The Quality of Nugget of Broiler Chicken Meat with Addition of Sago Flour (*Metroxylon Sp.*)

AUTHORS INFO

Sitti Nurlela
Universitas Sembilanbelas November Kolaka
st.nurlela18@gmail.com
+6281343605603

Hastuti
Universitas Sembilanbelas November Kolaka
hastutijalla@gmail.com
+6285255092481

Suparman
Universitas Sembilanbelas November Kolaka
suparman77ptk@gmail.com
+6282345330077

Abstract

This study aims to determine the quality of broiler chicken nuggets with the addition of sago flour (Metroxylon Sp.) As a binder. This study used a completely randomized design (CRD), with a factorial pattern of 3 x 3 and 3 replications where factor A was broiler chicken meat (A1 = 60%, A2 = 70% and A3 = 80%) and factor B was sago flour (B1 = 30%, B2 = 20% and B3 = 10%). The material used was 4.5 kg of fresh meat broiler chicken and 900 g of sago flour. Based on the results of the study showed that the administration of sago flour as a binder in broiler chicken nuggets dough did not significantly affect (P> 0.05) the quality of broiler chicken nuggets. The conclusion of the study showed that the administration of sago flour to the quality of broiler chicken nuggets had no real effect.

Keywords: Broiler chicken meat, sago flour, cooking shrinkage, organoleptic test

A. Introduction

Increasing public consumption of chicken meat is getting higher, especially broiler meat is the choice. Broiler meat is an option because it can cause pleasure for those who consume it because it has good taste and complete nutritional content. Besides that, broilers can be harvested and marketed quickly.

The community knows two forms of products that are used as sources of animal protein, namely fresh meat, and processed meat. In general, processing is carried out aiming to maintain the shelf life of a food product that is easily damaged, provides added value and taste of a product, and improves product quality. Therefore, it is necessary to make an effort so that the

nutritional content of meat can be maintained. One processed product that uses meat is a nugget.

Nugget is an emulsion-shaped meat product, where the quality of nuggets is determined by the characteristics of meat used as raw material. The ability to bind water and fat to stabilize emulsions is an essential characteristic for emulsion products, so products that have optimal physical and sensory properties are obtained. Moedjiharto (2002), nuggets are processed products that use restructuring technology by utilizing relatively small and irregular pieces of meat then reattaching them to a larger size aided by the binder. Fresh meat from different rigor phases has different characteristics as raw material. The increasing demand for quality and durable nuggets makes most nuggets sellers have to add additional ingredients such as phosphate. The addition of phosphate in the nugget mixture is intended to produce chewy and long-lasting nuggets, but the use of phosphate is still doubtful for health. Factors that affect the success of a product is placed on the ability of binding between particles meat, and other ingredients are added (Rahardjo, Dexter, Worfel, Sofos, Solomon, Shults, & Schmidt, 1995)

Quality is the main factor that needs to be considered in the production of meat and processed products that can be formed. At present, the use of materials to improve the quality of quality processed products that are safe for health is a serious concern to be developed, one of which is a nugget. The use of chicken meat with the substitution of sago flour is an innovation of nugget products so that prices are lower than other substitution — ingredients that are always available and can be consumed by all people and without reducing the nutritional value or acceptability of consumers. Soeparno (2005) states that meat quality is influenced by various factors, namely factors before cutting and after cutting. Therefore, it is necessary to research to determine the effect of adding sago flour to the quality of broiler chicken nuggets.

B. Methodology

1. The Material

The research material consisted of the tools used in this study were stoves, grinders, scales, frying pans, pans, ice cubes, knives, and other equipment. While the means for testing the physical quality of chicken nuggets using pH meters, penetrometers, analytical scales, tissue and writing equipment. The ingredients used for making chicken nuggets are fresh chicken meat, sago flour, corn oil, ice water, cooking oil and spices (garlic, pepper, salt).

2. Research Procedures

This study uses the experimental design used in this study is Complete Random Design (CRD) with a 3x3 factorial pattern with 3 replications of the treatment form is the addition of sago flour consisting of:

T0 = 60% chicken meat + 30% sago flour + 10% seasoning
T1 = 70% chicken meat + 20% sago flour + 10% seasoning
T2 = 80% chicken meat + 10% sago flour + 10% seasoning.

The implementation of this research includes several stages, namely as follows:

a) Washing

Chicken is washed in running water so that the remaining dirt or blood that is still attached to the meat is wasted. The purpose of washing apart from being to remove dirt can also reduce existing bacteria.

b) Calling

The goal is to separate meat from bones.

c) Weighing

After obtaining chicken meat separate from the bone, the next process is weighing. At first, the chicken is considered first as a reference to determine the quality of the other ingredients.

d) Milling

The grinding process is carried out until the meat tissue becomes smooth. When grinding, ice cubes and salt are added. The addition of salt serves to extract the actomyosin so that a product with good emulsion stability will be formed. The addition of ice cubes aims to dissolve the salt and distribute it evenly throughout the mass of the meat.

e) Mixing

Smooth meat dough mixed with fillers, emulsifiers, and spices. Addition of pads must be added first, after complete blend the addition of emulsifying material (eggs) must be added immediately to maintain the stability of the emulsion — finally spices as a taste of nuggets.

f) Printing

Once ready, the nugget mixture is transferred into the baking sheet and has been coated with plastic to prevent the nugget dough from sticking to the pan.

g) Steaming

The functions of steaming are to activate enzymes that will cause discoloration, taste or undesirable nutritional value during storage. The primary objective is to reduce the water content in the raw material so that the texture of the material becomes compact. This steaming step is carried out at a temperature of 60-80°C for 30 minutes

3. Parameters of Research

Parameters of this study were:

1. Cook shrinkage

The cooking shrinkage test is carried out by weighing a sample of 10 grams of nugget and frying for 3 minutes, then draining, cooling it on a cloth with tissue paper to absorb the oil. After that, the weighing is done again. Heavy fertilization before and after cooking is the amount of cooking shrinkage stated in%. Cookware is determined by the equation as follows:

Cook Shrinkage = <u>Dough weight before cooking – Weight after cooking</u> x 100%
Weight after cooking

2. The organoleptic test used is a hedonic test and hedonic quality test.

Tests are conducted to determine the level of preference and impression of the product on preferences, colors, textures, and aromas. The range of values used is 1-5 with some untrained panelists of 20 people. Scale values used are: 5 = very liked, 4 = liked, 3 = enough to like, 2 = not liked, 1 = very disliked.

While palatability is tested with non-parametric statistics is a test of preference that involves a person's judgment about the nature or quality of a material that causes people/panelists to like (Sukarto, 1981). The panelists presented samples arranged individually and asked to rate samples based on their enjoyment according to the scale of the grades provided. The level of preference can be seen in Table 1.

Table 1. Favorite and Numerical Scalas

Favorite Scale	Numerical Scale
Very liked	5
Liked	4
Enough to like	3
Dislike	2
Very Dislike	1

Sumber: Sukarto, 1981

4. Data Analysis

The results of the research data were analyzed by analysis of variance according to the Completely Randomized Design (CRD) with mathematical models (Steel & Torrie, 1991) as follows:

$$Yij = \mu + Pi + cij$$

Keterangan:

i   = 1,2,3,4,.....t
j   = 1,2,3,4,.....r
Yij   = observation of the second treatment and j[th] test
Yij   = μ + Pi + cij
μ = general average
Pi   = the effect of treatment on the ith
The ɛij = error of the second treatment and j[th] test

To determinate, the effect of treatment on the variables measured so that the data obtained were analyzed by variance. The treatment showed a significant effect, then a further test with BNT (Smallest Significant Difference) was conducted, (Steel & Torrie, 1991).

C.   Result and Discussion
1.   Cook shrinkage

Cooking shrinkage is the proportion of the weight of a material or product lost during the cooking or heating process. Cooking shrinkage is one indicator of nugget assessment that is related to binding capacity and water content. The average reduction of Broiler chicken nuggets cooked with sago flour is presented in Table 2.

Table 2. Average Shrinkage of Cook Nugget Chicken Meat Broiler Sago Flour Added (%)

Parameter	Treatments			Significant
	T0 (30%)	T0 (30%)	T0 (30%)	
Cook Shrinkage (%)	4.45	1.66	8.67	NS

Information: NS: Not Significant (P > 0.05); S: Significant (P<0.05)

Table 2 shows that the highest averages are P2 (8.67%), P0 (4.45%), and P1 (1.66%). To find out the effect of treatment on broiler nugget cooking losses so that statistical analysis was performed. The results of the variance analysis showed that the administration of sago flour to the quality of broiler chicken nuggets had no significant effect (P> 0.05) on cooking losses. The cooking shrinkage of broiler chicken nuggets given sago flour up to 30% in the nugget mixture proved to have no significant effect. It because the water content in broiler chicken nuggets increases with increasing sago flour while the starch content decreases so that the water binding power decreases. Soeparno (2005) in general, cooking losses vary between 1.5% to 54.5%.

Meat with a lower cooking shrinkage has better quality than beef with a high cooking shrinkage because this shows that during cooking the potential for water loss and the number of other nutrients is less. It is by the opinion of Soeparno (2005) arguing that the higher the protein contained an ingredient it will have the ability to bind more water. The maturation process can be a cause of decreasing protein levels, one of which is steaming which results in the release of water free from meat tissue and the occurrence of coagulation so that the texture of the meat solidifies, and the protein undergoes denaturation to form a simpler structure and the amount in food decreases (Agoes, Jacob, Anita, Lingga, & Nurjah, 2012).

2.   The organoleptic test

Based on the results of the implementation of the study, the organoleptic test of the three treatments as in Table 3.

Table 3. Average Organoleptic Nugget Sago-added Chicken Broiler Chicken (%).

Parameter	Treatments			Significant
	T0 (30%)	T0 (30%)	T0 (30%)	
likeness	1.64	1.71	1.44	NS
Colour	1.51	1.67	1.98	NS
Texture	1.73	1.58	1.44	NS
Aroma	1.40	1.36	1.31	NS

Information: NS: Not Significant (P>0.05); S: Significant (P<0.05)

a)   Likeness

Taste is sensing that is connected with tasting. Taste is measured by seeing the level of preference of the nugget. According to Chandrashekar, Hoon, Ryba, & Zuker (2006), the notion of taste or taste is the brain translation of sensations received by the sense of taste caused by compounds that dissolve and interact with receptors on the tongue. Until now five flavors are considered the basic taste that can be recognized by the human tongue, namely sweet, bitter, sour, salty and umami (savory taste). Average Organoleptic preferences of Broiler chicken nuggets which are added with sago flour are presented in Table 3. which shows that the highest average of treatments is P1 (1.71%), P0 (1.64%), and P2 (1.44%). To find out the effect of treatment on the organoleptic test of favorite broiler chicken nuggets a statistical analysis was performed.

The results of the variance analysis showed that the administration of sago flour to the quality of broiler chicken nuggets had no significant effect (P> 0.05) on the favorite organoleptic test. The sense of nugget is probably the most influential factor on the preference of panelists.

The taste of nuggets is almost certain to be directly proportional to the choice of panelists. The more delicious and tasty, the higher the level of choice of the panelists for the nugget products presented, and vice versa. Sense plays an essential role in the existence of a product in this case related to consumer tastes. Taste is a sensory quality of meat that is related to the sense of taste. The factors that determine whether a product is accepted or not by consumers are regarding taste (Widodo, 2008).

b) Colour
Determination of the quality of food, in general, is very dependent on several factors including taste, color, texture and nutritional value. Before other factors are taken into account, color is calculated first visually and is very decisive. A food that has nutritional value tastes good and has an excellent texture is not preferred when colors have less attractive colors (Winarno, 1997). The average Organoleptic color of Broiler chicken nuggets added with sago flour is presented in Table 3. which shows that the highest mean of treatment was P2 (1.98%), P0 (1.67%), and P2 (1.51%), respectively. To find out the effect of treatment on organoleptic tests on the appearance of broiler chicken nuggets a statistical analysis was performed.

The results of the variance analysis showed that the administration of sago flour to the quality of broiler chicken nuggets had no significant effect (P>0.05) on the organoleptic appearance test. It is due to the use of flour, resulting in the color of the golden yellow fried nugget and more interesting when compared to the nugget that uses fillers in the form of sago starch which produces colors that tend to be darker and unattractive. The color of fried nuggets is also strongly influenced by the time and temperature of the frying pan, as well as the dying into the batter (egg) and coating with bread (panir/bread flour) that lines the product. The time and temperature of the frying used to produce the golden yellow color of fried nuggets are 2 minutes with a temperature of 190-192oC (Sucipto, 2002). The brownish color that arises from frying is caused by the Maillard reaction, which is a reaction between amino acids in proteins and carbohydrates.

c) Texture
The texture is one indicator of the organoleptic quality characteristics of a product. Texture is sensing that is connected with touch or touch. The nugget texture is determined by the ingredients used, the mixing process and the cooking process. Organoleptic Mean The texture of Broiler chicken nuggets added with sago flour is presented in Table 3. which shows that the highest mean of treatments was P0 (1.73%), P1 (1.58%), and P2 (1.44%). To determine the effect of treatment on the organoleptic test of the texture of broiler chicken nuggets a statistical analysis was performed.

The results of the variance analysis showed that the administration of sago flour to the quality of broiler chicken nuggets had no significant effect (P> 0.05) on the organoleptic texture test. This is because the nugget using fillers in the form of sago starch produces a texture of fried nuggets that is more springy and in accordance with the nugget texture in general, the grinding process may also affect the texture of the nugget, the texture of the meat that has been milled is different from the texture of whole meat. It is because during the grinding process it is suspected that the muscle fibers are cut off by the grinding machine, thus affecting the texture of the ground meat. Owens (2001), states that milling or reduction in size functions so that the surface area of the meat extends so that that protein extraction can occur. Protein extraction is significant because if it does not happen extraction, the meat cannot blend when cooked, and this can affect the texture of the nugget produced.

d) Aroma
One crucial factor that is considered by consumers in choosing food products is aroma. Winarno (1997), states that in many ways, food delicacy is determined by the smell or smell of the food. A delicious aroma will be a useful parameter for consumers to choose these products. An organoleptic average of Broiler chicken nugget aroma added with sago flour is presented in Table 3. which shows that the highest mean is P0 (1.40%), P1 (1.36%), and P2 (1.31%). To find out the effect of treatment on organoleptic tests of the aroma of broiler chicken nuggets a statistical analysis was performed.

The results of the variance analysis showed that the administration of sago flour to the quality of broiler chicken nuggets had no significant effect (P> 0.05) on the organoleptic aroma test. It is because the aroma of broiler chicken nuggets still has a distinctive smell from chicken

meat as its raw material. The aroma of food ingredients is caused more by complex, volatile compounds derived from seasonings added (Widodo, 2008). Aroma or smell is a sensory trait that generally determines the delicacy of food. Responses to the sensory properties of aromas are usually associated with product odors or complex, volatile compounds derived from added spices.

D. Conclusion

Based on the results of the study it can be concluded that the nugget using sago flour in broiler chicken meat showed no significant difference (P> 0.05) on physical quality (cooking shrinkage) and organoleptic quality (appearance, preference, texture, and aroma).

E. References

Agoes, M., Jacoeb, Asnita, L., Lingga, Br., & Nurjanah. (2012). Karakteristik Protein dan Asam Amino Daging Rajungan (Portunus Pelagicus) Akibat Pengukusan. Fakultas Perikanan dan Ilmu Kelautan Institut Pertanian Bogor. Bogor. *JPHPI Vol 15* (2).

Chandrasekher, J., Hoon, M. A., Ryba, N. J. P., & Zuker, C. S. (2006). The receptors and cells for mammalian taste. *Nature. 444*, pp. 288 –294.

Moedjiharto, T. J. (2002). *Usaha Industri Rumah Tangga Fish Nugget*. Malang, Indonesia: Laboratorium Ilmu dan Teknologi Pangan fakultas Teknologi Hasil Pertanian. Universitas Brawijaya.

Ockerman, H. W. (1983). *Chemistry of Meat Tissue*. Ed. 10 Ohio, USA: Department of Animal Science. The Ohio State University and The Ohio Agricultural The Research and Departement Centre.

Owens, C. M. (2001). *Poultry Meat Processing*. (Edited by A. R. Sams). Texas, USA: CRC Press LCC. Department of Poultry Science.

Rahardjo, S., Dexter, D.R., Worfel, R.C., Sofos, J. N., Solomon, M. B., Shults, G. W., & Schmidt, G. R. (1995). Quality Characteristic of Restructured Beef Steak Manufactured by Various Techniques*. J. Food. Sci., 60(1)*, pp. 68-71.

Soeparno. (2005). Ilmu dan Teknologi Daging. Yogyakarta, Indonesia: Gadjah Mada University Press.

Sucipto. (2002). *Pembuatan Nugget Tahu Vegetarian, Studi Proporsi Tepung Tapioka dan Terigu, Jenis dan Konsentrasi Bahan dasar, serta Jenis Tahu terhadap Kualitasnya*. Tesis. Malang, Indonesia: Universitas Brawijaya.

Sukarto, S. T. (1981). *Penilaian Organoleptik untuk Industri Pangan*. Pusat Pengembangan Teknologi Pangan. Bogor, Indonesia: Institute Pertanian Bogor.

Steel, R. G. D. & Torrie, J. H. (1993). *Prinsip dan Prosedur Statistika suatu Pendekatan Biometrik*. Jakarta, Indonesia: PT. Gramedia Pustaka Utama.

Widodo, S. A. (2008). Karakteristik Sosis Ikan Kurisi (Nemipterus nematophorus) Dengan Penambahan Isolat Protein Kedelai dan Karagenan Pada Penyimpanan Suhu Chilling dan Freezing. Karya Ilmiah. Bogor, Indonesia: Fakultas Perikanan dan Ilmu Kelautan, Istitut Pertanian Bogor.

Winarno, F. G. (1997). *Kimia Pangan dan Gizi*. Jakarta, Indonesia: Gramedia Pustaka Utama.