B-ICON Proceeding

Proceeding Paper

SENSORY ACCEPTANCE OF BELEDANG FISH COOKIES

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Abstract

The low level of per capita fish consumption among Indonesian communities is attributed to two factors linked to weak supply and low demand. Beledang fish or Cutlass fish (*Trichiurus lepturus*) is one type of sea fish with high nutritional value but low consumer appeal. This study aims to determine the sensory acceptability of Beledang fish cookies. The materials required for this cookies manufacturing comprised Beledang fish flour, wheat flour, margarine, butter, fine sugar, eggs, lemon, skim milk, cornstarch, baking powder, and palm sugar. A completely randomized design (CRD) was employed for this study, with different proportions: 40%, 50%, and 60% of Beledang fish. The production of Beledang fish flour involves several steps. Firstly, 1000 grams of Beledang fish is cleaned by removing the gills and washed with flowing water. Subsequently, the fish is steamed for 10 minutes. Afterward, the fish meat is separated from the bones and dried using an oven at a temperature of 50^{o}C for 5 h. The dried fish meat is finely ground and sifted through a mesh with a size of 60. From 1000 grams of raw Beledang fish, approximately 130 grams of flour is obtained. The organoleptic tests showed the most preferred colour, taste, texture, and aroma for cookies were found in the formulation with a 60% of Beledang fish. There were significant differences between organoleptic properties of the cookies at 40%, 50%, and 60% Beledang fish cookies ($p<0.05$).

Keywords: beledang fish, cutlass fish, *Trichiurus lepturus*, cookies, sensory acceptance

Presented at The 3rd Bengkulu International Conference on Health (B-ICON), Bengkulu-Indonesia, September 12-14th, 2023

Published: December 02nd, 2023

ISSN : 2986-027X

INTRODUCTION

The national fish consumption data in 2020 amounted to 56.39 kg per capita, which is below the national target of 72.76 kg per capita (Djuanidah, 2017). The average per capita fish consumption in

Bengkulu Province is 29.04 kg per year (this figure still falls short of the expected food pattern (Pola Pangan Harapan/PPH) of 30.40 kg per year) (Sumantri, Sriyoto & Nabilasari, 2022). The low level of per capita fish consumption among Indonesian communities is caused by two factors linked to weak supply and low demand (Sokib, Palupi & Suharjo, 2012). On the supply side, the low fish consumption in Indonesian society is attributed to uneven availability of quality fish supply, inadequate sales infrastructure, lack of proper and hygienic fish distribution that can cover all regions, and the presence of fish substitution products (Sokib, Palupi & Suharjo, 2012). On the demand side, many factors are believed to contribute to the still-low fish-eating culture in Indonesia, including: limited availability of fresh fish in the market, certain societal taboos and behaviors against fish consumption, low nutritional knowledge among mothers, relatively higher prices of fish and its products compared to other foods, along with low purchasing power, and limited variety of fish types and diversified processed fish products, and a lack of technological mastery (Sokib, Palupi & Suharjo, 2012).

One of the marine fish species with high nutritional value but low consumer appeal is Beledang fish or Cutlass fish (Trichiurus lepturus). This is due to its unappetizing taste and the high water content in its meat (Rini, Asnurita & Hermalena, 2019). The overall yield of Beledang fish is 49%, meaning that this fish has 49% usable components. For every 100 grams of edible Beledang fish, the chemical composition is as follows: total energy 82 kcal, protein content 18 grams, fat content 1 gram, and carbohydrate content 0.4 grams.

Cookies are a type of crispy biscuit, high in fat, and have a less dense texture when divided into sections. Because of their low water content (less than 10%), ease of processing, and unique taste, cookies have a long shelf life, which is one of their advantages (Hasibuan, 2019). Therefore, the objective of this research is to determine the sensory acceptance of Beledang fish cookies

MATERIALS AND METHODS

Research Equipment

The tools employed in the product manufacturing included an oven, weighing scale, baking tray, mixing bowl, mesh sieve, blender, knife, steaming pot, cutting board, and gas stove.

Research Materials

The materials required for this cookies manufacturing comprised Beledang fish flour, wheat flour, margarine, butter, fine sugar, eggs, lemon, skim milk, cornstarch, baking powder, and palm sugar.

Ethical Approval

The research ethics were approved by the ethics committee of Politeknik Kesehatan Kementerian Kesehatan Bengkulu with Approval No. KEPK.BKL/306/02/2023. When conducting data collection, the researcher has provided informed consent to the research subjects as an agreement to participate in the study. The data obtained from the subjects will be kept confidential. The collected data will only be used for scientific purposes.

Location and Research Duration

This study was conducted during March 2023. The product manufacturing took place in the Food Laboratory, Department of Nutrition, followed by the sensory acceptance testing in the Organoleptic Laboratory, Politeknik Kesehatan Kementerian Kesehatan Bengkulu.

The Production of Beledang fish flour

The production of Beledang fish flour involves several steps. Firstly, 1000 grams of Beledang fish is cleaned by removing the gills and washed with flowing water. Subsequently, the fish is steamed for 10 minutes. Afterward, the fish meat is separated from the bones and dried using an oven at a temperature of 50^{o}C for 5 h. The dried fish meat is finely ground and sifted through a mesh with a size of 60. From 1000 grams of raw Beledang fish, approximately 130 grams of flour is obtained.

Formulation of Cookies

This research followed an experimental study, aiming to evaluate a treatment. The treatment involved different proportions of Beledang fish flour at 40%, 50%, and 60%.

Table 1. Cookies formulations

Composition (in gram)	**Formula**		
	A1 (40%)	**A2 (50%)**	**A3 (60%)**
Beledang fish flour	11	14	17
Wheat flour	17	14	11
Margarine	11	11	11
Butter	14	14	14
Palm sugar	21	21	21
Fine sugar	14	14	14
Egg	1	1	1
Skim milk	1	1	1
Cornstarch	8	8	8
Baking powder	1	1	1
Total	100	100	100

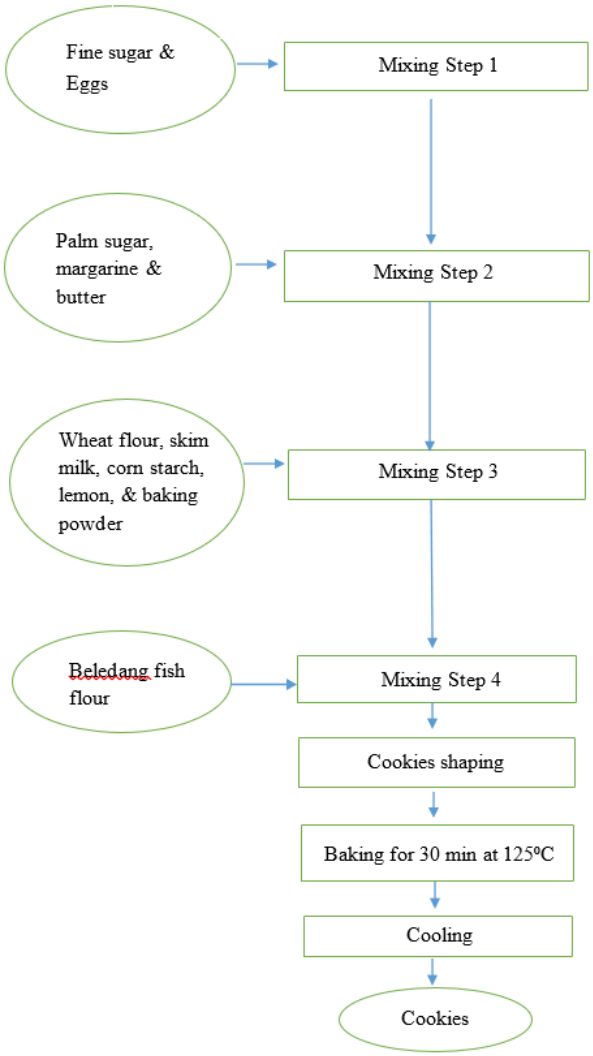

Figure 1. Cookies production

Sensory Acceptance Test

After the formulation was completed, a sensory evaluation was conducted on a group of semi-trained panelists consisting of 40 students from the Nutrition Department at Politeknik Kesehatan Kementerian Kesehatan Bengkulu to determine the most acceptable cookie formulation. The sensory evaluation was performed using a 5-point Likert scale to assess the organoleptic characteristics of Beledang fish cookies, with the following scores: 1 (dislike very much), 2 (dislike), 3 (somewhat like), 4 (like), and 5 (like very much). The organoleptic attributes of the cookies evaluated by the panelists included color, aroma, texture, and taste."

Statistical Analysis

This research utilized a Completely Randomized Design (CRD) due to the experiment involving three treatments: A1, A2, and A3.

RESULTS AND DISCUSSION

The colour preference of Beledang fish cookies

As presented in Figure 2, it can be observed that the cookie formula that received the highest acceptance for color was formula A3 (60% beledang fish), with 23 panelists indicating they liked it and 6 panelists stating they liked it very much. Based on Table 2, the Kruskal-Wallis test showed the significant difference between those formulas for the organoleptic colour characteristics (p=0.001). Formulas A1 and A2 were significantly different from A3. However, formula A1 was not significantly different from formula A2. This indicates that formula A3 received the highest preference for color compared to the other formulas. The color of the cookies is acceptable with the addition of 4% fish meal (Njoroge & Lokuruka, 2020). The results showed that cookies made from millet flour and flying fish flour were the best with the same composition (Patimah, et all, 2019).

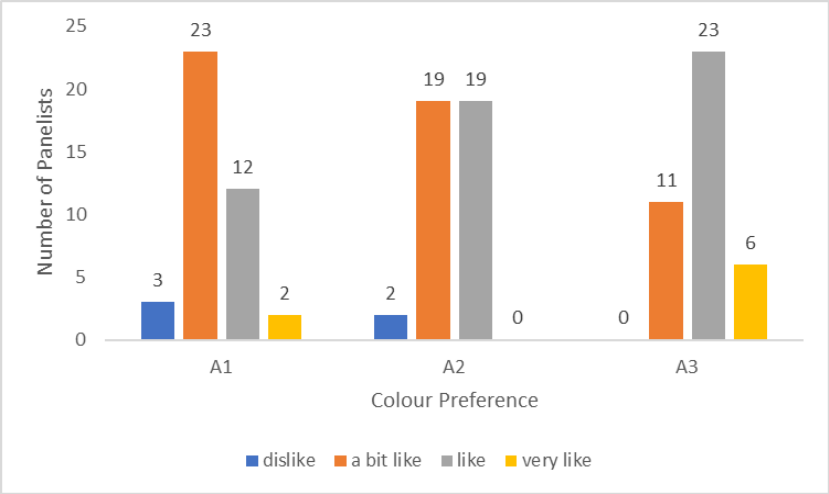

Figure 2. The distribution of the number of panelists based on their colour preference levels

Table 2. The mode values, average panelist preference for the colour of Beledang fish cookies and Kruskal-Wallis test

Formula	Mode	Mean	p-value (Kruskal-Wallis)
A1	3	3.32±0.69[a]	0.001
A2	3	3.42±0.59[a]	
A3	3	3.87±0.65[b]	

The aroma preference of Beledang fish cookies

As presented in Figure 3, it can be observed that the cookie formula that received the highest acceptance for aroma was formula A3 (60% beledang fish), with 21 panelists indicating they liked it and 15 panelists stating they liked it very much. Based on Table 3, the Kruskal-Wallis test showed the significant difference between those formulas for the organoleptic aroma characteristics (p=0.000), with formula A3 received the highest preference for aroma compared to the other formulas. The same research found that there was no difference in the acceptability of the aroma of cookies with the addition of tuna bone flour (Fatmawati, Kartini & Aisa, 2018).

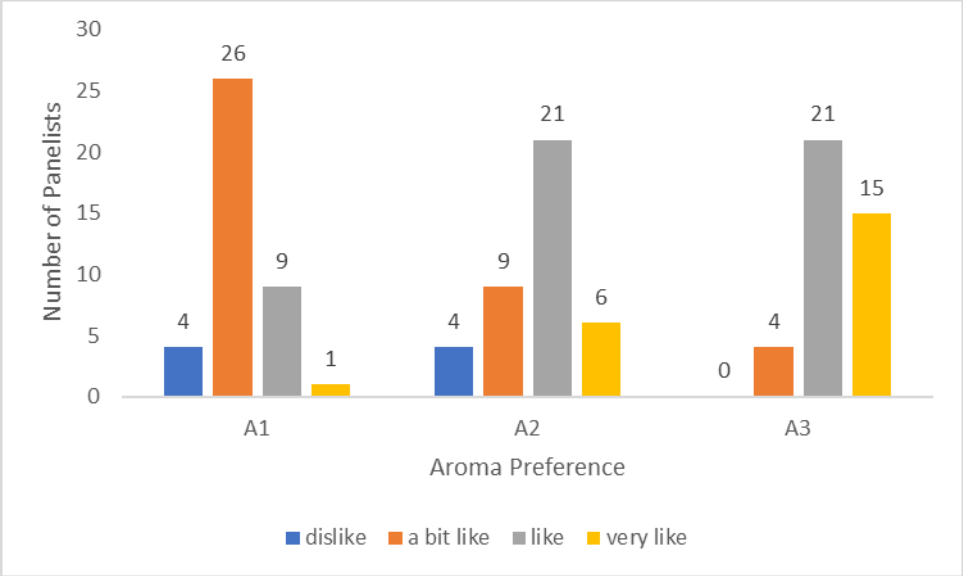

Figure 3. The distribution of the number of panelists based on their colour preference levels

Table 3. The mode values, average panelist preference for the colour of Beledang fish cookies and Kruskal-Wallis test

Formula	Mode	Mean	p-value (Kruskal-Wallis)
A1	3	3.18±0.64[a]	0.000
A2	3	3.73±0.85[b]	
A3	4	4.28±0.64[c]	

The texture preference of Beledang fish cookies

As presented in Figure 4, it can be observed that the cookie formula that received the highest acceptance for texture was formula A3 (60% beledang fish), with 32 panelists indicating they liked it and 5 panelists stating they liked it very much. Based on Table 4, the Kruskal-Wallis test showed the significant difference between those formulas for the organoleptic texture characteristics (p=0.000), with formula A3 received the highest preference for texture. Panelists can accept the texture of cookies, like in the Flying Fish Cookies research (Patimah, et all, 2019). Texture acceptance of tuna fish cookies with a concentration of 15% (Fatmawati, Kartini & Aisa, 2018).

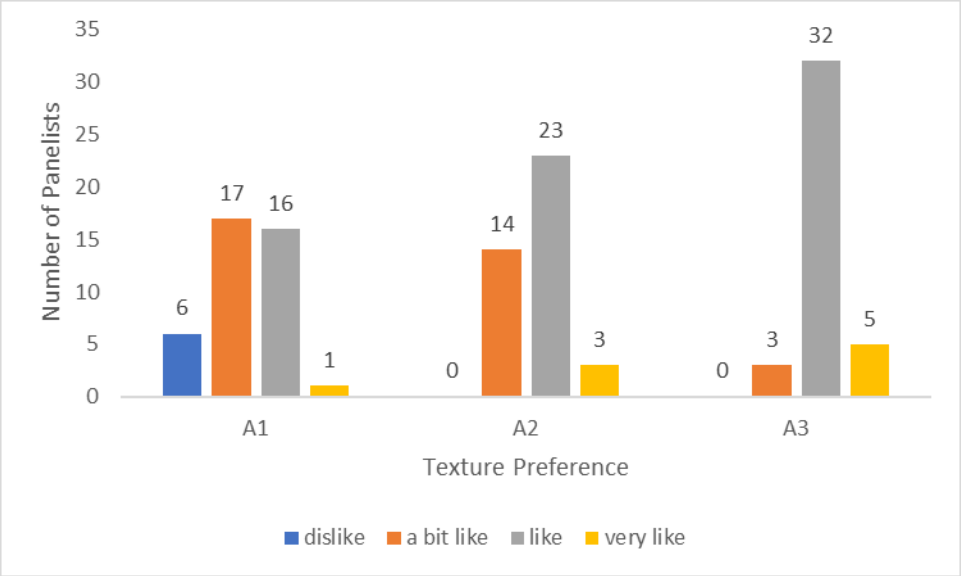

Figure 4. The distribution of the number of panelists based on their texture preference levels

Table 4. The mode values, average panelist preference for the texture of Beledang fish cookies and Kruskal-Wallis test

Formula	Mode	Mean	p-value (Kruskal-Wallis)
A1	3	3.30±0.76[a]	0.000
A2	3	3.73±0.60[b]	
A3	4	4.05±0.45[c]	

The taste preference of Beledang fish cookies

As presented in Figure 5, it can be observed that the cookie formula that received the highest acceptance for taste was formula A3 (60% beledang fish), with 23 panelists indicating they liked it and 16 panelists stating they liked it very much. Based on Table 5, the Kruskal-Wallis test showed the significant difference between those formulas for the organoleptic colour characteristics (p=0.000), with formula A3 received the highest preference for taste. Level of consumer acceptance of fortified snakehead fish protein concentrate cookies Chlorella sp. is very good, in line with this research (Dewita, Syahrul & Desmelati, 2018). The addition of fish meal to cookies does not affect the taste or texture (Wisyaningrum, Evawati & Saputra, 2022).

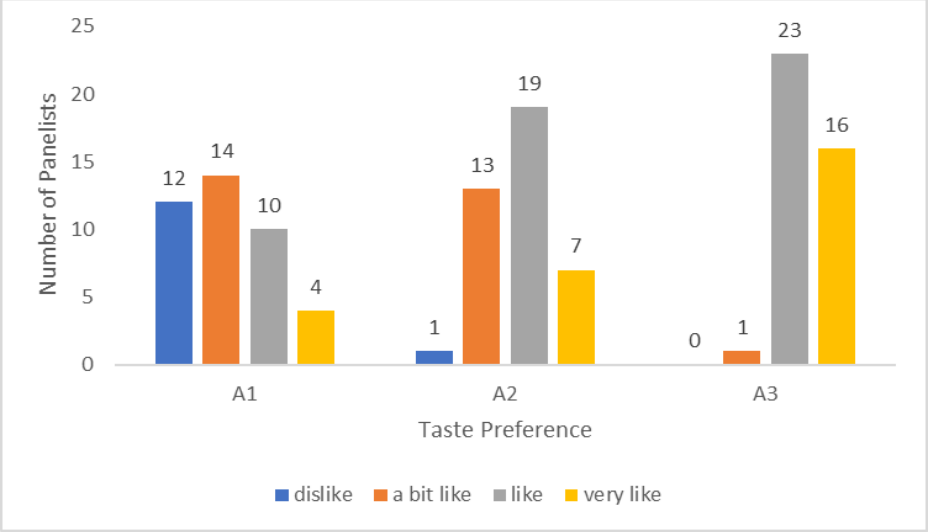

Figure 5. The distribution of the number of panelists based on their taste preference levels

Table 5. The mode values, average panelist preference for the taste of Beledang fish cookies and Kruskal-Wallis test

Formula	Mode	Mean	p-value (Kruskal-Wallis)
A1	3	3.15±0.98[a]	0.000
A2	3	3.80±0.76[b]	
A3	4	4.38±0.54[c]	

CONCLUSION

Cookies can be modified with Beledang fish to increase sensory acceptance, making them an excellent food choice.

Declaration of Interest Statement

The authors declare that they have no conflict of interests.

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