



Physicochemical Properties of Chicken Nugget with the Addition of Carrot (*Daucus carota L.*) and Suweg Flours (*Amorphophallus campanulatus*)

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Abstract. Chicken nugget is contained of beneficial nutrition and is also reachable but lacks of fibres. Therefore, it required more ingredients to improve the quality of chicken nuggets. In this research, the chicken nugget was added with carrot (*Daucus carota L.*) and suweg (*Amorphophallus campanulatus*) flours which aim to increase the fibres also the beneficial nutrition of the chicken nugget. The objective of this research was to determine the physicochemical properties of chicken nugget with the addition of carrot and suweg flours. The method used in this research is experimental using completely randomized design (CRD) with four treatments and four repetitions. The results showed that added carrot and suweg flours didn't gave significant effect on the water content, crude fibre and organoleptic of chicken nuggets. Moreover, in the conclusion of this research, adding of 6% of carrot flour and 14% of suweg flour (T3) produced a first rate of chicken nugget considered to the water content, crude fibre and texture.

Keywords: chicken nugget · carrot flour · suweg flour · physicochemical properties

1 Introduction

Chicken meat and chicken products are preferred by society and universally popular [1]. Broiler chicken meat has a chemical composition such as water 75.24%; protein 22.92%; and ash content 1.145%, respectively [2]. The broiler chicken categorized as source of animal protein with essential amino acids contained and play an important role in the growth and health of all individual [3, 4]. The meat of broiler has many advantages, the meat has a large amount of nutrition, and the texture is tender, compared to the other types of meat [5, 6]. The chicken meat is easily damaged if the process is defective. Thereby, it needs more treatment that prevents of damaged and also maintains the quality of chicken meat. One of the procedures is processing the meat chicken become to a processed product as evidenced by the chicken nugget.

Chicken nugget is one of the example of restructured meat processed product that consists of beneficial nutrition also affordable for everyone. Furthermore, the nutritional

composition of chicken nugget including protein, fat, carbohydrates, also mineral. Nevertheless, the fiber content in chicken nugget is deficient [7]. The consumer demand for chicken meat products enriched with fiber was increased since dietary fiber has a positive effect on human health [8]. The utilization of dietary fibers into chicken meat products could enhance their nutritional value and also reduce the production cost. Carrot flour is one category of vegetable that consists of good fibre. Whereas, suweg flour used to change tapioca starch as the substance in the processing of chicken nugget. Suweg flour has characteristics that are almost the same as tapioca starch and contains high fiber and also can be used as filler for chicken nugget and gave the same physicochemical properties with tapioca starch [9]. The use of carrot and suweg flour have contributed towards dietary fiber can act as a stabilizer, binder and volume enhancer in chicken meat processing. Thus, the combination between carrot flour and suweg flour will be expected to improve the quality of nutrition in a chicken nugget which reports from water content, crude fibre, and organoleptic profile.

2 Material and Method

The research was conducted at Animal Product Technology Laboratory, Faculty of Animal Science and Laboratory of Food Quality and Food Safety Test, Agricultural Product Technology Department, Faculty of Agricultural Technology Universitas Brawijaya. The research material consisted of broiler chicken meat, carrot flour, suweg flour, eggs, salt, pepper, garlic, breadcrumb, distilled water, alcohol 70%, H₂SO₄ 0.3 N and NaOH 1,5 N.

2.1 Nugget Preparation

The process of making nugget using the following procedure based on the formulation [10] shown at Table 1. Chicken meat is ground using *meat grinder* then added with ice cubes, salt, pepper, garlic, carrot flour, suweg flour, egg and stirred into a homogeneous

Table 1. Formulation of chicken nugget

Treatment (g)				
Ingrédients (g)	T ₀	T ₁	T ₂	T ₃
Chicken meat	250	250	250	250
Carrot flour	0	5	10	15
Suweg flour	50	45	40	35
Garlic	5	5	5	5
Pepper	1	1	1	1
Salt	3	3	3	3
Egg	27	27	27	27
Ice cube	4	4	4	4

mixture. Subsequently, a mixture put into aluminum pan coated with aluminium foil, steamed at 70 °C for 50 min and then cooled at room temperature. Nuggets are the cut to a size of about 3 × 3 cm and dipped in egg beaters then smeared with bread flour. After that the initial frying was done in a cooking oil for 20 s at 200 °C. Nugget and then are packed in plastic and stored in the freezer before cooking.

2.2 Research Design

Method used in this research is experimental research using Completely Randomized Design with four treatments consisted of T₀ (0% carrot flour and 20% suweg flour), T₁ (2% carrot flour and 18% suweg flour), T₂ (4% carrot flour and 16% suweg flour), T₃ (6% carrot flour and 14% suweg flour). Each treatment was repeated four times with parameter observed consisting of water content, crude fibre, and organoleptic properties [11]. The examination of organoleptic was conducted with seven panellists who were semi-trained. The assessment organoleptic profile was conducted by examining the level of satisfaction of panellists towards to chicken nugget with percentage treatment distinction of addition of carrot flour and suweg flour. Moreover, the assessment included flavour, scent, colour, and texture that used a product orientation test.

2.3 Data Analysis

The data obtained were tabulated and analysed statistically by Analysis of variants using Microsoft Excel 2010 program and if a difference is indicated the using BNT test to see the significant difference in each treatment [12].

3 Results and Discussion

The average of water content, crude fibre, and organoleptic in broiler chicken nugget with the addition of carrot flour and suweg flour can be seen in Table 2. The result showed that the additions of carrot flour and suweg flour did not gave significant effect ($p > 0.05$) on the water content, crude fibre, and organoleptic of chicken nugget. Table 2 showed the average water content in chicken nugget in the range of 48.23–50.12%, respectively. As stated in SNI 6683-2014, the maximum quality requirement of water content in chicken nugget of 50%, respectively. The higher addition of carrot flour in

Table 2. The average of water activity, crude fibre, and organoleptic broiler chicken nugget with the addition of carrot flour and suweg scratch.

Treatment	Water Content (%) ± SD	Crude Fibre (%) ± SD	Organoleptic			
			Flavor ± SD	Scent ± SD	Color ± SD	Texture ± SD
T0	48,23 ± 3,82	0,47 ± 0,05	3,89 ± 0,92	4,00 ± 0,77	3,25 ± 1,04	3,11 ± 0,83
T1	48,25 ± 2,04	0,51 ± 0,09	3,82 ± 0,94	4,18 ± 0,86	3,18 ± 0,86	3,60 ± 0,92
T2	49,36 ± 3,42	0,55 ± 0,08	3,82 ± 0,77	4,07 ± 0,66	2,93 ± 0,81	3,75 ± 0,75
T3	50,12 ± 1,22	0,58 ± 0,12	3,11 ± 1,23	3,57 ± 1,20	3,21 ± 0,83	3,89 ± 0,88

chicken nugget possessed tended to increase the water content in a chicken nugget, whereas the higher addition of suweg flour could decrease the water content of chicken nugget. The point of view was proper that the water content of carrot flour was less than 8%, respectively [13]. Carrot flour has a water content in the range of 5.6%, respectively [14]. In accordance that the water content of suweg starch is in the range of 4.98%, respectively [15].

Based on the results, the crude fibre of chicken nugget is in the range of 0.4–0.58%, respectively. The crude fibre had been increased at the same time as the level addition of carrot flour and was significant to the percentage decrease suweg flour in chicken nugget. The advance of crude fibre was expected to consist of fibre in carrot and suweg. Carrots have high fibre in the range of 46.95%, with the fibre insoluble in the range of 41.29% and soluble fibre in the range of 5.66%, respectively [16, 17]. Whereas soluble fibre and insoluble fibre of carrot in the range of 5.21% and 9.89%, respectively [18].

The average chicken nugget flavor is in the range of 3.11–3.89, respectively. It is recognized that the T0 sample had a maximum average score compared to another sample. The assessment flavor in chicken nugget presented that the maximum addition of carrot flour and decreasing of suweg flour can be reduced the flavor average. The addition of carrot flour in nuggets tended to change the flavor of chicken nuggets due to comparing an addition of carrot flour with chicken meat provided a sugary flavour [19]. It occurred because the carrot flour that was used had a distinctive flavour. The maximum combination of carrot flour that was used in the satisfaction level on fish cork nugget was reduced [20].

Furthermore, the average organoleptic (scent) chicken nugget is in the range of 3.57–4.18, respectively. T1 known as the sample had the maximum average scores if compared with another sample, considering that the T3 sample had the minimum average scores. A nugget that is already added with carrot flour is tended to give a distinctive scent prior to covering up the scent of spices that are used, along this line if more carrot flour is added, then it more covers up the scent of spices, because it happened because the character of carrot flour that will lean out a rotten scent when the process of establishment carrot flour. The minimum usage of carrot flour is more acceptable for the scent that was produced [20]. It was discovered that the carrot flour has a high concentration and will cover up the scent of fish cork. The scent of the nugget is affected by additional spices such as pepper, salt also garlic when the process of nugget, borders on the spices that are used also caused by the addition of carrot flour and suweg flour. The scent in nuggets is affected by deep frying processed also the addition of flour and seasoning such as spices. The average colour organoleptic in chicken nuggets is in the range of 2.93–3.25, respectively. It found that the T0 sample has the maximum average score compared to other samples, whereas T2 had the minimum average score. The result from a variety of analyses showed that the utilization of carrot and suweg flours with the distinction total addition is not impacted a direct effect ($P > 0,05$) on the color of broiler chicken nugget.

The colour of the nugget is affected by the colour of minced meat and the additional ingredients that are used. Moreover, the color of chicken meat is caused by provitamin A which can be found in chicken meat fat and oxymyoglobin pigment [21]. The deep-frying process can be caused the color of the nugget became to a slight brown. As a result of the non-enzymatic browning reaction from reducing sugar contained in addition to carrot,

it caused carrot contained carotene with the result that orange in the inside of nugget [22]. The more carrot added to the nugget the more carotene that is poultry extricated and produces orange in the nugget.

The average organoleptic (texture) broiler chicken nugget is in the range of 3.11–3.89, respectively. It found that the T3 sample had the maximum average score if compared to another sample, whereas T0 had the minimum average score. The result of texture of chicken nugget had an effect by flour that was used as filler ingredients. Organoleptic texture affected in water content found in a chicken nugget, because if the maximum water content contained in a chicken nugget, afterward the texture will be more flaccid [23]. As stated in Ernawati and Nugroho [24] explained the water content can be affected by texture and savouring in comestible also come to decide the freshness and durability of comestible. The toughness and the tenderness had a relation to the amount of water contained in a product, if the product consisted of maximum water content, then the texture will be flaccid compared to a product that consisted of a minimum of water.

4 Conclusion

Based on the result of this research it can be concluded that the addition of carrot and suweg flour didn't gave significant different ($P > 0.05$) on the water content, crude fiber, and organoleptic profile of chicken nugget. The addition of 6% carrot flour and 14% of suweg flour (T3) produced the maximum average score that was reported from the water content, crude fiber, and organoleptic texture.

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