



Research Article

Sensory Quality and Cooking Loss of Broiler Chicken Nuggets with the Addition of Yellow Corn

Mutu Sensoris dan Susut Masak Nugget Ayam Broiler dengan Penambahan Jagung Kuning

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Abstract: The term "organoleptic testing" is synonymous with the more specific term "sensory evaluation". The objective of the study was to ascertain the impact of incorporating supplementary yellow corn in the formulation of broiler chicken nuggets on their sensory quality and cooking loss. The research method employed was of an experimental nature, utilising a Completely Randomised Design (CRD) with three distinct treatments: P0, representing the control, P1, which involved the incorporation of 25 g of yellow corn into a 100% nugget mixture (10%), P2, encompassing the addition of 37.5 g of yellow corn into a 100% nugget mixture (15%), and P3, comprising the inclusion of 50 g of yellow corn into a 100% nugget mixture (20%). Recent studies have demonstrated that the provision of yellow corn does not exert a significant influence on the sensory quality values and cooking losses of broiler chicken nuggets ($p > 0.05$). The cooking loss of P1 nuggets was found to be 0.019% lower than that of P2 nuggets (0.22%) and P3 nuggets (0.41%). The Duncan test demonstrated that there was a negligible difference between P1 and P2, and between P2 and P3. Furthermore, there was no significant difference between P2 and P3. The lowest cooking loss for chicken nuggets in the treatment with the addition of yellow corn was P1 0.019%. This shows that the higher the level of yellow corn added, the lower the cooking shrinkage. The lower the cooking shrinkage value, the better the product quality because there will be less nutritional loss, on the other hand, the higher the cooking shrinkage value, the lower the product quality. The findings showed that the provision of yellow corn did not have a significant effect on the sensory quality or cooking loss of broiler chicken nuggets.

Keywords: Nugget, Chicken, Corn, Organoleptics

Abstrak: Pengujian organoleptik dikenal sebagai evaluasi sensorik. Penelitian bertujuan untuk mengetahui pengaruh tambahan jagung kuning terhadap mutu sensoris dan susut masak nugget ayam broiler. Metode penelitian ini adalah menggunakan Rancangan Acak Lengkap (RAL) dengan 3 perlakuan, P0= Kontrol, P1= Penambahan 25g jagung kuning (*Zea mays* L) dalam 100% adonan Nugget (10%), P2= Penambahan 37,5g jagung kuning (*Zea mays* L) dalam 100% adonan Nugget (15%), P3= Penambahan 50g jagung kuning (*Zea mays* L) dalam 100% adonan Nugget (20%). Berdasarkan data telah menunjukkan bahwa pemberian level jagung kuning tidak memberikan perbedaan atau pengaruh ($p > 0,05$) terhadap nilai mutu sensoris dan susut masak nugget ayam broiler. Susut masak nugget P1 0,019% lebih rendah dibandingkan dengan nugget P2 0,22% dan P3 0,41%.. Susut masak terendah nugget ayam pada perlakuan penambahan jagung kuning adalah P1 0,019%. Hal ini menunjukkan bahwa semakin tinggi penambahan level jagung kuning maka susut masaknya semakin rendah. Semakin rendah nilai susut masak maka kualitas produk semakin baik karena kehilangan nutrisinya akan lebih sedikit, sebaliknya semakin tinggi nilai susut masak maka kualitas produk akan berkurang. Namun penambahan jagung kuning dapat dikatakan sebagai alternatif bahan pengisi yang baik untuk meningkatkan kualitas fisik nugget ayam broiler.

Kata kunci: Nugget, Daging Ayam, Jagung

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INTRODUCTION

Meat has enormous benefits for humans, as it is a food source rich in protein, minerals, vitamins, fats and other substances needed by the body. As people's economies have improved and they have become more aware of the importance of animal protein, the demand for meat consumption has increased. Chicken is one of the sources of animal protein that has high nutritional value, good taste and is easy to find in fresh condition ([Nasari *et al.*, 2024](#)). However, chicken meat spoils quickly because it is susceptible to microbial contamination. Therefore, one way to prevent damage to chicken is to process it into nugget products.

Nugget is a processed meat product composed of minced meat combined with binding agents and seasonings, subsequently enrobed in a mixture of egg white (batter) and flour (breading). Subsequently, the nuggets undergo a pre-frying process, are packaged, and frozen in order to ensure the maintenance of their quality ([Mawati *et al.*, 2017](#)). Chicken nuggets have become increasingly popular as a nutritionally sound processed foodstuff, with a growing presence in supermarkets and a rising consumer demand ([Frakolaki *et al.*, 2023](#)).

The quality of food products such as chicken nuggets is influenced by several factors, including but not limited to taste, colour, texture, nutritional content, and microbiological aspects. The colour of the product is the primary factor determining its visual appeal and plays a pivotal role in consumer acceptance. This is due to the fact that colour is one of the sensory characteristics most readily perceived by consumers in comparison to other sensory attributes such as aroma and texture ([Oktarina *et al.*, 2024](#)). Consumers will not accept nuggets with good nutritional content, good taste, and perfect texture if the colour is not as expected.

Corn can be processed into various types of snacks, one of which is corn nuggets. Nuggets are defined as processed meat products that are seasoned, mixed with a binder, then shaped and coated with breadcrumbs (coating) before frying. Corn nuggets are manufactured by combining corn with a primary ingredient, namely broiler chicken meat. As demonstrated in the research conducted by ([Putri *et al.*, 2019](#)), the incorporation of moringa leaf flour during the fabrication of duck meat nuggets has the potential to enhance the crude protein content while concomitantly diminishing the levels of crude fat and total cholesterol in the final product. A further study demonstrated that moringa leaves can be utilised in the production of chicken meat nuggets as a source of protein and other essential nutritional components required by the body ([Hastuti *et al.*, 2015](#)). On the other case, yellow corn contains xanthophyll, a type of carotenoid pigment, is found in the kernels of corn. The chemical structure of this pigment contains hydroxyl groups, i.e. -OH, which endow xanthophyll with its distinctive properties ([Lalujan *et al.*, 2017](#)). These include the ability to play a role in the process of photosynthesis and to impart a yellow colour to the plants that contain it. Xanthophyll, a carotenoid, performs a significant function in biochemical processes within plant cells, particularly in protection mechanisms against oxidative stress. However, to the best of the author's knowledge, no studies have explored the use of yellow corn as an additive in the manufacture of broiler chicken nuggets. The objective of this study is to furnish members of the public with information regarding broiler chicken nuggets containing yellow corn. This is a subject that has the potential to add variety to processed livestock products

and increase their attractiveness. In order to evaluate the quality of the product and the level of consumer satisfaction, physical tests and hedonic tests can be conducted.

MATERIALS AND METHODS

Study Site and Nugget Processing

The research was carried out at the Laboratory of Animal Products and Biotechnology Faculty of Animal Husbandry University of Mataram. The apparatus employed in this study comprises the following items: a meat grinder, an oven, a tray, a label, a basin, a knife, a pan, a stove, a blender, a sieve, scales, an oil filter, a spoon, a fork, a nugget mould, a gutter, a pot, a cutting board and a plate. The following materials are required for the experiment: 1 kilogram of broiler chicken meat, 3 grams of pepper powder, 5 grams of salt and 3 grams of flavoring, 1 kilogram of tapioca flour, 10 grams of shallot, 6 grams of garlic, 150 grams of ice cubes, 25 grams; 37.5 grams; 50 grams of yellow corn.

Table 1. Broiler Chicken Nugget Ingredient Formulation with the addition of Yellow Corn

Ingridient	Treatment			
	P0	P1	P2	P3
	Weigh (gr)	Weigh (gr)	Weigh (gr)	Weigh (gr)
Broiler chicken meat	250	250	250	250
Corn	-	25 (10%)	37.5 (15%)	50 (20%)
Tapioca Flour	250	250	250	250
Shallot	6	6	6	6
Garlic	10	10	10	10
Pepper powder	3	3	3	3
Salt	5	5	5	5
Flavoring	5	5	5	5
Ice cubes	150	150	150	150

The following procedure is to be followed in order to produce nuggets:

1. Boneless chicken breast (broiler) meat
2. Cut into small pieces and ground with a meat grinder
3. Added ice cubes
4. The following ingredients were incorporated into the formulation: tapioca flour, garlic, pepper powder, salt and egg white.
5. The blending process was conducted using blender
6. The addition of corn, which has been mashed in accordance with formulation

7. This is a crucial step in the process. The dough was meticulously shaped into the designated mould. The item should be subjected to the process of steaming for a duration of nine minutes. Following this, it should be divided into small pieces.

Experimental Design

The research method employed is of an experimental nature, utilising a completely randomised design (CRD), with three distinct treatments and three replications:

P0= Control treatment

P1= Addition of 25 g of yellow corn (*Zea mays* L.) in 100% Nugget dough (10%)

P2= Addition of 37.5 g of yellow corn (*Zea mays* L.) in 100% Nugget dough (15%)

P3= Addition of 50 g of yellow corn (*Zea mays* L.) in 100% Nugget dough (20%)

Nugget dough is base recipe of nugget without yellow corn.

Cooking Loss

The calculation of cooking loss percentage is achieved by means of the following formula:

$$\text{Cooking Loss} = \frac{\text{Before Cooking} - \text{After Cooking}}{\text{Before Cooking}} \times 100\%$$

Organoleptic Testing

The organoleptic test is a test where panelists tend to make judgments based on preference (hedonic test) ([Kartika et al., 1988](#)). The test was administered by 20 untrained panelists. The panelists were tasked with evaluating various attributes, including colour, texture, and taste. The following organoleptic parameters were measured:

- a. Color (with five score criteria): (1) Very unattractive, (2) Not attractive, (3) Somewhat attractive, (4) Attractive, (5) Very attractive.
- b. Texture (with five score criteria): (1) Not very smooth, (2) Not smooth (3) Somewhat smooth (4) Smooth (5) Very smooth.
- c. Taste (with five score criteria): (1) Very bad, (2) Not good, (3) Somewhat good, (4) Good (5) Delicious.

Data Analysis

The data analysis was conducted utilising the Analysis of Variance (ANOVA) method. In the event of a discrepancy, the Duncan Multiple Range Test (DMRT) should be employed.

RESULTS AND DISCUSSION

Cooking Loss

The phenomenon of cooking loss has been identified as a reliable indicator of the nutritional value of a processed food product. Furthermore, it has been demonstrated that this

phenomenon also exerts a significant influence on the product's economic value. The results of the cooking loss test of chicken nuggets with the addition of yellow corn are as follows:

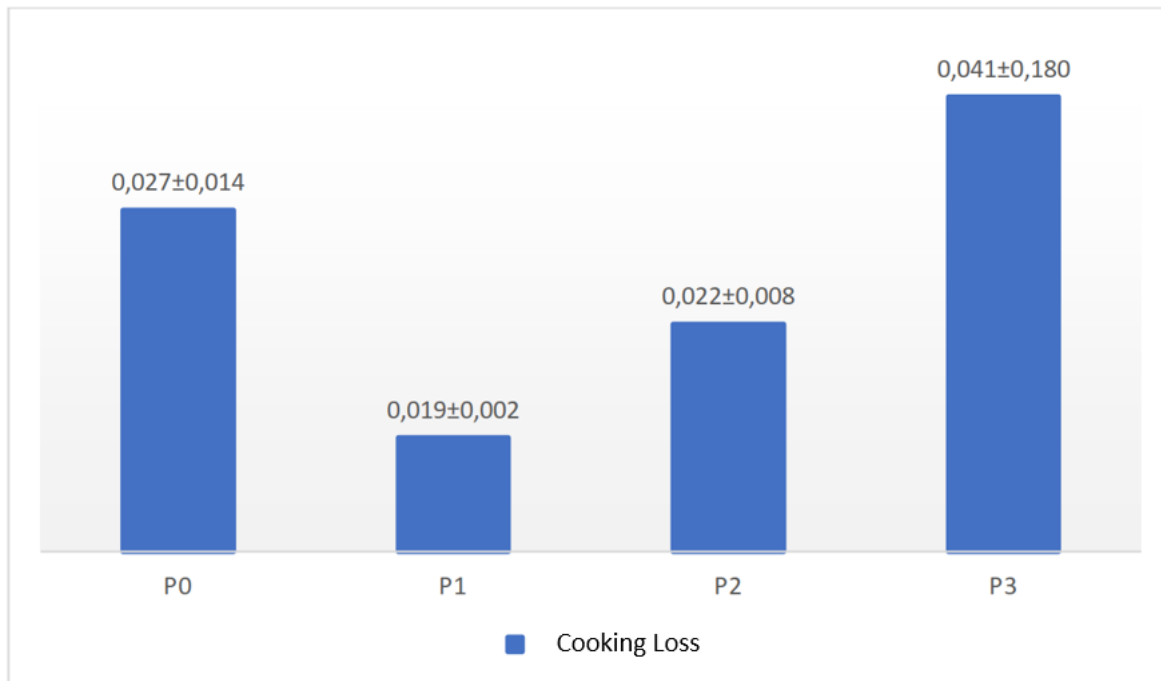


Figure 1. Cooking loss of broiler chicken nuggets with yellow corn added

As demonstrated in [Figure 1](#), the incorporation of yellow corn at varying levels does not exert a substantial influence ($p > 0.05$) on the cooking loss of nuggets. The cooking loss of P1 nuggets was found to be 0.019% lower than that of P2 nuggets (0.22%) and P3 nuggets (0.41%). The Duncan test results indicated that there was no statistically significant difference between P1 and P2, and between P2 and P3. The lowest recorded cooking loss of chicken nuggets in the treatment of yellow corn addition is P1 0.019%.

This indicates that an increase in the proportion of yellow corn incorporated into the mixture results in a decrease in cooking loss. It is imperative to note that a reduction in cooking loss value is indicative of superior product quality, given that the loss of nutrients is minimal ([Kartikasari et al., 2019](#); [Septian et al., 2025](#)). Conversely, an increase in cooking loss value is associated with a decline in product quality. In accordance with ([Priwindo, 2009](#)) assertion that a reduced cooking loss value is indicative of enhanced quality, both in terms of taste and organoleptic properties, and economic value. ([Winarno, 2004](#)) posits that processed meat products should undergo minimal cooking loss, given the close correlation between cooking loss and flavour and organoleptic properties. As posited ([Bulkaini et al., 2020](#)) ([Firahmi et al., 2015](#)), meat that experiences a reduced cooking loss is demonstrably of a higher quality than meat that experiences a greater cooking loss.

Organoleptics of Nuggets

Color

Color is frequently the primary visual aspect. In some cases, it can serve as a decisive factor in determining the quality of a product, even before other characteristics such as taste, aroma, texture, and acceptability are taken into account. In the domain of culinary arts, the colour of food assumes a pivotal role, for it is through the aesthetic presentation of food that its gustatory appeal is initially perceived. This appearance will affect the tastes of people who will consume it ([Tamsen *et al.*, 2018](#)).

Table 2. Organoleptic of broiler chicken nuggets with corn addition

Criteria	Treatment				Note
	P0	P1	P2	P3	
Color	4,00±0,65	4,06±0,70	4,40±0,63	3,86±0,99	NS
Texture	4,20±0,77	4,60±0,63	4,40±0,73	4,66±0,61	NS
Taste	4,20±1,01	3,86±0,74	4,46±0,74	4,33±0,72	NS

Note: NS= Not Significant

As demonstrated in [Table 2](#), the findings of the analysis of variance revealed that the incorporation of yellow corn into nuggets at varying levels did not yield a substantial impact ($P > 0.05$). The colour values obtained in this study were P0 at 4.00 (attractive), P1 at 4.06 (attractive), P2 at 4.40 (attractive), and P3 at 3.86 (somewhat attractive). The assessment of the colour of chicken nuggets with the addition of yellow corn by the panellists was found to be somewhat attractive. The incorporation of yellow corn in the formulation of broiler chicken nuggets represents a novel approach in the processing of livestock products, thereby enhancing the diversity of the product range and potentially attracting consumer interest. Measures of product quality and consumer preference can be determined through the implementation of physical tests and hedonic tests ([Rahimi *et al.*, 2018](#)).

Texture

Texture can be defined as the size and arrangement (network) of the constituent parts of an object or foodstuff. Texture can be perceived directly through the sense of sight, categorised as hard, soft, smooth, rough, whole, solid, liquid, dry, moist, clay, crispy, tender, and chewy ([Sakti, 2018](#)). Texture is defined as the sensory experience associated with the mouthfeel of meat, which is influenced by the size and arrangement of the meat nuggets.

The findings of the analysis of variance demonstrate that the incorporation of yellow corn into chicken nuggets at varying concentrations does not exert a substantial influence ($P > 0.05$). The mean nugget texture value ascertained in this investigation is P0 of 4.20 (smooth), P1 of 4.60 (smooth), P2 of 4.40 (smooth), and P3 of 4.66 (very smooth). The level of panelist observation of the texture of chicken nuggets with the addition of yellow corn was found to lie between smooth and very smooth. Research conducted by ([Akunne & Adeniji, 2021](#)) has demonstrated that the

organoleptic values of chicken texture can be enhanced by the addition of binders such as mocaf flour, with values ranging from 3.88 to 7.06.

The textural characteristics of food products are contingent on their capacity to bind water. A number of factors have been identified as being able to effect changes in texture ([Sony et al., 2024](#)). These include coagulation of protein, gelatinization of collagen, release of water, swelling and gelatinization of starch. As posited by ([Nishinari & Fang, 2018](#)), the degree of addition of fillers serves to enhance the elasticity of the final product and establish a solid texture.

Taste

Flavour is a determining factor in consumer acceptance of a food product. The flavour of food is influenced by a number of factors, including chemical compounds, temperature, the combination of food with other additives, and the length of the cooking process ([Brannan et al., 2014](#)); ([Oktarina et al., 2024](#)). The flavour of nuggets is also influenced by the meat used, spices, and ingredients added during processing. The taste response is received by the sensory on the tongue due to the presence of particles dissolved in water and oil, as well as the solubility of protein binding. Flavor has been identified as the most significant factor in consumer acceptance of nuggets ([Liu et al., 2022](#)).

The results of the analysis of variance demonstrate that the incorporation of yellow corn at varying levels does not yield a substantial impact on the quality of chicken nuggets ($P > 0.05$). The study obtained a P0 value of 4.20, indicating a satisfactory outcome, a P1 value of 3.86, also indicating a satisfactory outcome, a P2 value of 4.46, also indicating a satisfactory outcome, and a P3 value of 4.66, indicating an excellent outcome. The level of panelist observation with regard to the flavour of chicken nuggets with the addition of yellow corn was found to be satisfactory. The findings of this study are consistent with the perspective of ([Sunarlim, 1992](#)), who posited that consumers exhibit a predilection for the flavour of meat in nuggets and an aversion to starch.

As posited by ([Hermanianto & Andayani, 2002](#)), the consumer acceptance of nuggets is determined by three distinct flavour components: saltiness, meat flavour and crispness. As posited by ([Winarno, 2004](#)), the human gustatory system is capable of discerning four discrete flavors: namely, salty, sour, sweet, and bitter. The perception of flavour is influenced by a number of factors, including chemical compounds, their concentration, and the manner in which they interact with other components.

CONCLUSIONS

The findings of the research indicate that the provision of yellow corn does not exert a significant influence on the sensory quality or cooking loss of broiler chicken nuggets.

Nevertheless, it can be posited that the incorporation of yellow corn constitutes a commendable alternative filler material, one which has the capacity to enhance the physical integrity of ayam broiler nuggets. The optimal treatment was identified as P2, exhibiting a cooking loss value of 0.22, a colour rating of 4.40 (attractive), a texture rating of 4.40 (smooth), and a taste rating of 4.46 (good).

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