SENSORY CHARACTERISTICS OF WALNUT FISH BALLS MADE FROM SAGO FLOUR FILLER

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Abstract : Meatballs are a type of food that is very well known and liked by the wider community ranging from children to adults. Meatballs made from skipjack tuna (Katsuwonus pelamis) have not been found in the market, even though skipjack tuna in Maluku is one of the potential commodities. Skipjack tuna contains 19.6 g of protein and is very beneficial for the growth of children. The use of local food to process it into one nutritious food product is very important, meaning reducing dependence on food imported from outside the region. In addition to skipjack tuna, walnuts are also one of the local foods with high protein content (12.1%), so these two local foods from Maluku have been fortified into meatballs By using several formulation treatments, namely the ratio of fish to walnuts in percent (100: 0; 80: 20; 60: 40; 40: 60 and 20: 80). This study aims to determine the best formulation of meatballs from fish and walnut base ingredients and made from sago flour filler. The benefit of this study is that consumers can consume the meatballs produced, especially for stunted children who experience protein nutrition deficiencies. The experimental design used was a Factorial Complete Randomized Design using 5 treatments, namely skipjack tuna: walnut (%): (100: 0; 80: 20; 60: 40; 40: 60; 20: 80) with two replays So that 10 experimental units were obtained. The data is sensorily analyzed to determine its characteristics including hedonic tests (very like, like, somewhat like, and dislike) of taste, aroma, chewiness/texture, and color as well as quality tests hedonistic to the texture (very chewy, chewy, slightly chewy and not chewy) as well as flavor (very savory, savory, somewhat savory and not savory). Sensory tests were conducted on 30 somewhat trained and trained panelists. The data were analyzed in a fingerprinted manner and if there was a noticeable difference, it was followed by the Tukey test with a 95% confidence level.

Keywords: Meatballs; Skipjack Tuna; Walnuts; Sago Flour

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INTRODUCTION

Meatballs are a type of food that is very well known and liked by the wider community ranging from children to adults. Meatballs that are often found in the market are beef meatballs, chicken meatballs, and fish meatballs. Additional ingredients for making meatballs are tapica flour, onion, garlic, and other flavoring ingredients, then formed round and boiled until the meatball balls float as a sign that the meatballs have been cooked [1]. Meatballs made from skipjack tuna (Katsuwonus pelamis) have not been found in the market, even though skipjack tuna in Maluku is one of the potential commodities. Skipjack tuna production in Maluku is 59057.60 tons/year. In addition to its fairly high production in Maluku, skipjack tuna also contains various nutrients, especially protein nutrients (19.6 g per 100 g of ingredients) which are very beneficial for children's growth.

In addition to skipjack tuna, there is one other local food that also has a fairly high protein content besides being rich in unsaturated fatty acids (omega 3 fatty acids, omega 6 fatty acids, omega 9 fatty acids), namely walnuts. Fresh walnuts contain 8.2% protein, and roasted walnuts contain 12.1% protein[2]. Walnuts also have a fairly high protein digestibility (84.5% in fresh walnuts and 95.3% in dry/roasted walnuts). Walnuts are a very potential food to support the growth of children, one of the indicators is that walnuts that are tried on experimental animals (white rats) aged 28 days, can increase PER (Protein Efficiency Ratio) according to standards (2.5) so that walnuts can be categorized as a fairly good source of protein[3].

The basic manufacture of meatballs always uses flour or starch as a binder. Tapioca flour is one of the binding agents used to increase the binding power of water[4]. Sago flour is also widely produced in Maluku, so this raw material can also be used as an alternative filler or substitute for tapioca flour.

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[1] M Natsir Usman, "Mutu Briket Arang Kulit Buah Kakao Dengan Menggunakan Kanji Sebagai Perekat," *Jurnal Perennial* 3, no. 2 (2007): 55–58.

[2] Meitycorfrida Mailoa, Tri D Widyaningsih, and Widya D R Putri, "Effect of Walnut (Canarium Vulgare L.) Provisioning on White Rat Biology," *EurAsian Journal of BioSciences* 13, no. 1 (2019): 213–217.

[3] Ibid.

[4] Nurbety Nurbety Tarigan, "Mutu Bakso Ikan Kakap (Lutjanus Bitaeniatus) Dengan Penambahan Bubur Rumput Laut (Euchema Cottoni)," *AGRISAINTIFIKA: Jurnal Ilmu-Ilmu Pertanian* 4, no. 2 (2020): 127–135.

In terms of market demand, meatballs still have a high demand value because generally meatballs are liked by all groups ranging from children to adults. Based on these things, the author wants to try to formulate fish and walnuts as the basic ingredients for making meatballs using several different formulations and made from sago flour fillers, so that finally the best treatment will be found sensorily. The research that will be carried out is entitled: Sensory Characteristics of Walnut Fish Balls Made from Sago Flour Filler.

RESEARCH METHODS

Time and Place of Research

This research has been carried out in November 2022 at the Sensory Laboratory of the Department of Agricultural Product Technology, Faperta Unpatti.

Tools and Materials

The tools used are knives, meat grinding machines, pots, stirring spoons, and other tools for analysis, while the materials used are skipjack tuna, walnuts, salt, sago flour, ice cubes, and materials for chemical analysis and sensory test forms.

Research Procedure

The research procedure begins with studying how to make fish balls Then modified on several materials according to research need[5].
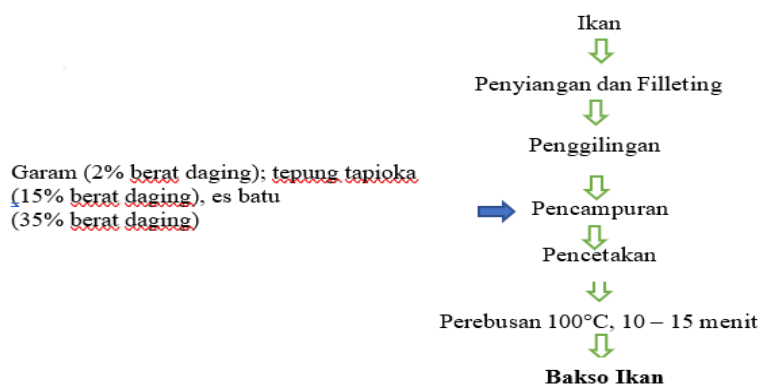

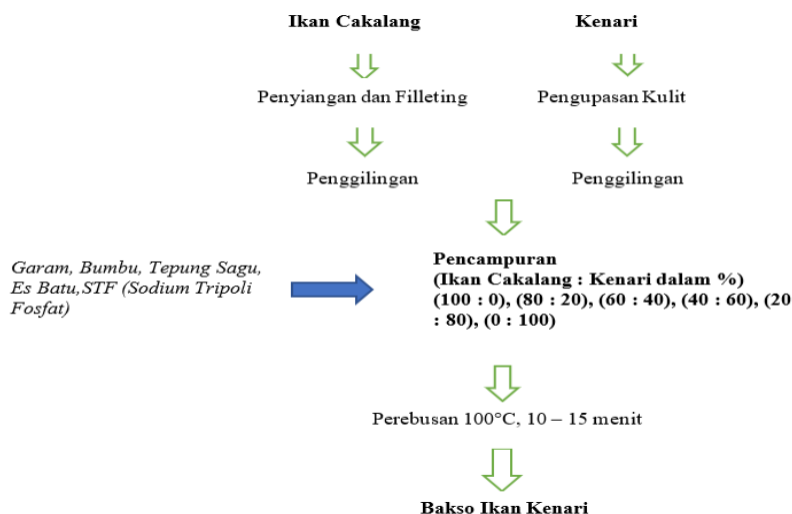Figure 1. Diagram Flow of Making Fish Meatballs

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[5] Ibid.

Figure 2. Diagram Flow Research Procedure

Trial Design

The experimental design used was a Factorial Complete Randomized Design using 5 treatments, namely skipjack tuna: walnut (%) (100: 0, 80: 20, 60: 40, 40: 60, and 20: 80). 2 tests were carried out so that 10 experimental units were obtained.

Data Analysis

The resulting Walnut Meatballs will be tested and analyzed sensorily to determine their characteristics. Sensory characteristics include hedonic tests of taste, aroma, chewiness/texture, and color with favorability scores of 4 (very like), 3 (like), 2 (somewhat like), and 1 (dislike). Hedonic quality tests were also carried out on texture (very chewy, chewy, slightly chewy, not chewy) and taste (very savory, savory, slightly savory, and not savory). Sensory tests were conducted by 30 rather trained and trained panelists. The data were analyzed using fingerprints. If there is a real difference, then proceed with the Duncan test with a 95% confidence level.

Observation Variables

1. Hedonic Test

Sensory includes hedonic tests of taste, aroma, and chewiness texture with favorability score of 4 (very like), 3 (like), 2 (somewhat like), and 1 (dislike). The sensory test was conducted by 30 trained panelists. The data

were analyzed using fingerprints. If there is a significant difference between treatments, it will be continued with the Tukey Test (α = 0.05)

2. Hedonic Quality Test

Hedonic quality tests were conducted on texture and taste. The scores on each test parameter include: Texture is 4 (very chewy), 3 (chewy), 2 (slightly chewy), and 1 (not chewy), while Taste is 4 (very savory), 3 (savory), 2 (slightly savory) and 1 (not savory). The data were analyzed using fingerprints. If there is a significant difference between treatments, it will be continued with the Tukey Test (α = 0.05).

RESEARCH RESULTS
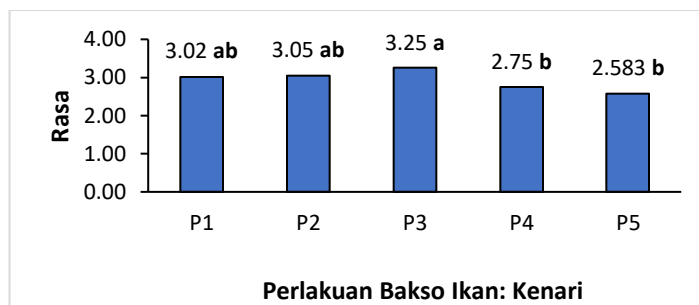**Hedonic Test Results**
  1. **Taste**

Figure 1. Sensory Test Results on the Taste of Walnut Meatballs

The Tukey test showed significantly different results between treatments. The data in Figure 1 shows that sensorily, panelists prefer the taste of meatballs that are only made from fish without the addition of walnuts and also meatballs with fish formulations: walnuts (80% versus 20%) and (60% to 40%). The highest favorability level assessment was in the meatball formulation treatment with a ratio of fish: walnuts are 60%: 40%.i.e. 3.25 (likes). Panelists are not used to consuming meatballs with the addition of walnuts although according to Mailoa, walnuts have a fairly high-fat content (68.96%) which can have a savory taste in food[6]. Sociocultural factors of nutrition greatly influence consumer acceptance of the taste of a food product, Data in Figure 1 shows that the level of panelists' liking for taste decreases

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[6] Mailoa, Widyaningsih, and Putri, "Effect of Walnut (Canarium Vulgare L.) Provisioning on White Rat Biology."

with the addition of more walnuts, but still tends to like (somewhat like), This shows that although walnut meatballs are a new food product, they are still liked by consumers. This is suspected by the presence of fat content in fish (22.16%) and also in walnuts (68.96%) which is a fairly high content that is thought to give a savory taste to food, so panelists still tend to like even in the likes to somewhat like category.
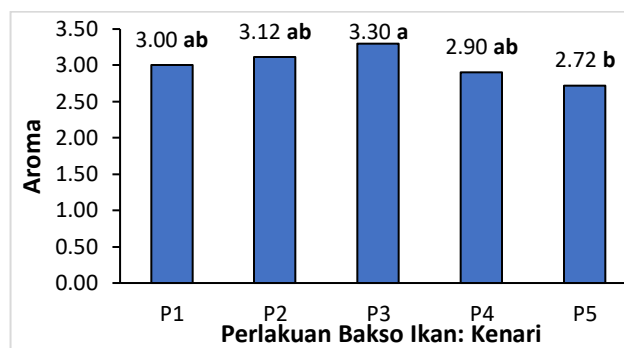
2. **Aroma**

Figure 2. Sensory Test Results on the Aroma of Walnut Meatballs

The Tukey test showed significantly different results between treatments. Aroma is an important factor that can also determine the consumer's taste in food products. Generally, the preferred aroma also gives a good taste[7]. The data in Figure 2 shows that sensorily, panelists prefer the aroma of meatballs that are only made from fish without the addition of walnuts and also meatballs with fish formulations: walnuts (80% versus 20%) and (60% compares: 40%). The highest level of favorability to the aroma of meatballs is in the treatment of meatball formulations with a ratio of fish: walnuts are 60%: 40%.i.e. 3.30 (likes). The panelists' acceptance or liking for meatball aromas decreased with the addition of larger walnuts, although they were still in the somewhat like category (2.72 – 2.90). This showed that the panelists did not like the walnut aroma that was more dominant in the resulting meatballs. According to Winarno (1993), seawater fish has a relatively high-fat content that can cause a meatball aroma that is preferred compared to meatballs made from freshwater fish. The aroma of fish meat will

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7 Elsina H Ohoiner, Meitycorfrida Mailoa, and Syane Palijama, "Jurnal Agrosilvopasture-Tech," *Jurnal Agrosilvopasture-Tech Vol* 1, no. 1 (2022): 1–9.

give the impression of a fishy smell in meatballs, because the content of protein and urea in meat is quite high[8]. The aroma of meatballs with 100% fish formulation is still liked by panelists allegedly because the fishy smell has disappeared with the manufacturing technology, namely fish washed with 35% ice water to remove the fishy smell. Panelists are not yet familiar with walnut-scented meatballs, so this affects the panelists' declining assessment of the more dominant aroma of walnut-based meatballs.
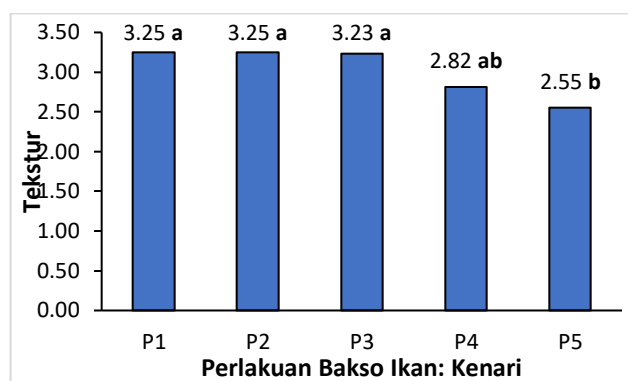
Texture

Figure 3. Sensory Test Results on the Texture of Walnut Meatballs

The Tukey test showed significantly different results between treatments. The texture can be known by using the taste buds (mouth) and also the taste buds (skin), namely fingers to feel food products. The data in Figure 2 shows that sensorily, panelists prefer the texture of meatballs that are only made from fish without the addition of walnuts and also meatballs with fish formulations: walnuts (80%: 20 %), (60%: 40 %) and (40%: 60%). This shows that up to the formulation of walnut meatballs 60% versus fish 40% still gives a dense and chewy meatball texture so that it is liked by the panelists, but with the addition of walnuts more dominantly, the meatballs seem a bit dense and slightly chewy, so the level of liking for the texture of meatballs begins to decrease (somewhat like). This is thought to be due to the presence of a higher fat content in walnuts than the fat content in fish. As stated by Amrullah that

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[8] Endah Hasrati and Rini Rusnawati, "Kajian Penggunaan Daging Ikan Mas (Cyprinus Carpio Linn) Terhadap Tekstur Dan Cita Rasa Bakso Daging Sapi," *Jurnal Ilmu-ilmu Pertanian* 7, no. 1 (2020): 17.

too high-fat content in the constituent ingredients of meatballs will produce meatballs with a perforated texture[9].
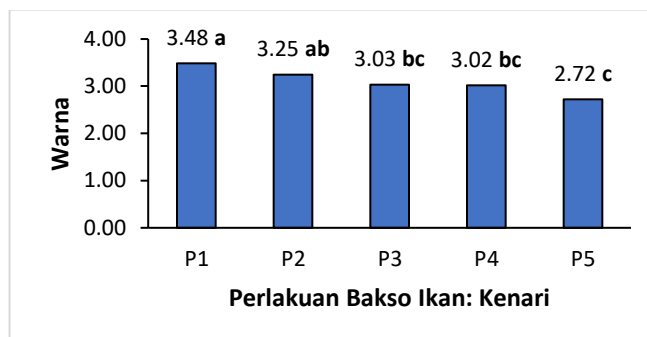
3. **Color**

Figure 4. Sensory Test Results on the Color of Walnut Meatballs

The Tukey test showed significantly different results between treatments. The data in Figure 4 shows that sensorily, panelists prefer the color of meatballs that are only made from fish without the addition of walnuts and also meatballs with fish formulations: walnuts (80% versus 20%), (60% compares: 40%) and (40%: 60%) which are in the like category, while fish ball formulations are 20% and walnuts 80%, panelists choose to like somewhat. This shows that panelists don't like the color of meatballs that use walnuts more dominantly. According to Mailoa, walnuts have a yellowish-white color[10]. This contrasts somewhat with the color of beef meatballs or fish balls which gives the impression of a slightly brownish-black color. Panelists are used to the brownish-black color of meatballs, so they tend to prefer the whiter color of meatballs.

hedonic quality test

1. **Texture**

The Tukey test showed significantly different results between treatments. The data in Figure 5 shows that the hedonic quality of texture shows a statistically relatively similar assessment, namely from the 1st treatment – the 4th treatment (walnut-based fish ball formulation: 100%: 0 %;

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[9] Muhammad Amrullah, "Penambahan Tepung Sagu Dengan Level Yang Berbeda Terhadap Mutu (Organoleptik) Bakso Daging Ayam" (Universitas Islam Negeri Alauddin Makassar, 2017).

[10] M Auzaini et al., "Variasi Fenotipe Morfometri Burung Kenari Dewasa Antara Warna Bulu Terang Kuning Dan Putih," *TERNAK TROPIKA Journal of Tropical Animal Production* 14, no. 2 (2013): 31–37.

80%: 20%, 60%: 40%; 40%: 60%). This is thought to be a good blend of fish and walnuts and is also supported by sago flour as a good binding force. As said by Indrawati, sago flour is sticky and rich in carbohydrates[11].
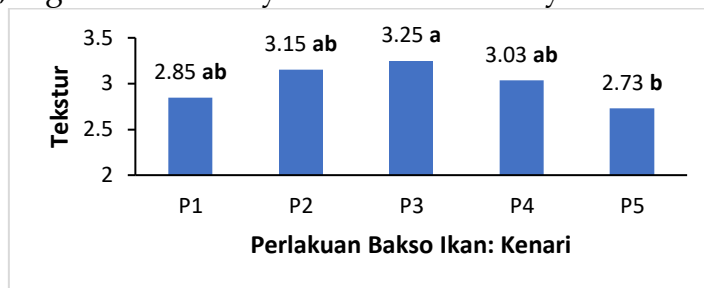

Figure 5. Sensory Test Results on the Quality (Texture) of Walnut Fish Balls

Sago starch in the form of granules when mixed with cold water will experience a reversible hydration event, namely water absorption. According to him, sago flour also has physical characteristics similar to tapioca flour. According to Untoro, the difference in the chewiness of meatballs can be caused by several things, including protein content, water content, and fat content of each constituent ingredient[12]. According to him, the constituent ingredients are high in protein and if the mixing of the two is right and appropriate, chewy meatballs can be produced. It is suspected that the texture that has a compact and chewy shape in walnut fish balls is caused by the presence of a fairly high protein content both in fish (19.6%) and in walnuts (12.1%)[13]. The lack of chewiness of texture in the P5 treatment (2.73) was thought to be due to the small number of ice cubes added due to the percentage of fish that were only a few (20%) walnut-based (80%). Ice cubes can help the muscles of the meat contract, making the texture denser, chewy, and less flabby. It is said by Widya and Murtini that ice cubes are mixed at the time of grinding with the aim that during the grinding the elasticity of the meat is maintained so that the meatballs produced will be chewier[14].

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[11] Anis Fauziyah, "PENGARUH JUMLAH TEPUNG SAGU (Metroxylon Sago Rottb) DAN JUMLAH BAYAM (Amaranthus Spp) TERHADAP SIFAT ORGANOLEPTIK BAKSO IKAN GABUS BAYAM ANIS FAUZIYAH," *Jurnal Tata Boga* 6, no. 3 (2017).

[12] Noviadi Setyo Untoro, Kusrahayu Kusrahayu, and Bhakti Etza Setiani, "Kadar Air, Kekenyalan, Kadar Lemak Dan Citarasa Bakso Daging Sapi Dengan Penambahan Ikan Bandeng Presto (Channos Channos Forsk)," *Animal Agriculture Journal* 1, no. 1 (2012): 567–583.

[13] Mailoa, Widyaningsih, and Putri, "Effect of Walnut (Canarium Vulgare L.) Provisioning on White Rat Biology."

[14] Patang Patang, "The Making Meatballs Based Main Milk Fish with Addition of
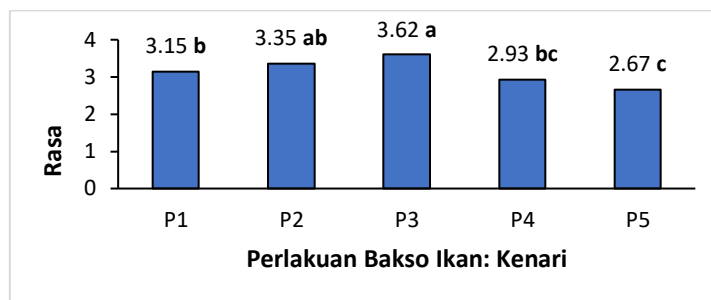
2. **Taste**

Figure 6. Sensory Test Results on the Quality (Taste) of Walnut Fish Balls

The Tukey test showed significantly different results between treatments. Data in Figure 6. showed the results of the panelists' assessment, namely in savory taste (P1 – P3) and slightly savory taste (P4 and P5). According to Firahmi et al. (2014), the taste is a determining factor in consumer acceptance of food products[15]. He also said that the formulation of seasonings, fillers, and meat conditions for making meatballs greatly affect the taste of the meatballs produced. Although the data in Figure 6 shows a decrease in taste, from savory to slightly savory, the panelists still liked it (Figure 1). This is thought to be due to the high-fat content in the constituent ingredients of meatballs, both fish and walnuts, which can give a savory taste to the resulting meatballs.

CONCLUSION

The best sensory characteristics of meatballs made from fish and walnuts are in the formulation treatment of 60% skipjack tuna and 40% walnut It is recommended to be able to improve the processing technology of walnut fish balls to further increase the level of consumer liking for these meatball products.

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