPKIN FLOUR AS A SOURCE OF PROTEIN AND VITAMIN A IN COVID-19 PANDEMIC

Mutia Reski Amalia^{1*}, Maya Kumalasari Sugiyanto¹, Pepi Sugianto Umar¹, Novian Swasono Hadi¹

¹Nutrition Department, Health Polytechnic of Gorontalo

*E-mail: mutiaamalia@poltekkesgorontalo.ac.id

ABSTRACT

Enhancing immunity is crucial against COVID-19, achieved through improved nutrition, especially protein and vitamin A. Protein aids in antibody production, which is vital for infection defence. Malnourished children have weakened immunity due to inadequate antibody formation, leading to higher mortality rates. Vitamin A also bolsters immunity. This study focused on tuna sausages enriched with pumpkin flour to enhance nutritional value and visual appeal. The aim was to boost agricultural and fisheries productivity for food security during the pandemic, offering a healthy, cost-effective protein and vitamin A source from local resources. The study assessed the characteristics of these sausages through a randomized design with three formulations: 10%, 20%, and 30% pumpkin flour. Nutritional analysis was conducted using the proximate method. Results favoured the second formula, showing significant differences in taste, colour, and texture. The third formula had the highest protein content, while the second one excelled in fat and vitamin A.

Keywords: sausage, tuna, yellow pumpkin

ABSTRAK

Meningkatkan imunitas sangat penting dalam melawan COVID-19, dapat dicapai melalui peningkatan asupan nutrisi, terutama protein dan vitamin A. Protein membantu produksi antibodi yang sangat penting dalam pertahanan tubuh terhadap infeksi. Anak-anak yang mengalami malnutrisi memiliki sistem kekebalan tubuh yang lemah karena produksi antibodi yang tidak memadai, yang dapat mengakibatkan tingginya tingkat kematian. Vitamin A juga mendukung kekebalan tubuh. Studi ini berfokus pada sosis tuna yang diperkaya dengan tepung labu untuk meningkatkan nilai gizi dan daya tarik visual. Tujuan penelitian ini adalah untuk meningkatkan produktivitas pertanian dan perikanan guna menjaga ketahanan pangan selama pandemi, dengan menawarkan sumber protein dan vitamin A yang sehat dan ekonomis dari sumber daya lokal. Studi ini mengevaluasi karakteristik sosis melalui desain acak dengan tiga formulasi: 10%, 20%, dan 30% tepung labu. Analisis gizi dilakukan menggunakan metode proksimat. Hasilnya lebih mendukung formula kedua, menunjukkan perbedaan signifikan dalam rasa, warna, dan tekstur di antara ketiganya. Formula ketiga memiliki kandungan protein tertinggi, sementara formula kedua unggul dalam kandungan lemak dan vitamin A.

Kata kunci: sosis, tuna, labu kuning

INTRODUCTION

Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered corona virus that requires people to take preventive measures by changing habits. During the Covid-19 pandemic, people did a lot of activities from home (Saragih and Saragih, 2020) Higher consumption of processed foods with higher calorie content, high in saturated fat, sugar, refined carbohydrates, easier access and use, may contribute to increasing the prevalence of obesity during the time of COVID-19 (Rampling *et al.*, 2021). Improving immunity is

one of the countermeasures for COVID-19 disease, one of which is by increasing nutritional intake. One of the nutrients needed to increase immunity is protein and vitamin A. Protein is crucial to form antibodies which will later fight infection. The high mortality rate in children who suffer from malnutrition is mostly caused by decreased immunity against infection due to their inability to form antibodies in sufficient quantities. Vitamin A is also one of the vitamins that play a role in boosting immunity. A strong association has

been found between vitamin A status and risk of respiratory infections (Almatsier, 2004) .

One source of animal protein that is widely consumed by the public, easy to obtain at a low price is fish. Fish cannot be stored for a long time because it quickly undergoes a process of decay. Therefore, it is necessary to process fish so that it is stored longer and lasts longer. One effort to diversify fishery products is fish sausage (Ramasari, Ma'ruf and Riyadi, 2012) .

One of the fisheries products that has the potential to be developed is tuna. Based on data from the Ministry of Maritime Affairs and Fisheries for 2020, the total catch of tuna in Indonesia has reached 69 thousand tons. Gorontalo Province is the province with the highest amount of tuna caught, reaching ten thousand tons (MMAF, 2020) .

Sausages are generally made of ground meat, mashed, seasoned, put in *casings* and smoked with or without cooking (Verly Dotulong, 2009) . The addition of pumpkin flour which is a source of vitamin A is expected to increase the nutritional value of sausages. The addition of pumpkin flour to meat sausages has been shown to increase β -carotene levels in beef sausages (Prayitno *et al.* , 2009) .

The development of tuna sausages has been carried out by utilizing the fermentation method or using the red meat of tuna (Suhendar, 2003; Ikasari, Syamdidi and Suryaningrum, 2011; Nursam, 2011; Yuwana, 2018). The sausages in this study were sausages made from tuna with the addition of pumpkin flour so that it was expected to increase the nutritional content and attractive color of the sausages. The selection of this product aims to increase the productivity of agriculture and fisheries in order to realize food security in the framework of national security. In addition to developing healthy, economical, and nutritious sausages as a source of protein and vitamin A made from local food during the Covid-19 pandemic.

METHODS

The research design used a completely randomized design with three different treatments of tuna sausage formulations with the addition of 10% pumpkin flour; 20%; and 30%. Nutritional

value using the proximate method. Stages study started with making flour pumpkin yellow then making sausage. Stages next is a power test accept and analyze proximate and Vitamin A levels. The research data were processed statistically for the ANOVA (Analysis of Variance) test of diversity and continued with the BNT test (Dahlan, 2013.)

Sausage development consists of several stages, namely preparation of ingredients, mixing of ingredients, insertion into sausage casings, steaming, cooling and storage. The pumpkin tuna sausage was then tested for its acceptability and nutritional value was analyzed using the proximate test. Parameters observed in this study were acceptability (color, aroma, taste, and texture), analysis of nutrients (protein content, fat content, ash content, carbohydrate content, and vitamin A).

RESULTS AND DISCUSSIONS

Acceptability includes aroma, color, taste, and texture with 30 panelists. The average score of the acceptability test or organoleptic test can be seen in Table 1. Aroma is one of them nature sensory received by the senses the smeller could influence level reception sensory. Duncan's further test results show that sausage tuna squash does raises evaluation that scent different in a manner significant. Similar results were also found for the product *muffins*, analog rice, noodles and sausages added meat with flour pumpkin yellow with addition flour pumpkin yellow (Rismaya, Syamsir and Nurtama, 2018 ; Pramono *et al.* , 2021; Novita Indrianti, Sholichah and Afifah, 2021; Hleap-Zapata *et al.* , 2020) . Color is a main factor considered in development product, because panelist evaluate product first time sighting the visual. kindly general, increase concentration flour pumpkin added yellow cause decline reception sensory color. Addition flour pumpkin yellow have evaluation sensory low color consequence that color too dark (Rismaya, Syamsir and Nurtama, 2018) . These results were also shown in tuna sausage with addition flour pumpkin yellow. The more many additions flour the pumpkin, the more decreased level favorite from facet color. Yellow browning color of added product flour pumpkin yellow suspected caused by existence beta carotene

Table 1. Preference test results

Component	Formulas		
	F1	F2	F3
Flavor*	3.80 ± 0.8 ^a	3.93 ± 0.98 ^b	3.00 ± 1.23 ^c
Color *	3.97 ± 0.77 ^a	3.93 ± 0.87 ^b	3.30 ± 1.08 ^c
Texture *	3.67 ± 0.75 ^a	4.03 ± 0.61 ^b	3.43 ± 1.13 ^c
Aroma	3.23 ± 1.19	3.60 ± 1.19	3.33 ± 1.18

Table 2. Nutritional value of sausages (per 100g)

Component	Formulas		
	F1	F2	F3
Water (%)	66.6 ± 0.15	66.54 ± 0.14	66.16 ± 0.15
Ash (%)	1.69 ± 0.14	1.82 ± 0.09	1.66 ± 0.48
Fat (%)	0.44 ± 0.07 ^a	0.94 ± 0.06 ^b	0.86 ± 0.05 ^b
Proteins (%)	14.30 ± 0.01 ^a	14.35 ± 0.44 ^a	17.03 ± 0.24 ^b
KH (%)	16.97 ± 0.15 ^a	16.55 ± 0.89 ^b	14.28 ± 0.05 ^b
Vitamin A (µg/100g)	137.87 ± 7.21 ^a	293.73 ± 78.31 ^b	258.07 ± 102.12 ^b

Data presented in mean ± standard form deviation

Same letters in the same column show no significant difference ($p > 0.05$)

content in flour pumpkin yellow (Rasyid *et al.*, 2020).

Based on the results of the preference test seen that the second formula to be the formula with the most preferred taste, texture and aroma. Tuna Pumpkin Sausage with the first formula is the most preferred color.

Sausage water content tuna squash ranged from 66.16-11.6% and content ash ranged from 1.66-1.69% (table 2). The low water activity provided by the flour pumpkin yellow show stability excellent storage, because almost all contributing reactions to damage food delayed or entirely stopped when food water activity reduce (Pereira *et al.*, 2020).

Statistically, water content and content ash no show difference significant between three sausage formulas tuna squash ($p > 0.05$). The levels of fat, protein, carbohydrates and vitamin A show difference significant from difference formulation flour pumpkin and smoked roa fish based on a two-way ANOVA test ($p < 0.05$).

Protein content of sausage with addition pumpkin yellow presented in Table 2. Research results show that protein content of sausage with addition pumpkin yellow was significantly different ($P < 0.05$). A number minerals, vitamins, carotenoids, and substances bioactive others, as well activity promotion documented health,

making flour pumpkin as ingredient addition interesting food (Poliszko *et al.*, 2019). Protein contents was ranged between 14.30% to 17.03%. The more yellow pumpkins added, protein levels is increased. Results was like sausages meat fortified beef with β -carotene from pumpkin yellow show that the higher level of flour filler substitution pumpkin yellow the more increase score sausage protein content. This caused because flour protein content pumpkin yellow more tall compared flour tapioca. Flour protein content pumpkin yellow that is about 5%, meanwhile flour protein content tapioca that is around 0.5 to 0.7% (Prayitno *et al.*, 2009). Enhancement Vitamin A levels are seen in sausages tuna squash. Change Vitamin A levels are also seen in addition flour pumpkin on spongecake (Ghaboos and Ardabili, 2018).

A study that discusses people's consumption of processed food during the Covid-19 Pandemic, especially the consumption of processed food in the form of grains, fruits, meat and fish, vegetables, milk, and ready-to-eat processed foods. The results showed that processed meat and fish that were consumed the most were sausages because they could be eaten immediately, were filling, easy to find, and liked by various groups, both children and adults (Kamelia, Supriyadi and Afif, 2021). Pumpkin tuna sausage products can be used as a

healthy solution for processed foods as a source of protein.

CONCLUSION

Sausage tuna squash has opportunity to be developed as processing which food contains protein and vitamin A as one form processed side dish which is useful in improving nutritional intake and immunity. Further research could be done in evaluating storage time of developed sausage.

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