

PHYSICAL PROPERTIES OF BEEF NUGGET WITH THE ADDITION OF DIFFERENT EGG WHITES

Wa Ode Harliani¹, Harapin Hafid^{2*}, Muh. Amrullah Pagala²

¹Alumnus of Animal Science Faculty, Halu Oleo University

²Lecturer of Animal Science Faculty, Halu Oleo University

Email: harapinhafid14@gmail.com

(Diterima:18-08-2020;

Disetujui:11-09-2020)

ABSTRACT

The purpose of this study was to determine the Physical and Organoleptic Properties of Beef Nugget with the Addition of Different Egg White Percentages. The research was carried out in 2 stages, namely preliminary research and primary research. The preliminary research aims to determine the process of making and formulating the useful nuggets with egg whites. The main research was conducted to determine the physical and organoleptic beef nuggets by adding a different egg white percentage. This research was carried out experimentally using a Completely Randomized Design with four treatments and five replications in the physical test and 15 semi-trained panelists as a test in the organoleptic test. Trained panelists were recruited from students and alumni of the Department of Animal Husbandry, Faculty of Animal Husbandry, the University of Halu Oleo, who understood the science and technology of meat and were willing to do an organoleptic perception testing (hedonic test). The form of treatment is adding a white egg percentage on beef nuggets consisting of four treatments. The composition of the experiment is as follows: P0 = Giving 0% (0 gram) egg whites and 100% beef, P1 = Giving 5% (5 grams) egg whites and 100% beef, P2 = Giving 10% (10 grams) white eggs and 100% beef, and P3 = Provision of 15% (15 grams) egg whites and 100% beef. The variables measured in this study include Physical and Organoleptic Properties of Beef Nugget. Physical variable tests include pH and yield, while Organoleptic variables test, namely color, aroma, taste, tenderness, and texture. Based on the results and discussion, it can be concluded that adding a different percentage of egg white to the nugget does not affect the pH and the rendering of the beef nugget. Meanwhile, based on organoleptic test results (color, aroma, taste, texture, and tenderness), beef nuggets with the addition of a different percentage of egg white affect the texture but does not affect the color, aroma, taste, and tenderness. It should be continued with the addition of egg whites with a higher level, from this study to see the effect on the physical and organoleptic properties of Beef Nugget.

Keywords: Physical Properties, Beef Nugget, Egg White

INTRODUCTION

Meat is a source of animal protein that has high nutritional Value compared to vegetable protein because meat contains complete and balanced amino acids, in addition to the presence of fats, minerals, and vitamins that the body needs and has high digestibility and is easily absorbed. However, meat is easily damaged due to microorganisms' activity, so that proper

handling, storage, or processing is required to maintain the quality of the heart.

Meat is one of the livestock products that can hardly be separated from human life. Besides diversifying food sources, the heart can lead to satisfaction or enjoyment for those who eat it because its nutritional content is complete. A healthy balance for life can be fulfilled (Soeparno, 2005; Hafid, 2011). Nugget is a product that comes from processed ground meat, which is popular

with many people. Chunk is one of the processed meat products that use restructured meat technology, namely technology, by utilizing relatively small and irregular meat cuts, which are then reattached to a larger size (Amertaningtyas, 2001).

Examples of restructured meat products widely recognized by the public include sausage, steak, corned beef, meatballs, and nuggets (Mastuti, 2008). Beef nuggets are foods that are processed using ground beef with spices and flour. Although it is expensive, it is hoped that the use of meat can help people who do not like a heart to take advantage of this beef nugget as an alternative; besides that, it can be done as an innovation in making nuggets so that producers do not only refer to chicken meat.

The quality of the nuggets is determined by their ability to form a protein matrix or bind between meat particles and other ingredients added to produce a compact texture and not easily break. This is primarily determined by the filler material used. Fillers are ingredients added to making processed meat products that can bind a certain amount of water and have gelling properties (Soeparno, 2005).

Flour is one of the supports for the manufacture of food ingredients such as nuggets, mostly imported products. Simultaneously, domestically many other flours can be used as supporting materials, namely fillers. Fillers are added in the restructuring products to increase the product's weight by substituting a portion of the meat so that costs can be reduced. Another function of fillers is to help improve product volume (Afrisanti, 2010). One of the additional ingredients that can improve the quality of the nuggets is egg white. Egg white contains protein and can act as a binding agent, which binds other elements together, which is expected to get better quality nuggets. (Herly, 2010).

According to Sudaryani (2003), eggs are a livestock product that provides the most significant contribution to achieving

adequate nutrition in the community. From an egg, you get sufficient nutrition because it contains nutrients that are very good and easy to digest. Therefore, eggs are an excellent food for growing children and require large amounts of protein and minerals and are also recommended to be given to sick people to speed up the healing process.

Albumin or egg white contains the highest protein, but besides having enormous benefits for the human body. Based on the chicken eggs' weight, the egg part consists of egg yolk, about 30% -32%, albumin about 58% -60%, and eggshell about 10% -12%. (Yuwanta, 2010). Based on the description of the background above, research on the Physical and Organoleptic Properties of Beef Nugget was carried out with the addition of a different percentage of egg white.

RESEARCH METHODS

Location and Time of Research

This research was conducted from September to November 2018, at the Laboratory of Animal Products Technology Unit, Faculty of Animal Husbandry, Halu Oleo University, Kendari.

Materials and Tools

The materials used in the study were 5 kg of beef chuck and breast, egg white and tapioca flour, spices (consisting of garlic, pepper, and salt), ice water, bread flour, eggs, cooking oil, paper: labels and tissue. The tools used in this research are blenders, meat mixers, cutting boards, knives, spoons, measuring cups, analytical scales, pans, pans, pans, stoves, pH meters, and freezers. In addition to the excellent quality ingredients used and the tools used are clean, making it according to a predetermined recipe can also affect the quality of the nuggets.

Research procedure

Beef Nugget Making Stage

These nuggets start with chopping the beef into smaller pieces and grinding it with a meat mixer. Beef nuggets are made

by 75 grams of ground beef mixed with egg white in each treatment (0 grams, 5 grams, 10 grams, and 15 grams). Spices consist of salt as an affirmation of taste and preservative, garlic 2 gram serves as a flavor enhancer and enhances the taste of nuggets, and 1 gram of pepper as a flavoring and extends the durability of food. The flour used for every 75 grams of beef tapioca flour is 15 grams. The dough ready to be printed on the aluminum foil is steamed for 15 minutes at 100 OC. Burning is the best cooking process in maintaining the nutritional value of food. Once cooked, the nugget dough is removed and cooled to room temperature for about 20 minutes. After cooling, the nuggets are uniformly cut into rectangles. Next, coat the chunks with egg and breadcrumbs in succession. The next stage is frying the nuggets for consumption.

Research Implementation

The implementation of this research was carried out in 2 stages, namely preliminary research and primary research. Preliminary research aims to determine the proper manufacturing process and formulation of nuggets with egg whites (Table 3.1). The primary research was conducted to determine the physical and organoleptic aspects of beef nuggets with different egg white percentages.

Nugget Formula

The ingredient formula for making nuggets in research on physical and organoleptic quality of beef nuggets with egg white follows the steps carried out by Hafid (2017), which has been modified with beef with the addition of egg white can be seen in Table 3.1.

Table 3.1. Description of adanon beef nuggets per sample unit

Ingredients		Treatment			
		P0	P1	P2	P3
Beef	(gram)	73	73	73	73
Egg whites	(%)	0	5	10	15
Tapioca flour	(%)	15	15	15	15
Garlic	(%)	2	2	2	2
Pepper	(%)	1	1	1	1
Salt	(%)	2	2	2	2
Ice Cube	(%)	2	2	2	2
Egg yolk	(%)	1	1	1	1

Note: Hafid, (2017)

Research design

This research was conducted experimentally using a completely randomized design (CRD) with four treatments and five replications on the physical test and 15 semi-trained panelists as replications in the organoleptic test. Trained panelists were recruited from the Department of Animal Husbandry, Faculty of Animal Husbandry, Halu Oleo University. The latter understand meat science and technology and are willing to do the perception equalization test organoleptic test (hedonic test). The form of treatment was the addition of the percentage of egg whites on the beef

nuggets consisting of four treatments. The experimental setup is as follows:

P0 = Giving 0% (0 gram) egg white and 100% beef

P1 = giving 5% (5 grams) of egg whites and 100% beef

P2 = giving 10% (10 grams) of egg whites and 100% beef

P3 = giving 15% (15 grams) of egg whites and 100% beef

Research variable

The variables measured in this study include Physical and Organoleptic Properties of Beef Nugget. The variable physical test has pH and yield, while the

Organoleptic variable test, namely color, aroma, taste, tenderness, and texture, according to Hafid and Syam (2007) references.

Physical Properties

pH Nugget

According to Soeparno (2009), the pH test, namely a 10-gram sample of meat, was mashed, then mixed with 10 ml of aqua dest then stirred until it was homogeneous. The pH meter was cleaned with aqua dest and put in buffer pH 7 to adjust the pH. Each solution is measured for pH three times, and the results are averaged as the pH value of the nuggets.

Rendement

The yield is the ratio of product weight to material weight x 100% (Hafid et al., 2009). The following formula can calculate the amendment Value of the nuggets:

$$\text{Rendement (\%)} = \frac{\text{Weight of the nuggets (g)}}{\text{Batter (g)}} \times 100\%$$

Data analysis

Analysis of variance is used to analyze research data; the model used in mathematics, namely:

$$Y_{ij} = \mu + \alpha_i + \varepsilon_{ij}$$

Information :

Y_{ij} = Value of observations given the i th treatment and j th repetition

μ = General mean (middle value)

α_i = Different Effect of egg white

ε_{ij} = Effect of experiment errors

Furthermore, if the treatment shows an effect, it is followed by the least significant difference test / LSD (Gasperz, 1991).

RESULTS AND DISCUSSION

Physical Properties of Beef Nugget

Beef Nugget pH test

The level of acidity (pH) is an indicator that determines the quality of a product. The average pH of Beef nuggets is presented in Table 1.

Table 1. The pH value of Beef Nugget Beef with the addition of a different percentage of egg white.

Repeat	Treatment			
	P0	P1	P2	P3
1	5.40	5.65	5.69	5.85
2	6.18	6.10	6.12	6.39
3	6.36	6.34	6.57	6.62
4	6.55	6.56	6.64	6.57
5	6.58	6.59	6.82	6.92
Average	6.21±0.48	6.25±0.39	6.37±0.46	6.47±0.40

Note: treatment has no significant effect ($P > 0.05$)

The results of the analysis of variance showed that the addition of egg whites (0%, 5%, 10%, and 15%) had no significant effect ($p > 0.05$) on the pH of beef nuggets. The resulting beef nuggets pH value range is between 6.21-6.47. The pH average of beef nuggets in this study is still in the meat products' normal pH range.

According to Soeparno (2005), the pH of processed meat products is usually determined by the pH of the meat used.

Generally, processed meat products' acidity ranges from pH 5.5 - 7.2 (normal pH). In addition to the manufacturing process, the pH of beef nuggets is influenced by the pH of the ingredients used, including meat and fillers (egg whites). Seasoning also plays a vital role in determining the pH of beef nuggets.

The pH value of the base material can cause changes in the pH value of the nuggets. This occurs due to changes in the

chunks' hydrogen balance due to the pH value of the essential ingredients used in the lumps' manufacture. The mixing of the elements creates a new hydrogen balance point in the nuggets, according to Pearson and Dutson's (1994) opinion. That the structural changes in the restructured meat in its function as meat protein have been shown to affect the resulting product's pH.

Rendement

One of the physical qualities that are often calculated in the processing of livestock food is yield; the yield is calculated as a presentation of the dough/initial raw material's weight with the weight of the beef nuggets produced. The yield value of beef nuggets made in this study can be presented in Table 4.2.

Table 2. Yield Value of Beef Nugget Beef with the addition of a different percentage of egg white.

Repeat	Treatment			
	P0	P1	P2	P3
1	103.33	91.57	88.88	100.97
2	101.09	102.10	101.94	108.08
3	104.54	97.95	105.37	100.00
4	97.00	102.04	102.88	100.96
5	101.09	101.05	97.95	101.94
Average	101.41±2.88	98.94±4.45	99.40±6.46	102.39±3.25

Note: treatment has no significant effect ($P>0,05$)

The results of the analysis of different yields showed that the addition of egg whites (0%, 5%, 10%, and 15%) did not have a significant effect ($p> 0.05$) on the yield of beef nuggets and the range of products of beef nuggets produced was between 98.94- 102.39.

According to Abubakar (2011) that the yield can be increased by adding fillers, but in this study, the percentage of fill used is the same, namely sago starch with the same rate in each treatment, so it tends to produce almost the same yield in each treatment. The work of beef nuggets with egg white is influenced by the water content of WHC (Water Holding Capacity). (Water Holding Capacity) is the ability of meat to bind water, which is controlled by protein. In essence, the protein's ability to bind water between egg whites and beef is no different. It is causing no significant percentage of beef nuggets by weight. This is by Soeparno (1998), the binding capacity of water is defined as the ability of meat to bind water or added water as long as there is an influence from outside forces. The binding capacity of meat water is

influenced by the meat protein state, although only less than 5% of the water binds directly to the hydrophilic group of the meat protein (Bintoro, 2008).

CONCLUSION

Based on the results and discussion, it can be concluded that the addition of a different percentage of egg whites to the nuggets does not affect the pH and yield of beef nuggets. Meanwhile, based on the organoleptic test (color, aroma, taste, texture, and tenderness), beef nuggets with the addition of different egg white percentages affect the surface. Still, they do not affect color, aroma, taste, and tenderness. It is necessary to continue with egg whites' addition to a higher level from this study to see the Effect on the physical and organoleptic properties of Beef Nugget.

REFERENCES

- Abubakar, 2007. Inovasi Teknologi Pengolahan Hasil Ternak itik. Pres. Seminar Nasional Inovasi dan Teknologi spesifik lokasi mendukung revitalisasi Pertanian. 5 Juni 2017.

- Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian. Badan Litbang Pertanian, Deptar Medan. Hlm. 189-698.
- Adam, Dewi. 2005. Variasi Nugget. Jakarta: Gramedia Pustaka Utama.
- Andriani. 2014. Merryana dan B. Wirjatmadi., Pengantar Gizi Masyarakat. Jakarta: Kencana.
- Aeni, N. 2016. Kualitas fisik dan organoleptik *beef nugget* dengan lokasi otot yang berbeda. Jurusan Peternakan. Fakultas Peternakan. Universitas Halu Oleo Kendari. Kendari.
- Afrisanti, D.W. 2010. Kualitas kimia dan organoleptik nugget daging kelinci dengan penambahan tepung tempe. Skripsi. Program Studi Peternakan. Fakultas Pertanian. Surakarta : Universitas Sebelas Maret.
- Alamsyah, Y., 2008. Nugget. Gramedia Pustaka Utama, Jakarta.
- Amertaningtyas, D., Purnomo, H., dan Siswanto. 2001. Kualitas nuggets daging ayam broiler dan ayam petelur afkir dengan menggunakan tapioka dan tapioka modifikasi serta lama pengukusan yang berbeda. Tesis. Program Pasca Sarjana Universitas Brawijaya. Malang.
- Hakim, A.N.A. 2017. Pengaruh penggunaan tapioka, terigu dan tepung sagu terhadap kualitas fisik dan organoleptik *duck nugget*. Jurusan Peternakan. Fakultas Peternakan. Universitas Halu Oleo Kendari. Kendari.
- Ardiansyah, 2010. Bumbu-bumbu masakan. [Http://reseptradisional.blogspot.com](http://reseptradisional.blogspot.com) (4 Mei 2017).
- Arifin, M., B. Dwiloka dan D. E. Patriani. 2008. Penurunan kualitas daging sapi yang terjadi selama proses pemotongan dan distribusi di kota semarang. Seminar Nasional Teknologi Peternakan dan Veteriner, 99-104.
- Astawan, M. 2007. Sehat Dengan Makanan Berkhasiat. Buku Kompas. Jakarta.
- Aswar. 2005. Pembuatan fish nugget dari ikan nila merah (*Oreochromis Sp.*). Skripsi. Teknologi Hasil Perikanan. Fakultas Perikanan. Bogor: Institut Pertanian Bogor.
- Bahri, S. 2008. Beberapa aspek keamanan pangan asal ternak di Indonesia. Pengembangan Inovasi Pertanian 1(3): 225–242.
- Bintaro, U.P. 2008. Teknologi Pengolahan Daging dan Analisis Produk. Universitas Diponegoro, Semarang.
- Brewer, S.M., And J. Novakofski, 1999. Cooking rate. pH and final endpoint temperature effect on color and cooking loss of a lean ground beef model system. Meat Science. 52:443-451.
- BSN, 2002. Nugget Ayam. SNI 01-6683-2002. Badan Standardisasi Nasional. Jakarta.
- Fellow, J.P. 2000. Food Processing Technology, Principles, and 2nd ed. Woodhead pub. Lim., Cambridge. England.
- Forrest, J., 1992. Meat Quality and Safety. Ag.ansc.purdue. edu / meat-quality / maf- stress.html-United States.
- Gaspersz, V. 1991. Metode perancangan percobaan. CV.ARMICO. Bandung.
- Hafid, H. 2009. Sifat fisik dan mutu sensori daging sapi bali yang dipelihara secara tradisional (pengaruh pelayuan dan jenis kelamin). Majalah Ilmiah Agriplus. 14 (1) : 61-64.
- Hafid, H., dan A. Syam. 2007. Pengaruh lama daging dan lokasi otot yang berbeda terhadap kualitas organoleptik daging sapi. Buletin Peternakan. 31 (4): 209-216.
- Hafid, H., 2011. Pengantar Evaluasi Karkas. Cetak Pertama. Unhalu Press. Kendari.
- Hafid, H. 2017. Pengantar Pengolahan Daging. Cetak pertama. Alfabeta Press. Bandung.
- Hakim, A.N.A. 2017. Pengaruh penggunaan tapioka, terigu dan tepung sagu terhadap kualitas fisik dan organoleptik *duck nugget*. Jurusan Peternakan. Fakultas Peternakan.

- Universitas Halu Oleo Kendari. Kendari.
- Herawati. 2008. Produksi Karkas, Hasil Olahan dan Perubahan Histologi Organ dan Jaringan Ayam Broiler dengan Suplemen Fitobiotik Jahe Merah.
- Jamaluddin, B. Rahardjo. P. Hastuti., dan Rochmadi. 2008. Model matematik perpindahan panas dan massa proses penggorengan buah pada keadaan hampa. Dalam: Prosiding Seminar Nasional Teknik Pertanian. Universitas Gadjah Mada. Yogyakarta.
- Judge, M.D., E.D. Aberle, J.C. Forrest, H.B. Hendrik, and R.A. Merkel, 1989. Principles of Meat Science. End Euri Disney. Kendall/Hunt. Publishing Co., Dubuque, Iowa.
- Komala, I. 2008. Kandungan Gizi Produk Peternakan. Student Master animal Science, Fac. Agriculture-UPM.
- Kusmajadi, S. 2006. Perubahan sifat fisik daging ayam broiler post mortem selama penyimpanan temperatur ruang (change of physical characteristics of broiler chicken meat post mortem during room temperature storage) Jurnal Ilmu Ternak, Juni 2006, Vol. 6 No. 1, 23-27.
- Kusumaningrum, M., Kusrahayu, & Mulyani S. 2013. Pengaruh berbagai filler (bahan pengisi) terhadap kadar air, rendemen dan sifat organoleptik (warna) chicken nugget. Animal Agriculture Journal 2 (1): 370-376.
- Kurtini, T., K. Nova., dan D. Septinova. 2011. Produksi Ternak Unggas. Universitas Lampung, Bandar Lampung.
- Laksmi, R.T., A.M. Legowo, dan Kusrahayu. 2012. Daya ikat air, pH, dan sifat organoleptik chicken nugget yang disubstitusi dengan telur rebus. Animal Agriculture Journal, 1(1):453-460.
- Lawrie, R. A. 2003. Ilmu Daging. Edisi Kelima. Penerbit Universitas Indonesia. Jakarta. (Penerjemah: A. Parakkasi).
- Lestari, P, I. 2009. Kajian supply chain management: analisis relationship marketing antara peternakan pamulihan farm dengan pemasok dan pelanggannya. Institut Pertanian Bogor. Bogor.
- Mastuti, R. 2008. Pengaruh suhu dan lama waktu menggoreng terhadap kualitas fisik dan kimia daging kambing restrukturisasi. Fakultas Pertanian Universitas Samudra Langsa.
- Maghfiroh, I. 2000. Pengaruh penambahan bahan pengikat terhadap karakteristik nugget ikan patin (*pangasius hypothalamus*). Skripsi. Program Studi Teknologi Hasil Perikanan. Fakultas Perikanan. Bogor : Institut Pertanian Bogor.
- Montolalu, S., N. Lontoar., S. Sakul dan A.D, Mirah. 2013. Sifat Fisik, Kimia, dan mutu Organoleptik bakso broiler dengan menggunakan tepung Ubi Jalar (*Ipomoea batatas*l). Zuatek, 32(5).
- Owens, C.M., 2001. Poultry Meat Processing, CRC Press LCC Departement Of Poultry Science, Texas (Edited by A.R Sams).
- Persagi. 2005. Daftar Komposisi Bahan Makanan. Persatuan Ahli Gizi Indonesia, [Http://www.persagi.org](http://www.persagi.org) (5 Mei 2017).
- Pearson, A.M and T.R. Dutson, 1994. Advance in Meat Research, Restructured Meat and Poultry Products. J. Food Science, Vol. 3. No 19:15-18.
- Rahayu, R.Y. 2007. Komposisi kimia rabbit nugget dengan komposisi filler tepung tapioka yang berbeda. Yogyakarta : Fakultas Peternakan Universitas Gajah Mada.
- Rasyaf, M. 1990. Bahan Makanan Unggas Di Indonesia. Kanisius. Yogyakarta.
- Rumiyati. 2002. Pengaruh perbedaan komposisi tepung terigu dan tapioka terhadap mutu nugget ikan hiu (*charchatinuslimbatus*). Skripsi. Fakultas Perikanan. Program Studi Teknologi Hasil Perikanan. Universitas Brawijaya. Malang.

- Saptarini, K. 2009. Isolasi *salmonella spp.* pada sampel daging sapi di wilayah bogor serta uji ketahanannya terhadap proses pendinginan dan pembekuan. Thesis. Fakultas Teknologi Pertanian Institut Pertanian Bogor. Bogor.
- Setyawan, N., Widyaningrum, K. T. Dewandri. 2011. Efisiensi penggunaan penggorengan hampa dalam menekan pembentukan akrilamida pada makanan yang digoreng. Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian. Jakarta.
- Soeparno. 2009. Pilihan produksi daging sapi dan teknologi prosesing daging unggas. Fakultas Peternakan. Universitas Gadjah Mada.
- Soeparno. 2005. Ilmu dan Teknologi Daging. Gadjah Mada University Press. Yogyakarta.
- Sudaryani. 2003. Kualitas Telur. Penebar Swadaya. Jakarta.
- Suprati, L. 2005. Teknologi pengolahan pangan tepung tapioka dan pemanfaatannya. PT. Gramedia Pustaka: Jakarta. 80 hlm.
- Sofiana. 2003. Sosialisasi pembuatan nugget ayam pada ibu-ibu kelompok PKK di kelurahan Pijoan kecamatan Jambi luar kota kabupaten Muaro Jambi. Jurnal pengaduan pada masyarakat No. 46 tahun 2008. ISSN : 1410-0770.
- Sutaryo, 2004. Modul materi kuliah pokok bahasan penyimpanan dan pengawetan daging. Semarang: Fakultas Peternakan Universitas Diponegoro.
- Usmiati, S. 2010. Pengawetan daging segar dan olahan. Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian. Bogor.
- Yulianti. 2017. Sifat fisik dan organoleptik beef nugget menggunakan tepung yang berbeda. Skripsi. Fakultas Peternakan Universitas Halu Oleo. Kendari.
- Yuwanta, T., 2010. Utilization of eggshells. Animal Science and Industry Study Program. Faculty of Animal Husbandry. Gajah Mada University. Yogyakarta.
- Wibowo, S. 2008. Budi Daya Bawang Putih, Merah dan Bombay. Penebar Swadaya. Jakarta.
- Winarno, F. G. 2004. Kimia Pangan dan Gizi. PT. Gramedia Pustaka Utama, Jakarta.