



Organoleptic Evaluation of Chicken Nuggets with the Addition of Carrot (*Daucus carota* L.)

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Abstract

Currently, public interest in consuming vegetables is decreasing due to the increasing availability of fast foods that are delicious and favored by many people. One of the reasons some people dislike vegetables is their taste, which is often considered less appealing. Therefore, a solution is needed to increase vegetable consumption among the community, one of which is by processing chicken nuggets with the addition of carrot (*Daucus carota* L.). This study was conducted to determine the organoleptic value of chicken nuggets with the addition of carrot (*Daucus carota* L.).

This research was conducted in July 2025 in Bukit Gadang, Tilatang Kamang District, Agam Regency. The study used a descriptive method with four treatments. The treatments consisted of adding carrot (*Daucus carota* L.) at levels of 0%, 10%, 20%, and 30% in the chicken nugget formulation. The objective of this study was to determine which chicken nugget formulation was most preferred by the panelists after the addition of carrot (*Daucus carota* L.). The test conducted was an organoleptic test by evaluating the level of preference for color, aroma, texture, and taste of the chicken nuggets.

The results of the average organoleptic test indicated that the best treatment in terms of color, aroma, taste, and texture was the addition of 30% carrot. Panelists preferred chicken nuggets with the highest percentage of carrot addition.

Keywords: chicken nugget, carrot addition, *Daucus carota* L., organoleptic evaluation, sensory quality

1. Introduction

Changes in modern lifestyles have led to an increase in the consumption of fast food that is practical and easy to prepare. One of the processed food products that is quite popular among the public is chicken nuggets, as they have a delicious taste, attractive shape, and are easy to consume by people of all age groups. Chicken nuggets are a good source of animal protein; however, this product generally contains low dietary fiber. Therefore, consumption without being balanced with vegetable intake may lead to an imbalance in nutritional intake [1].



On the other hand, the consumption of vegetables and fruits in Indonesia is still relatively low. According to a report by the Ministry of Health of the Republic of Indonesia, most Indonesians have not met the recommended daily intake of vegetables and fruits, indicating the need for innovative efforts to increase vegetable consumption in the community's diet [2]

One possible alternative is to incorporate vegetables into processed food products, such as adding carrots (*Daucus carota* L.) to chicken nuggets. Carrots are vegetables rich in dietary fiber, vitamins, and antioxidant compounds that are beneficial for human health. In addition, carrots have an attractive color and a relatively sweet taste, which can potentially improve consumer acceptance of processed food products [3].

The addition of carrots to chicken nuggets is expected to improve nutritional value while also influencing sensory characteristics such as color, aroma, taste, and texture. Therefore, an organoleptic test is necessary to determine consumer preferences for chicken nuggets with different levels of carrot addition..

2. Literature Review

2.1. Carrots and Their Nutritional Content

Carrot (*Daucus carota* L.) is one of the most widely consumed root vegetables in the world and is known for its high nutritional value and health benefits. Carrots are an important source of dietary fiber, vitamins, minerals, and bioactive compounds that contribute to human health. One of the main nutritional components found in carrots is beta-carotene, a precursor of vitamin A that plays a significant role in maintaining eye health, improving immune function, and supporting normal growth and development [3].

In addition to beta-carotene, carrots contain other essential nutrients such as carbohydrates, protein, small amounts of fat, and various minerals including potassium, phosphorus, magnesium, sodium, and iron. Carrots are also rich in vitamins such as vitamin A, vitamin C, and several B-complex vitamins, which are essential for metabolic processes and overall body health [4]. Furthermore, carrots contain antioxidant compounds such as flavonoids and phenolic compounds that help protect the body from oxidative stress and reduce the risk of chronic diseases.

Carrots are also known for their high dietary fiber content, including pectin, cellulose, hemicellulose, and lignin. Dietary fiber plays an important role in maintaining digestive health, preventing constipation, and reducing the risk of certain diseases such as obesity, cardiovascular diseases, and colorectal cancer [4]. Because of their sweet taste, attractive orange color, and nutritional benefits, carrots are often used as ingredients in various food products, including soups, juices, snacks, and processed meat products.”.



2.2. Chicken Nuggets

Chicken nuggets are one of the most popular processed meat products made from minced or ground chicken meat that is mixed with various ingredients such as flour, seasonings, and binders, then shaped, coated with batter or bread crumbs, and cooked through frying or baking. Chicken nuggets are widely consumed because they are convenient, easy to prepare, and have a taste and texture that are highly acceptable to consumers [1].

Nutritionally, chicken nuggets are a good source of animal protein, which is essential for muscle growth, tissue repair, and overall body development. Chicken meat used in nugget production contains high-quality protein, essential amino acids, vitamins, and minerals that contribute to human nutritional needs. However, processed chicken products such as nuggets generally contain limited dietary fiber because their main ingredient is meat [5].

In recent years, food researchers and industries have attempted to improve the nutritional quality of chicken nuggets by incorporating plant-based ingredients such as vegetables, cereals, and legumes. The addition of vegetables into chicken nuggets can enhance the nutritional value, particularly by increasing dietary fiber, vitamins, and antioxidant content. Moreover, vegetable addition may influence the sensory characteristics of the product, including color, aroma, taste, and texture, which are important factors in determining consumer acceptance.

3. Methodology

3.1 Time and Location of the Study

This research was conducted in July 2023 in the production kitchen located in Bukit Gadang, Tilatang Kamang, Agam Regency.

3.2 Tools and Materials

1. Tools

The tools used in this study included a blender, frying pan, steamer pot, stove, gas cylinder, tray mold, knife, spoon, grater, weighing scale, plastic bowl, cutting board, oil strainer, tray, spatula, plastic mica packaging, pen, and labeling paper.

2. Materials

The materials used in this study were carrots, chicken meat, garlic, shallots, salt, ground pepper, cooking oil, wheat flour, water, chicken eggs, and bread crumbs.

3.3 Research Design

This study used a descriptive method with four treatments, as follows:

Chicken nuggets without the addition of carrots (control).

Chicken nuggets with the addition of 10% carrots.

Chicken nuggets with the addition of 20% carrots.

Chicken nuggets with the addition of 30% carrots.

3.4 Observed Parameters

The variable observed in this study was the organoleptic test conducted using 40 panelists consisting of 10 MSME members, 10 students, 10 lecturers, and 10 housewives. The organoleptic evaluation included the following parameters:

Aroma

The testing method based on aroma involved assessing the panelists' level of preference for the aroma of the chicken nuggets. The nuggets were brought close to the nose so that the panelists could smell the aroma.



Color

The testing method based on color involved assessing the panelists' level of preference for the color of the chicken nuggets. The nuggets were cut open and the internal color was visually observed.

Texture

The testing method based on texture involved assessing the panelists' level of preference for the texture of the chicken nuggets. The nuggets were cut open and the texture was visually observed, then chewed and tasted to evaluate the fiber and mouthfeel.

Taste

The testing method based on taste involved assessing the panelists' level of preference for the taste of the chicken nuggets. The panelists chewed, tasted, and swallowed the nuggets to evaluate their savory flavor.

4. Results and Discussion

Organoleptic testing is an evaluation conducted by observing the color, aroma, taste, and texture of a food product. Organoleptic testing is based on the use of human sensory organs, where individuals act as panelists. The organoleptic test of chicken nuggets with the addition of carrot (*Daucus carota* L.) aimed to determine the best results among several treatments based on the evaluation of color, aroma, taste, and texture. The four treatments consisted of A (control), B (10% carrot addition), C (20% carrot addition), and D (30% carrot addition). The evaluation was carried out by 40 panelists consisting of lecturers, students, MSME members, and housewives. After the research was conducted, the following results were obtained:

4.1 Color

The results of the organoleptic test on the color of chicken nuggets with the addition of carrots based on the panelists' preference levels for each treatment are presented in **Table 1** below.

Table 1. Organoleptic Test Results of the Color of Chicken Nuggets

Preference Level	Treatment A	Treatment B	Treatment C	Treatment D
Strongly Dislike	2.5%	0%	0%	0%
Dislike	5%	2.5%	0%	2.5%
Slightly Like	10%	22.5%	20%	7.5%
Like	42.5%	50%	35%	37.5%
Strongly Like	40%	25%	45%	52.5%

The results of the organoleptic test showing the comparison of the average panelists' acceptance of the color of chicken nuggets with the addition of carrots can be seen in Figure 1 below.

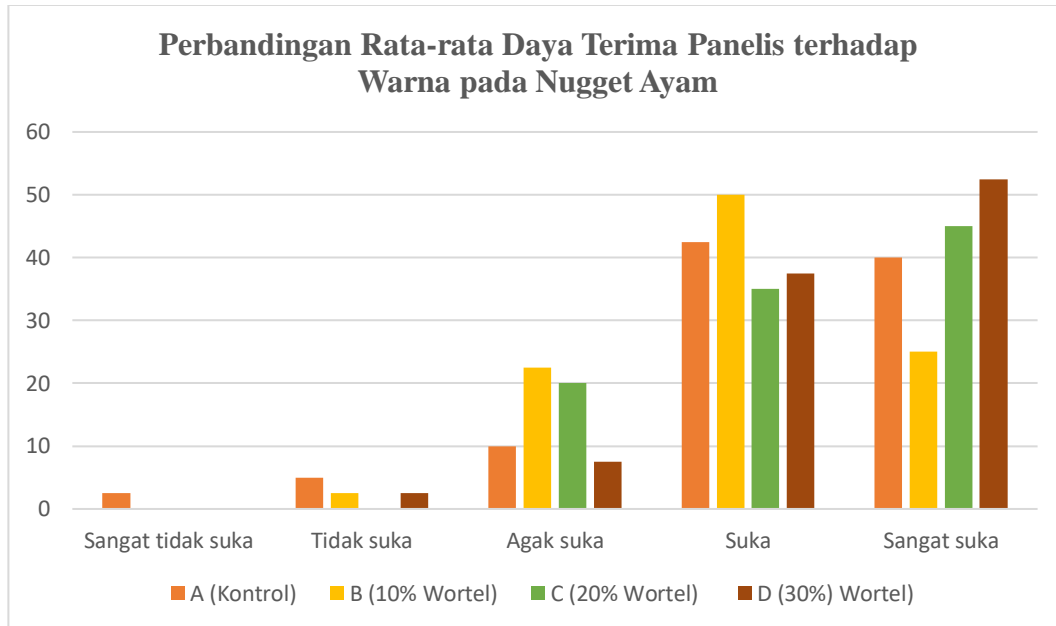


Figure 1. Comparison of the Average Color Scores According to Panelists

Color is one of the most important sensory attributes influencing consumer acceptance of food products. In processed meat products such as chicken nuggets, color plays a crucial role in determining the overall appearance and attractiveness of the product. Consumers generally prefer products with a bright and appealing color, which often indicates freshness and good quality [6].

Carrots (*Daucus carota* L.) are widely recognized as a natural source of carotenoid pigments, particularly beta-carotene, which contributes to the characteristic orange color of the vegetable. Carotenoids are natural pigments responsible for yellow, orange, and red colors in many fruits and vegetables. These compounds not only enhance the visual appearance of food products but also provide significant nutritional benefits due to their antioxidant properties [7].

The incorporation of carrots into processed meat products has been reported to improve both nutritional value and sensory characteristics, especially color. Studies have shown that increasing the proportion of carrot addition in meat-based products results in a more intense orange color due to the higher concentration of carotenoids [8]. This improvement in color can increase consumer preference and acceptance of the product.

Furthermore, beta-carotene present in carrots functions as a precursor of vitamin A, which plays an essential role in vision, immune function, and cell growth. In addition, carotenoids have strong antioxidant activity that may help reduce the risk of chronic diseases such as cardiovascular diseases and certain types of cancer [9].

Previous research has also demonstrated that the addition of vegetable ingredients such as carrots can significantly influence the sensory properties of processed meat products. Increasing the level of carrot incorporation tends to enhance the brightness and attractiveness of the product color, which positively affects panelists' acceptance during organoleptic evaluation [8].



4.2 Flavor

The results of the organoleptic test on the aroma of chicken nuggets with the addition of carrots, based on the panelists' level of preference for each treatment, are presented in Table 2 below.

Table 2. Organoleptic Test Results for the Aroma of Chicken Nuggets

Preference Level	Treatment A	Treatment B	Treatment C	Treatment D
Strongly Dislike	0%	0%	0%	0%
Dislike	2.5%	0%	0%	0%
Slightly Like	20%	25%	27.5%	12.5%
Like	47.5%	50%	45%	35%
Strongly Like	30%	25%	27.5%	52.5%

The results of the organoleptic test showing the comparison of the average panelists' acceptance of the aroma of chicken nuggets with the addition of carrots can be seen in Figure 2 below.

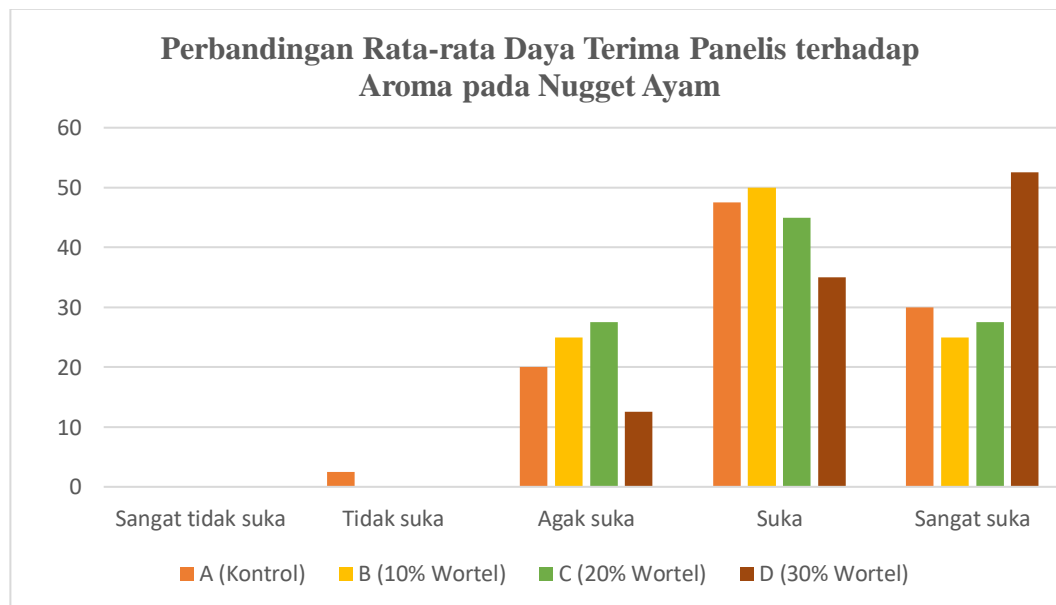


Figure 2. Comparison of the Average Aroma Scores According to Panelists

Flavor is one of the most important sensory attributes that influence consumer acceptance of food products. In meat-based products such as chicken nuggets, aroma plays a significant role in determining product quality and overall consumer preference. The characteristic aroma of meat products is generally influenced by the composition of raw materials, seasoning ingredients, and processing methods used during production [10].

The addition of vegetables to processed meat products has been widely studied as a strategy to improve both nutritional value and sensory characteristics, including flavor. Vegetables may help reduce the undesirable odor of meat, particularly the typical "fishy" or raw meat smell, which is often less preferred by some consumers. According to research conducted by [8],



incorporating vegetable ingredients into meat products can reduce the intensity of the meat odor and produce a more balanced and acceptable aroma profile.

Carrots (*Daucus carota* L.) contain various volatile compounds and essential oils that contribute to their characteristic fresh aroma. These compounds can interact with other ingredients in processed foods, resulting in a milder and more pleasant flavor. In addition, carrots contain bioactive compounds . as carotenoids, phenolic compounds, and essential oils that may influence the sensory properties of food products[7]

Essential oils found in carrots also exhibit antimicrobial properties that can inhibit the growth of certain bacteria and fungi. These antimicrobial effects may contribute to maintaining product freshness and reducing undesirable odors associated with microbial activity in food products [11]. Therefore, the addition of carrots to chicken nuggets not only improves nutritional value but may also help modify the aroma of the product.

Previous studies have shown that increasing the proportion of carrot addition in processed meat products tends to enhance the overall sensory acceptance of flavor by masking the strong odor of chicken meat and reducing the intensity of seasoning flavors such as garlic and pepper. As a result, products with higher levels of carrot incorporation are often preferred by consumers due to their fresher and more balanced flavor characteristics [8].

4.3 Taste

The results of the organoleptic test on the taste of chicken nuggets with the addition of carrots, based on the panelists' level of preference for each treatment, are presented in Table 3 below.

Table 3. Organoleptic Test Results for the Taste of Chicken Nuggets

Preference Level	A (0%)	B (10%)	C (20%)	D (30%)
Strongly Dislike	5%	5%	0%	0%
Dislike	2.5%	2.5%	5%	0%
Slightly Like	10%	15%	17.5%	15%
Like	42.5%	37.5%	37.5%	30%
Strongly Like	40%	40%	40%	55%

The results of the organoleptic test showing the comparison of the average panelists' acceptance of the taste of chicken nuggets with the addition of carrots can be seen in Figure 3 below

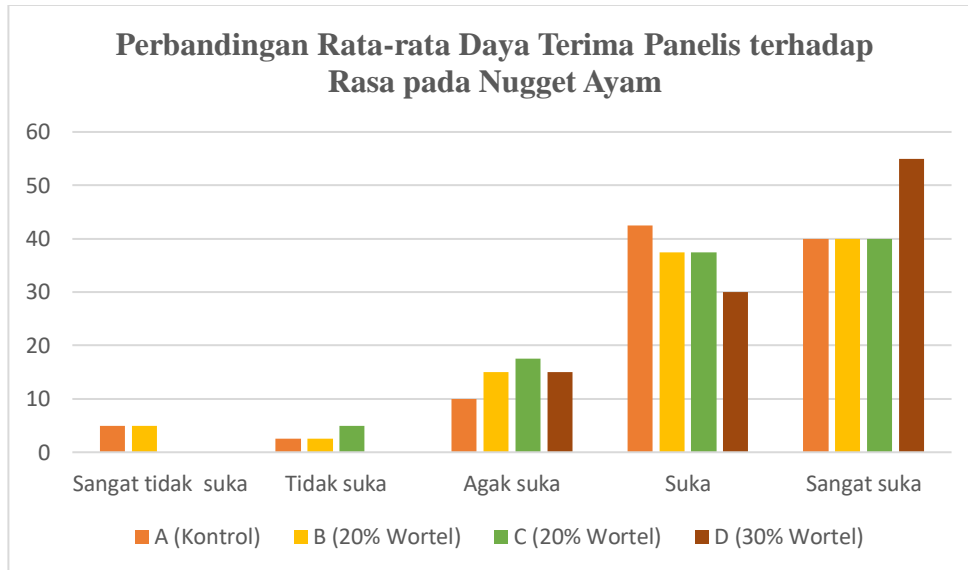


Figure 3. Comparison of the Average Taste Scores According to Panelists

The results of the organoleptic test on the taste of chicken nuggets with the addition of carrots showed that the highest average level of panelists' preference was found in treatment D (30% carrot addition), while the lowest average preference was found in treatment B (10% carrot addition). Based on the average results of the organoleptic test, most panelists preferred chicken nuggets with a higher percentage of carrot addition. This indicates that increasing the proportion of carrots can improve the taste acceptance of chicken nuggets.

Carrots contribute a naturally sweet flavor to food products due to their carbohydrate content, particularly simple sugars such as sucrose, glucose, and fructose. These sugars provide a mild sweetness that can enhance the overall flavor profile of processed foods, including meat products such as nuggets. The presence of natural sugars in carrots can balance the savory taste of chicken meat and spices, producing a more pleasant and palatable product [8].

In addition to sugars, carrots also contain organic acids, dietary fiber, and various phytochemicals that contribute to the characteristic flavor and sensory quality of carrot-based food products. The combination of these compounds can improve the taste perception and overall acceptability of processed foods when carrots are incorporated as an ingredient [12]

Previous studies have reported that the incorporation of vegetable ingredients into meat products can significantly influence sensory attributes, particularly taste. Vegetable additions such as carrots not only enhance nutritional value but also contribute to flavor improvement by providing natural sweetness and reducing excessive meat flavor that may not be preferred by some consumers [13]

Furthermore, the sugar composition of carrots—mainly sucrose, glucose, and fructose—plays an important role in the development of sweetness and flavor balance in food products. These sugars are naturally present in carrots and can improve the palatability of processed foods without the need for additional sweeteners [14]. Therefore, increasing the percentage of carrot addition in chicken nugget formulations tends to enhance the taste and overall sensory acceptance by panelists.

4.4 Texture



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The results of the organoleptic test on the texture of chicken nuggets with the addition of carrots, based on the panelists' level of preference for each treatment, are presented in Table 4 below.

Table 4. Organoleptic Test Results for the Texture of Chicken Nuggets

Preference Level	A	B	C	D
Strongly Dislike	5%	2.5%	0%	0%
Dislike	5%	5%	2.5%	2.5%
Slightly Like	27.5%	27.5%	25%	15%
Like	37.5%	37.5%	42.5%	47.5%
Strongly Like	25%	27.5%	30%	35%

The results of the organoleptic test showing the comparison of the average panelists' acceptance of the texture of chicken nuggets with the addition of carrots can be seen in Figure 4 below

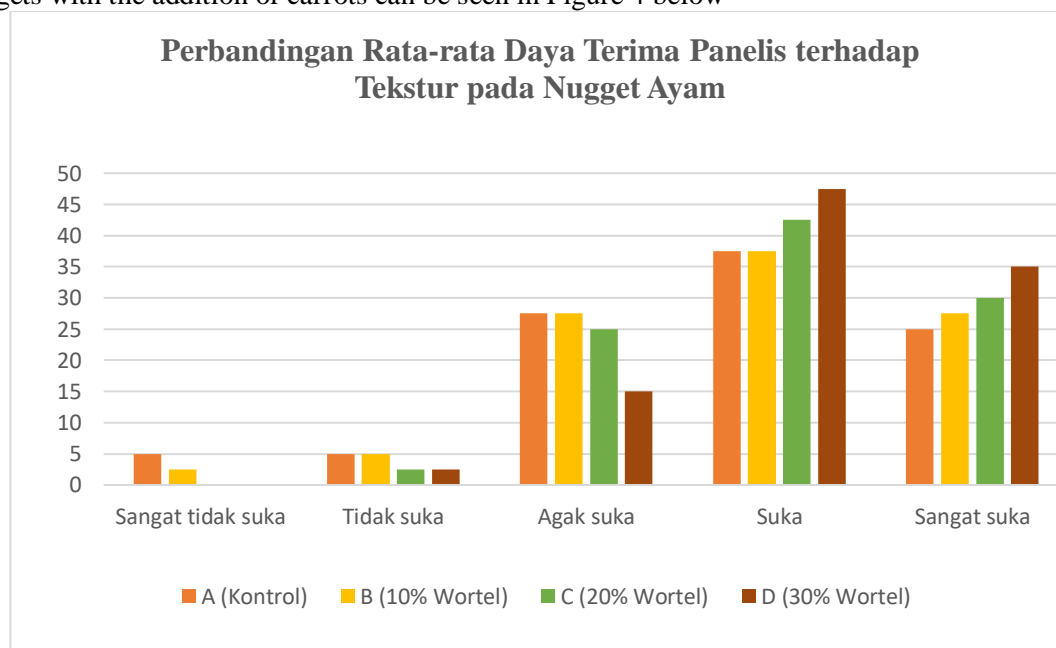


Figure 4. Comparison of the Average Texture Scores According to Panelists

The organoleptic test results showed that the highest average panelist preference for texture was found in treatment D (30% carrot addition), while the lowest preference was observed in treatment A (control, without carrot addition). Based on the average sensory evaluation, most panelists preferred chicken nuggets with a higher proportion of carrot addition. This indicates that the incorporation of carrots can improve the texture characteristics of chicken nuggets.

Carrots contain dietary fiber, water, and structural carbohydrates that influence the physical properties of processed meat products. When grated carrots are incorporated into nugget batter, they contribute to a softer and more elastic texture due to their natural moisture and fiber content. The presence of plant fibers can improve water-binding capacity and reduce product hardness, resulting in a more desirable texture in meat-based products [12].

The addition of vegetables such as carrots in processed meat products has also been reported to enhance juiciness and tenderness. The natural moisture present in carrots increases the water-holding capacity of the nugget mixture,



which contributes to a softer and less compact structure after cooking [13]. Consequently, increasing the proportion of carrot addition can produce nuggets with improved mouthfeel and better consumer acceptance.

Furthermore, the use of ice during the grinding process plays an important role in maintaining the quality of the meat emulsion. Ice helps control the temperature during grinding, preventing protein denaturation caused by excessive heat. Stable meat proteins improve the binding of water and fat in the nugget batter, resulting in a more cohesive and elastic texture [10]. Proper control of processing conditions, including temperature and ingredient composition, is therefore essential to obtain the desired texture in processed chicken products.

Overall, the addition of carrots not only enhances the nutritional value of chicken nuggets but also improves their textural properties by increasing moisture retention, softness, and elasticity, leading to higher sensory acceptance among panelists.

5. Conclusion

Based on the results of the organoleptic test on chicken nuggets with the addition of carrots, it can be concluded that the addition of carrots influences the sensory characteristics of the product, including color, aroma, taste, and texture. The treatment with 30% carrot addition (Treatment D) showed the highest level of panelist preference in most sensory parameters compared to the other treatments.

The addition of carrots improved the appearance of the nuggets by producing a more attractive orange color due to the presence of carotenoid pigments. In terms of aroma, carrot addition helped reduce the fishy odor of chicken meat and produced a fresher aroma. Regarding taste, the natural sugars contained in carrots contributed a slightly sweet and savory flavor that increased the overall palatability of the nuggets. Furthermore, the texture of the nuggets became softer and more elastic due to the moisture and fiber content of carrots.

Therefore, the addition of 30% carrots in the formulation of chicken nuggets can be considered the best treatment based on panelists' acceptance. This result indicates that carrots can be utilized not only to enhance the sensory quality of chicken nuggets but also to improve their nutritional value.

Declarations

5.1. Author Contributions

Conceptualization: F.A., S.A., and T.A; Methodology: S.A.; Software: F.A.; Validation: F.A., S.A., and T.A.,; Formal Analysis: .A., S.A., and T.A.; Investigation: F.A.; Resources: S.A.; Data Curation: S.A.; Writing Original Draft Preparation: .A., S.A., and T.A.; Writing Review and Editing: .A., S.A., and T.A.,; Visualization: F.A.; All authors have read and agreed to the published version of the manuscript.

**FA is abbreviation of "Firs Author", SA is abbreviation of "Second Author", and TA is abbreviation of "Third Author".*

5.2. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

5.3. Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

5.4. Institutional Review Board Statement

Not applicable.



5.5. Informed Consent Statement

Not applicable.

5.6. Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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