Jurnal Pertanian Terapan of JURNAL ROCE (AGROSCIENCE)
*https://jurnal.rocewisdomaceh.com/index.php/roce* *e-ISSN : 3032-4505*
*Vol. 1 No.2 Thn. 2024*

# ANALISIS FISIKOKIMIA DAN ORGANOLEPTIK NUGGET TEMPE DENGAN FORMULASI TEPUNG DAUN KELOR *(Moringa oleifera)*

# PHYSICOCHEMICAL AND ORGANOLEPTIC ANALYSIS OF TEMPEH NUGGETS WITH MORINGA LEAF FLOUR FORMULATION (*Moringa oleifera*)

**Nurhikma Uday[1], Muh. Tahir[2*], Marleni Limonu[1]**

[1] Food Technology, Faculty of Agriculture, Universitas Negeri Gorontalo
[2]Agricultural Product Technology, Faculty of Agriculture and Forestry, Universitas Sulawesi Barat

*Correspondent Author: muhtahirlaw@gmail.com

**Article Info**

Article history :
Received :
27 – 06 – 2024
Received in revised :
02 – 07 – 2024
Accepted :
08 – 07 – 2024
Availeble online :
15 – 07 – 2024

**Abstract**

Improving the nutritional quality of tempeh nuggets can be done through food processing with the addition of moringa leaf flour. This study aims to improve the nutrition of tempeh nugget products and determine the organoleptic properties of tempeh nuggets after adding moringa leaf flour. This study used a single-factor complete randomized design (CRD) (Moringa leaf flour formulation for tempeh nuggets) and 5 treatments; control (0 g moringa leaf flour), 1 g moringa leaf flour, 2 g moringa leaf flour, 3 g moringa leaf flour, 4 g moringa leaf flour. Each treatment was repeated 3 times. The results showed that the best treatment for making tempeh nuggets was obtained in the formulation of tempeh 50 g and moringa leaf flour 4 g on nutritional value. The value of protein is 9.37%, fat 12.73%, ash 2.17%, calcium 2.91%, and elasticity test 889.7g/f.

***Keywords** : Nuggets, Moringa leaf flour, Protein, Calcium, Elasticity.*

**Abstrak**

Peningkatan kualitas gizi nugget tempe dapat dilakukan melalui pengolahan pangan dengan penambahan tepung daun kelor. Penelitian ini bertujuan untuk meningkatkan nutrisi produk nugget tempe dan mengetahui sifat organoleptik dari nugget tempe setelah ditambahkan tepung daun kelor. Penelitian ini menggunakan rancangan acak lengkap (RAL) faktor tunggal (Formulasi tepung daun kelor terhadap nugget tempe) dan 5 perlakuan yaitu kontrol (0 g tepung daun kelor), 1 g tepung daun kelor, 2 g tepung daun kelor, 3 g tepung daun kelor, 4 g tepung daun kelor. Masing-masing perlakuan diulang sebanyak 3 kali. Hasil yang diperoleh menunjukkan bahwa perlakuan terbaik untuk membuat nugget tempe diperoleh pada formulasi tempe 50 g dan tepung daun kelor 4 g terhadap nilai gizi. Nilai kadar protein 9,37%, kadar lemak 12,73%, kadar abu 2,17%, kadar kalsium 2,91%, dan uji kekenyalan 889,7g/f.

**Kata Kunci :** Nugget, Tepung daun kelor, Protein, Kalsium, Kekenyalan.

## INTRODUCTION

The field of food technology continues to develop every year. Changes in people's consumption patterns continue with the development of food technology. Especially people in urban areas, because they prefer to consume food products that are *ready to* eat and ready to cook. Ready-to-cook products are products that can be directly consumed by the public. In contrast, ready-to-cook products are products that have gone through the processing process to packaging so that when the product arrives in the hands of the community or people, the product is ready to be cooked (Wulandari et al., 2016).

Nuggets are a type of ready-to-eat processed food that has developed a lot and is in great demand by the public. In general, nuggets are rectangular, but with the development of food technology, nuggets have been found in various shapes and variations. Nuggets that are widely found in the market are beef nuggets, chicken nuggets, and fish nuggets. Nuggets have a good nutritional content for the body, including fats, carbohydrates, and proteins. According to Dewi (2018), in general, nuggets are made from chicken meat raw materials that have been ground and flour is added, but the chicken meat can be replaced with local food ingredients such as tempeh. Nuggets are generally made from meat that is a high source of protein, in addition to meat that can be used as an alternative to making nuggets, namely tempeh.

Tempeh is a food product produced from the fermentation process by utilizing Rhizopus Oryzae yeast. Tempeh has many nutrients that are very important for the body, including carbohydrates, proteins, fats, and minerals. Tempeh is a source of plant-based protein, and its price is very cheap when compared to beef or chicken. The development of tempeh as a raw material for making this nugget is very important because it helps increase the economic value of tempeh products. In addition, with the existence of tempeh nugget products, it is hoped that it can be an alternative to ready-to-eat foods that are high in protein in addition to processed nugget products that are widely found in the market. In addition to tempeh, the material used for making nuggets is moringa leaf flour.

Moringa (Moringa Oleifera) is a plant that has many nutrients in the form of minerals, especially iron, and calcium, protein, ß-carotene, vitamin C. All parts of the moringa plant starting from the leaves, fruits, seeds, flowers, bark, and stems, to the roots have extraordinary benefits. Moringa leaves contain the highest calcium. Calcium is an essential mineral that is needed by the human body a lot. Because of nutrients, calcium is very important for the mineral content in the body and for a healthy diet (Yusmiati & Wulandari, 2017). In general, the role of calcium in the body is divided into two, namely it can help the formation of tooth bones and regulate biological processes in the body (Padmasuri, 2015; Yusmiati & Wulandari, 2017). The purpose of this study is to improve the nutrition of tempeh nugget products and to find out the organoleptic characteristics of tempeh nuggets after adding moringa leaf flour.

## RESEARCH METHODS

### Material

The ingredients used in this study are moringa leaf flour as much as 115 g, tempeh 780 g, wheat 225 g, eggs 225 g, salt 30 g, tapioca flour 150 g, garlic 30 g, pepper 30 g. The analysis materials used were HCl, aquates, NaOH, catalyst tablets, boiling stones, and alcohol.

### Tool

The tools used in this study are ovens, blenders, 100 mesh sieves, analytical scales, containers, pans, gas stoves, stirring spoons, and nugget molds. The analytical tools used are porcelain cups, kilns, desiccants, soxlets, condensers, fat flasks, ovens, kjeldahl, electric heaters, destructors, hot plates, Erlenmeyer, burettes, volumetric pipettes, droppers, measuring flasks.

### Design and Location of the Experiment

This study used a single-factor Complete Random Design (RAL), namely with the addition of moringa leaf flour (0 g, 1 gr, 2 g, 3 g, and 4 g) each treatment was repeated 3 times and carried out in the Food Technology Laboratory.

### Analysis Procedure

The test analysis carried out in this study was ash content test (Indonesian National Standard, 2010), protein content test (Indonesian National Standard, 2006b), fat content test (Indonesian National Standard, 2006a), calcium content test (Mardiah, 2017), elasticity (Kusnadi, Bintoro, & Al-Baari, 2012), and organoleptic test (Laksmi, 2012); Sari et al., 2014).

### Research Stages

### Making Moringa Leaf Flour

Moringa leaves are weighed as much as 1800 grams, washed, and drained, then moringa leaves are dried in an oven at a temperature of 60$^{o}$C for 24 hours. The dry matter of moringa leaves was then crushed using a grinder and sifted using a 100-mesh sieve.

### Making Tempeh Nuggets with Moringa Leaf Flour Formulation.

The tempeh used is in good condition and intact. Tempeh is steamed and then ground by adding ice water, then mixed with tapioca flour, moringa leaf flour, wheat, salt, pepper, and garlic. The mixing process is done until the dough is well mixed, then molded in a box pan. The next process is steamed again so that the dough becomes dense and easy to cut, greased with egg

whites then smeared with breadcrumbs. The tempeh nuggets are then fried before the evaluation stage.

## RESULTS AND DISCUSSION

The results showed that the formulation of moringa leaf flour in making tempeh nuggets had an effect on the nutritional content and the level of preference of the panelists. The values of ash, protein, fat, calcium content, and elasticity can be seen in Table 1.

**Table 1.** Test Results of Tempeh Nugget Formulation with Moringa Leaf Flour

| It | Parameters | Treatment | | | | |
|---|---|---|---|---|---|---|
| | | P0 | P1 | P2 | P3 | P4 |
| 1 | Ash (%) | 1.35$^{a}$ | 1.41$^{b}$ | 1.72$^{c}$ | 1.83$^{d}$ | 2.17$^{e}$ |
| 2 | Protein (%) | 8.27$^{a}$ | 8.42$^{a}$ | 8.57$^{a}$ | 8.97$^{b}$ | 9.37$^{c}$ |
| 3 | Fat (%) | 15.77$^{a}$ | 15.45$^{b}$ | 15.13$^{c}$ | 13.93$^{d}$ | 12,73$^{e}$ |
| 4 | Calcium (%) | 1.24$^{a}$ | 1.56$^{ab}$ | 1.74$^{b}$ | 2.36$^{c}$ | 2.91$^{d}$ |
| 5 | Elasticity (g/f) | 426.3$^{a}$ | 455.6$^{a}$ | 484.9$^{a}$ | 687.3$^{b}$ | 889.7$^{c}$ |

Remarks: Numbers followed by different letters show a noticeable difference in the value of α 0.05

### Ash Rate

Ash content is an inorganic substance left over from the combustion of one of the organic materials. Ash content is related to the minerals of a material (Winata et al., 2015). Analysis of ash content in tempeh nuggets formulated with moringa leaf flour showed that the ash content value ranged from 1.35%-2.17%. The highest ash content was found in the formulation of 50 g tempeh and 4 g moringa leaf flour, which was 2.17%, while the lowest ash content was found in the formulation of 54 g tempeh and 0 g moringa leaf flour, which was 1.35%.

These results show that the formulation of moringa leaf flour influences on the ash content value, the higher the moringa leaf flour added, the higher the ash content produced. This is because moringa leaf flour contains higher ash levels. Dewi, (2018) stated that the ash content in moringa leaf flour was higher, which was around 11.40%. According to Sari (2019), moringa leaves are a plant that has a lot of nutrients, including iron. Moringa leaves have a higher iron content than other vegetables, which is 17.2 mg/100g. The increase in ash content in tempeh nuggets is due to different formulations of adding moringa leaf flour.

### Protein Content

In addition to energy needs, protein is also a regulatory and building substance needed by the body. Protein is a source of amino acids with elements C, H, O, and N that are not found in fats and carbohydrates (Winarno, 2002; Fitriasari, 2010). The results of the protein content value

in Table 1 showed that the protein content in tempeh nuggets formulated with moringa leaf flour ranged from 8.27%-9.37%. The highest protein content was found in the formulation of 50 g tempeh and 4 g moringa leaf flour, which was 9.37%, and the lowest protein content was found in the formulation of 54 g tempeh and 0 g moringa leaf flour, which was 8.27%. Based on the Indonesian National Standard (2014), the quality requirement for nuggets for protein content is at least 9%. This shows that tempeh nuggets with the addition of moringa leaf flour produce a fairly high protein content and meet the specified standards. Research by Zakaria et al., (2012), showed that the protein content of moringa leaf flour was 28.25%. Therefore, the protein content obtained increases if the moringa leaf flour is added more and more.

**Fat Content**

Fats are a more effective source of energy than carbohydrates and proteins. Fat has a function as a source of energy and a solvent for vitamins A, D, E, and K. Fat can be used to improve the texture and taste of food (Winarno, 2002). The fat content value in Table 1 shows that the fat content in tempeh nuggets formulated with moringa leaf flour ranges from 15.77%-12.73%. The highest fat content was found in the formulation of 54 g tempeh and 0 g moringa leaf flour which was 15.77%, while the lowest fat content was found in the formulation of 50 g tempeh and 4 g moringa leaf flour which was 12.73%. Nugget quality requirements for fat content based on the Indonesian National Standard (2014), a maximum of 20%. This shows that tempeh nuggets with the addition of moringa leaf flour still meet the predetermined standards. The increase in fat content in this study was not too significant with the addition of moringa leaf flour because moringa leaf flour only contained fat around 2.3%.

**Calcium Levels**

The macro mineral that is needed from food intake in the body is calcium. More than 99% of calcium is found in cartilage and teeth, the rest is in body fluids and soft tissues (Putranto et al., 2015). The calcium content in Table 1 shows that the calcium content in tempeh nuggets formulated with moringa leaf flour ranges from 1.24%-2.91%. The highest calcium content was found in the formulation of 50 g tempeh and 4 g moringa leaf flour, which was 2.91%, while the lowest calcium content was found in the formulation of 54 g tempeh and 0 g moringa leaf flour, which was 1.24%. The results of this study show that the increase in calcium levels produced is in line with the addition of moringa leaf flour.

This fact is due to the ingredients used containing calcium as researched by Hasniar et al., (2019) moringa leaves have a calcium content of 0.44% and tempeh contains calcium as much as 0.155%. Raw materials that contain calcium will cause the calcium content in tempeh meatballs with the addition of moringa leaves also increase. Nugget quality requirements for calcium levels based on the Indonesian National Standard (2014), a maximum of 30-50%. This shows that the calcium content in tempeh nuggets with the addition of moringa leaf flour is still low in all formulations but meets the predetermined standards.

**Elasticity**

The level of elasticity of tempeh nuggets formulated with moringa leaf flour in Table 1, shows that the elasticity of tempeh nuggets with the addition of moringa leaf flour ranges from 425.3g/f -889.7g/f. The highest nugget elasticity was found in the formulation of 50 g tempeh and 4 g moringa leaf flour which was 889.7g/f, while the lowest nugget elasticity was found in the formulation of 54 g tempeh and 0 g moringa leaf flour which was 425.4g/f.

These results show that the more moringa leaf flour is used, the more the level of elasticity of the nuggets decreases and becomes denser. This is due to the fiber content in moringa leaf flour. According to Krisnadi, (2010) and Sinaga, et al., (2019) that moringa leaves have a higher fiber content, which is five times more than vegetables in general.

**Organoleptic**

**Color**

Color has an important role in terms of the appearance of food, even though the food is delicious, if it does not look attractive when served, the taste of people who want to consume it will disappear (Putri, 2009; Nurlaila et al., 2016). The degree of preference of the panelists for color can be seen in Figure 1(a).

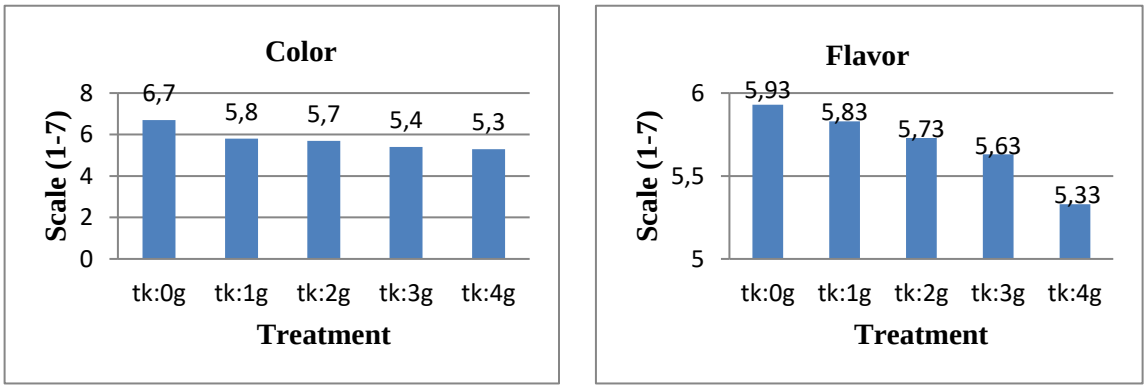


Figure 1. (a) Color value and (b) Flavor value of tempeh nuggets formulated with moringa leaf flour.

Figure 1(a) shows that the color of tempeh nuggets with the addition of moringa leaf flour ranges from 6.7%-5.3%. The highest color was found in the formulation of 54 g tempeh and 0 g moringa leaf flour, which was 6.7% (like), while the lowest color was found in the formulation of 50 g tempeh and 4 g moringa leaf flour, which was 5.3% (somewhat like).

The results of the hedonic test showed that in general, the color of tempeh nuggets was accepted by the panelists, either with moringa leaf flour added or control. The panelists' level of preference will be reduced due to the high amount of moringa leaf flour added. The decrease in the level of preference of the panelists in the treatment of 50 g tempeh and 4 g moringa flour was due to the color of the nuggets produced that were less attractive due to the use of moringa flour which caused color change and was not like other nugget colors. Tempeh nuggets with moringa

leaf flour added tend to be dark green, different from the control nuggets. The color of the nuggets will be greener with the addition of moringa leaf flour which increases because moringa leaves have a green substance or known as chlorophyll (Hasanah, 2015).

**Flavor**

Flavor is something that can be judged by the sense of smell. The degree of preference of the panelist towards scents can be seen in Figure 1(b). Based on the panelists' assessment, it is known that the highest level of preference of the panelists is found in the formulation of adding 0 g of moringa leaf flour with an average value of 5.93%. Meanwhile, the lowest level of preference of the panelists was found in the formula for adding moringa leaf flour of 4 g with an average value of 5.33%.

The high level of flavor preference in the control treatment nuggets was due to the absence of the addition of moringa leaf flour. The panelists' preference level decreased if moringa leaf flour increased. This happens because moringa leaf flour has a distinctive flavor compared to the main ingredient (Nurlaila et al., 2016), where moringa leaves have a distinctive langu flavor. Moringa leaves contain the enzyme lipoxidase, this enzyme exists in green vegetables by hydrolyzing or decomposing fats into compounds that cause langu which belong to the hexaanal and hexanol groups (Ilona & Ismawati, 2015).

**Taste**

Taste is an important sensory property in the reception of a product, observation of taste is carried out by determining the level of taste preference sensorily based on the taste sensation in the mouth when tasted using the sense of taste (Nurlaila et al., 2016). The level of preference of the panelists for taste can be seen in Figure 3(a).

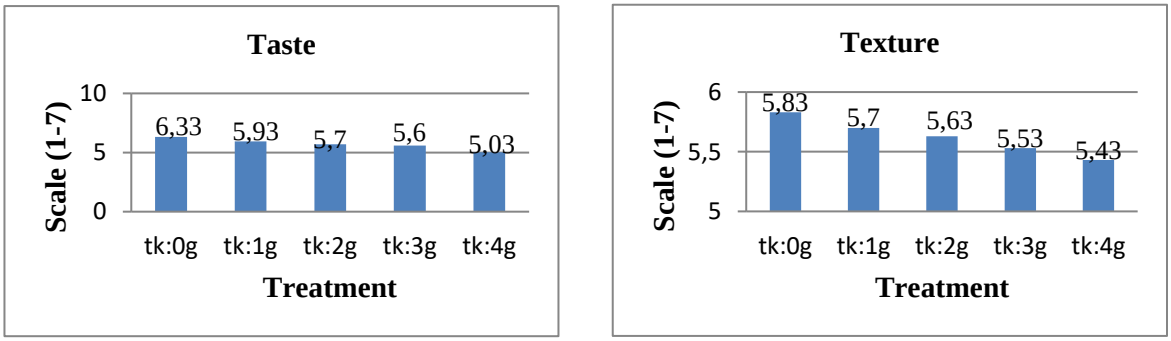


Figure 3. (a) Taste value and (b) Texture value of tempeh nuggets formulated with moringa leaf flour.

Based on the panelists' assessment, it is known that the level of preference of the panelists for the taste with the highest value is found in the formulation of 0 g moringa leaf flour with a value of 6.33% (suka), while the lowest level of preference of the panelists is found in the formulation with the addition of 4 g moringa leaf flour with 5.03% (somewhat like).

These results showed that the level of preference for the taste of nuggets decreased due to the use of moringa leaf flour. The panelists' preference for the taste of nuggets decreased if moringa leaf flour increased. Dita et al., (2015) and Nurlaila et al., (2016) said that the high amount of moringa leaf flour added to food can produce a bitter taste and color change.

**Texture**

Texture is one parameter that can be measured by the human senses. Texture has important properties in fried products. The level of preference for texture can be seen in Figure 3(b). Based on the results of the hedonic test, organoleptic characteristics on the texture of the nugget obtained from the results of the study showed a very different level of preference in each formulation. The score range between 5.83% and 5.43% showed that the panelists' preference for the texture of the nuggets ranged from “somewhat like” to “like”. The highest texture hedonic score was obtained in the formulation with the addition of 0 g of moringa leaf flour, while the lowest texture was obtained in the formulation with the addition of 4 g of moringa leaf flour. From all formulations, it can be concluded that the formulation without moringa leaf flour is the most preferred by the panelists. This happens because the texture of the nuggets is getting denser as researched by Nurlaila et al, (2016) that adough will get denser if the moringa leaf flour is more.

## CONCLUSION

The results of the study showed that the formulation of moringa leaf flour in making tempeh nuggets had a good influence on the nutritional content but was opposite to the level of preference of the panelists. The more moringa leaf flour is added, the more nutritional content will be increased, on the contrary, the less moringa leaf flour is added, the higher the level of preference of the panelists. The addition of moringa leaf flour in making tempeh nuggets is the best nutritional content for the 4-gram formulation with the highest protein content (9.37%), and the highest calcium content (2.91%). The formulation of adding moringa leaf flour in making tempeh nuggets has the effect of reducing fat content with the lowest fat content value (12.73%) in the formulation of adding 4 grams of moringa leaf flour. The level of preference for tempeh nuggets with the addition of moringa leaf flour gave the lowest value for color, namely 5.3 (somewhat like), aroma 5.33 (somewhat like), taste 5.03 (somewhat like) and texture 5.43 (somewhat like). Both the protein, fat, calcium, and hedonic tests of the tempeh nuggets produced still meet SNI 6683:2014.

## REFERENCES

Dewi, D. P. (2018). Substitusi tepung daun kelor (Moringa oleifera L.) pada cookies terhadap sifat fisik, sifat organoleptik, kadar proksimat, dan kadar Fe. *Ilmu Gizi Indonesia*, 01, 104–112.

Khusna, A., Dita, Rauf, R., & Mustikaningrum, F. (2015). *Pengaruh Penggunaan Tepung Daun Kelor Sebagai Bahan Pensubtitusi Tepung Tapioka Terhadap Tingkat Kekenyalan dan Daya Terima Cilok*. (Skripsi, Universitas Muhammadiyah Surakarta).

Fitriasari, R. (2010). *Kajian Penggunaan Tempe Koro Benguk dan Tempe Koro Pedang dengan Perlakuan Variasi Pengecilan Ukuran (Pengirisan dan Penggilingan) Terhadap Karakteristik Kimia dan Sensoris Nugget Tempe Koro*. (Skripsi, Universitas Sebelas Maret Surakarta).

Hasanah, H. (2015). *Pemanfaatan Daun Kelor Sebagai Bahan Campuran Nugget Ikan Tongkol*. (Skripsi, Universitas Muhammadiyah Surakarta).

Ilona, A. D., & Ismawati, R. (2015). Pengaruh Penambahan Ekstrak Daun Kelor (Moringa oleifera) dan Waktu Inkubasi Terhadap Sifat Organoleptik Yoghurt. *e-Journal Boga*, 04, 151–159.

Krisnadi, A. D. (2010). *Kelor Super Nutrisi*. Blora: Pusat Informasi dan pengembangan Tanaman Kelor Indonesia.

Kusnadi, D., Bintoro, V., & Al-Baari, A. (2012). Daya IKat Air, Tingkat Kekenyalan dan Kadar Protein Pada Bakso Kombinasi Daging sapi dan daging Kelinci. *Jurnal Aplikasi Teknologi Pangan*, 1, 28–31.

Laksmi, R. T. (2012). Daya Ikat Air, pH dan Sifat Organoleptik Chicken Nugget Yang Disubtitusi dengan Telur Rebus. *Indonesian Jurnal Of Food Technology*, 1, 1–9.

Mardiah. (2017). Analisa Kadar Kalsium (Ca) Pada Daun Kelor (Moringa oleifera). *Jurnal Ilmu Alam San Lingkungan*, 8, 49–52.

Nurlaila, Sukainah, A., & Amiruddin. (2016). Pengembangan Produk Sosis Fungsional Berbahan Dasar Ikan Tenggiri dan Tepung Daun Kelor. *Jurnal Pendidikan Teknologi Pertanian*, 2, 105–113.

Padmasuri, K. (2015). *I'm A Happy Vegetarian*. CV. Yogyakarta. Solusi Distribusi.

Putranto, H., Asikin, A., & Kusumaningrum, I. (2015). Karakterisasi Tulang Ikan Belida Sebagai Sumber Kalsium dengan Metode Hidrolisis Protein. *ZIRAA'AH*, 40, 11–20.

Putri, E. F. (2009). *Sifat Fisik dan Organoleptik Bakso Daging Sapi pada Lama Postmortem yang Berbeda dengan Penambahan Keragenan*. (Skripsi, Institut Pertanian Bogor).

Sari, D. K., Marliyati, S. A., Kustiyah, L., Khomsan, A., & Gantohe, T. M. (2014). Uji Organoleptik Formulasi Biskuit Fungsional Berbasis Tepung Ikan Gabus (Ophiocephalus striatus). Agritech, 34, 1–6.

Sari, F. (2019). *Pengaruh Penambahan Tepung Daun Kelor (Moringa oleifera) dalam Pembuatan Bolu Kukus Menggunakan Tepung Terigu dan Tepung Pisang Kepok Putih*. (Skripsi, Universitas Sumatera Utara).

Sinaga, H., Purba, R., & Nurminah, M. (2019). Pengaruh Penambahan Tepung Daun Kelor dalam Pembuatan Kue Onde-Onde Ketawa Menggunakan tepung Mocaf. *JFLS*, 3, 29–37.

Standar Nasional Indonesia. (2006a). SNI 01-2354.3-2006 . *Cara uji kimia - Bagian 3: Penentuan kadar lemak total pada produk perikanan ICS 67.120.30*. Badan Standarisasi Nasional.

Standar Nasional Indonesia. (2006b). SNI 01-2354.4-2006 C*ara uji kimia - Bagian 4: Penentuan kadar protein dengan metode total nitrogen pada produk perikanan*. Badan Standarisasi Nasional.

Standar Nasional Indonesia. (2010). SNI 2354.1:2010 *Cara uji kimia – Bagian 1: Penentuan kadar abu dan abu tak larut dalam asam pada produk perikanan*. Badan Standarisasi Nasional.

Standar Nasional Indonesia. (2014). *SNI 6683:2014 Nugget Ayam (Chicken Nugget)*. Badan Standarisasi Nasional.

Winarno, F. (2002). *Kimia Pangan Dan gizi*. Jakarta. PT. Gramedia Pustaka Utama.

Winata, A., Yualiati, K., & Hanggita, S. (2015). Analisis Korelasi Harga dan Mutu Kimiawi Kerupuk di Pasar Tradisional Cinde Palembang. *Jurnal Hasil Perikanan*, 4, 179–183.

Wulandari, E., Suryaningsih, L., Pratama, A., & Putra, D. S. (2016). Karakteristik Fisik. Kimia dan Nilai Kesukaan Nugget Ayam Dengan Penambahan Pasta Tomat. *Jurnal Ilmu Ternak*, 16, `95–99.

Yusmiati, S. N., & Wulandari, R. (2017). Pemeriksaan Kadar Kalsium Pada Masyarakat Dengan Pola Makan Vegetarian. *Jurnal Sain Health*, 1, 43–49.

Zakaria, Tamrin, A., Hartono, R., & Sirajuddin. (2012). Penambahan Tepung Daun Kelor pada Menu Makanan Sehari-hari dalam Upaya Penanggulangan Gizi Kurang pada Anak Balita. *Media Gizi Pangan*, XIII, 41–47.