Analysis of Nutritional Value

by Mars Khendra Kusfriyadi

Submission date: 23-May-2023 10:23AM (UTC+0700)
Submission ID: 2099753588
File name: Analysis_of_nutritional_value_acceptability-2022.pdf (396.54K)
Word count: 3375
Character count: 17236

How to Cite:
Kusfriyadi, M. K., & Nabilah, D. F. (2022). Analysis of nutritional value, acceptability and organoleptic quality of mackerel fish waffle with additional Kelulut honey as an additional food alternative for stunting children. *Linguistics and Culture Review*, *6*(S4), 182-190. https://doi.org/10.21744/lingcure.v6nS4.2183

3

Analysis of Nutritional Value, Acceptability and Organoleptic Quality of Mackerel Fish Waffle with Additional Kelulut Honey as an Additional Food Alternative for Stunting Children

Mars Khendra Kusfriyadi
Department of Nutrition, Politeknik Kesehatan Kemenkes Palangka Raya, Indonesia

Dita Farhah Nabilah
Department of Nutrition, Politeknik Kesehatan Kemenkes Palangka Raya, Indonesia

***Abstract*---**One of the factors in the incidence of stunting in children under five years old is the lack of nutrition intake that help for growth and development, such as protein and calcium. Mackerel is a food that contains high protein and calcium. The use of mackerel fish flour as a substitute material in making waffles is one of the efforts done to increase the nutritional value of protein and calcium and reduce the use of wheat flour. The disadvantage of fish flour products is the fishy smell, so the researchers used Kelulut honey as an additional ingredient in this study. This study is pure experimental using a completely randomized design with one factor, namely the substitution of mackerel fish flour with the addition of Kelulut honey. There were 7 treatments in this study, namely the substitution of mackerel fish flour with a percentage of 0%, 5%, 10%, 15%, 20%, 25%, to 30%. Meanwhile, the addition of Kelulut honey ranged from 1 to 6 tablespoons. The results of this study indicate that there is a significant difference in the acceptability of waffle girlut aroma in each treatment, but it is not significantly different in terms of the acceptability of taste, texture and color. The organoleptic quality characteristics of waffle girlut are described as having a sweet taste (P 30%), having a soft texture (P3 15%), having creamy color (P5 25%) and having a waffle aroma that is not fishy. The nutritional value of waffle girlut per 25 grams is known based on analysis using the Indonesian Food Composition Table, which is 347.5 kcal of energy, 13.8 grams of protein, 16.8 grams of fat and 345.3 mg of calcium.

***Corresponding author**: Kusfriyadi, M. K.; Email: Mars.khendra.k@gmail.com*
Manuscript submitted: 27 Jan 2022, Manuscript revised: 18 April 2022, Accepted for publication: 09 May 2022

Keywords---Kelulut honey, mackerel fish flour, stunting children, waffle.

Introduction

The incidence of stunting that occurs in children under five years old before they turn two years old has a serious impact, both in the short and long term. Children who experience stunting when they are under two years old will have a low cognitive level with implications for poor learning achievement and being psychosocially bad. Condition of *severe stunting* in the first two years of life is closely related to cognitive delays during childhood and has an impact on their quality as human resources as adults.

The main factor that is directly related to the incidence of stunting is the non-fulfillment of nutrition intake, especially protein and calcium, for a long period of time. The level of protein and calcium consumption significantly affects the nutritional status of children. Children under five years old whose protein consumption is lacking for a long time will be stunted in their height growth even though their energy consumption is sufficient. The height growth of children who have a protein deficiency will be slower than those who have sufficient protein consumption (Grantham-McGregor et al., 1996; Saran et al., 2002; Duranti & Gius, 1997).

In addition to protein, calcium also plays an important role in the process of bone growth. If the calcium consumption is lacking continuously over a long period of time, it will result in the process of bone formation being not optimal. The government through the Ministry of Health has made efforts to increase nutrition intake for children, especially in their first 1000 days of life. This effort is realized by providing additional food for pregnant women and children under five years old in the form of biscuits.

This study provided an alternative choice in making additional food for children under five years old by using animal foodstuffs that is rich in protein and calcium with honey as additional ingredient. The animal foodstuffs used is Mackerel. Mackerel, as a source of animal protein, contains Omega 3, Omega 6 and Omega 9. Omega 3 functions to help the development of the eyes, brain and nerves; Omega 6 is beneficial for hormones; and Omega 9 serves to relieve symptoms of joint inflammation and maintain cholesterol stability. The protein found in the fish is easier to digest and has a complete amino acid content.

The use of mackerel fish flour in processed food in the form of waffle is an alternative choice for the community to utilize local food. However, there is a disadvantage, one of which is the fishy smell of the fish that still remains even though it has been processed into flour. Proline is an important amino acid in fish that plays a role in fishiness. The fishy smell of fish can be minimized, one of which is by using honey. This is because honey contains a high water content. To that end, the researchers tried to use honey from the type of Kelulut honey as an additional ingredient for the waffle. Kelulut honey has a clearer color than usual forest honey, has a watery texture and has a sweet and slightly sour taste. The

dilution of honey indicates the high water content in the honey which causes the fermentation process to occur easily and affects the acidity level in the honey (Grantham-McGregor et al., 1991; Humphrey et al., 2019; Semba et al., 2016). In addition, this study also sought to reduce the use of wheat flour in the manufacture of waffle products by substituting mackerel fish flour with the addition of Kelulut honey. The researchers refer to the product of this study as Waffle *Girlut*.

Research Methods

This study is pure experimental using a Completely Randomized Design (CRD). The variation of substitution of mackerel fish flour with the addition of Kelulut honey was the independent variable, while the nutritional value, acceptability and organoleptic quality were the dependent variables. The nutritional value of waffle *girlut* products was analyzed using the Indonesian Food Composition Table (TKPI) which can be accessed through www.panganku.org. Chemical nutritional value analysis was not carried out due to the COVID-19 pandemic. As for the acceptability and organoleptic quality analyses, the researchers used 25 untrained panelists. The results of the acceptability test were processed and analyzed using the Kruskal Wallis test, while the results of the organoleptic quality test were analyzed descriptively.

Table 1
Composition of Mackerel Fish Flour and Kelulut Honey Formulation

Formulation	Wheat Flour (%)	Mackerel Fish Flour (%)	Kelulut Honey (ml)
P0	100	0	0
P1	95	5	5.5
P2	90	10	11
P3	85	15	16.5
P4	80	20	22
P5	75	25	27.5
P6	70	30	33

The research procedure for making waffle girlut consisted of two stages, namely the stages of making mackerel fish flour and stages of processing waffle girlut. The method used in the making of mackerel fish flour is the drying method using an oven at a temperature of 50°C for 4 hours. The fish were ground using a dry blender and sieved using an 80-mesh sieve. In the processing of waffle girlut stage, 125 g of wheat flour, 5 g of salt, 10 g of baking powder, 1 egg yolk, 250 ml of liquid milk and 60 ml of oil and 5 g of vanilla were used. Meanwhile, the composition of mackerel fish flour and the addition of kelulut honey was based on the treatments as shown in Table 1.

Discussion

The yield in the making of mackerel fish flour was 8.73% from 131 g of mackerel fish meat. Meanwhile, Kelulut honey used has the characteristics of a slightly sour sweet taste, a distinctive honey aroma, watery texture, brownish yellow

color. Waffle *Girlut* is a waffle product with the raw material of substitution of mackerel fish flour with the addition of Kelulut honey (Yegge et al., 2021; Sahlan et al., 2019; Semba et al., 2008; Moreira et al., 2021). In accordance with the expectations of this study that this waffle product is an innovative product that can be utilized in reducing stunting prevalence through increasing protein and calcium nutrition intake. Mackerel fish flour contains 60-70% protein and is rich in essential amino acids, especially lysine and methionine and contains 1.23% calcium. 1 waffle girlut weighs about 24-25 grams. So if it is calculated based on TKPI per 100 g of ingredients, the nutritional value of Waffle Girlut is known.

Table 2
Nutritional Value

Nutritional Value	100 g Waffles	25 g Waffles
Energy	1390.05 kcal	347.5 kcal
Protein	55.43 g	13.8 g
Fat	67.58 g	16.8 g
Calcium	1381.35 mg	345.3 mg

Figure 1. Waffle Girlut

The results of the analysis of the acceptability of taste, texture, color and aroma of waffle *girlut* as well as its organoleptic quality are as follows:

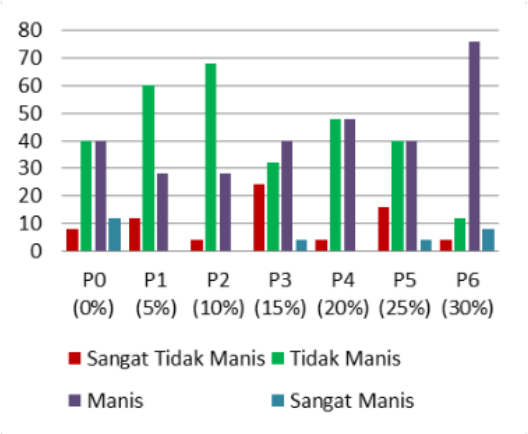


Figure 2. Waffle Girlut taste

The graph shown in Figure 2., provides information that the average waffle product has a sweet taste. The more the addition of Kelulut honey, the sweeter the taste. Kelulut honey contains reducing sugar. In addition, Kelulut honey also has a special aroma, which is a mixture of sweet and slightly sour taste like lemon produced by Trigona sp[9] bees. Based on the Kruskal Wallis test on the acceptability of the waffle *girlut* taste, it is known that there is no significant difference in all treatments with a significance of 0.270 (p-value > 0.05) (Rosida, 2011; Ridoni et al., 2020; Sartimbul et al., 2017; Akhmazillah et al., 2013).

The graph shown in Figure 3., provides information that the average waffle product of the 6 treatments has a soft texture. Waffle texture is influenced by the use of egg whites, oil and the level of fineness of flour during the flouring or milling process, because the finer the flour used will produce a softer texture. Besides, the mackerel fish flour produced in this study is also classified as smooth and soft because it uses an 80-mesh sieve. Based on the statistical test results on the acceptability of the waffle *girlut* texture, it is known that there is no significant difference in all treatments with a significance of 0.646 (p-value > 0.05)

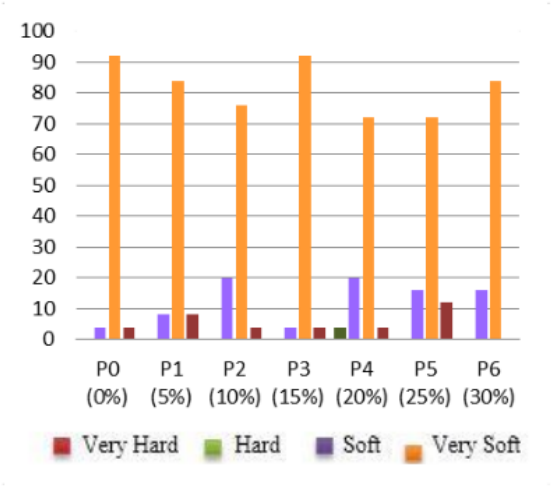


Figure 3. Waffle Girlut texture

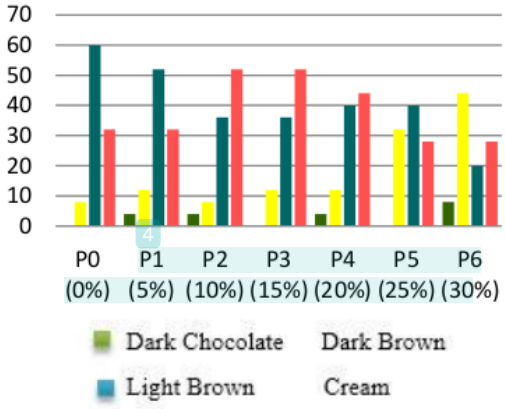
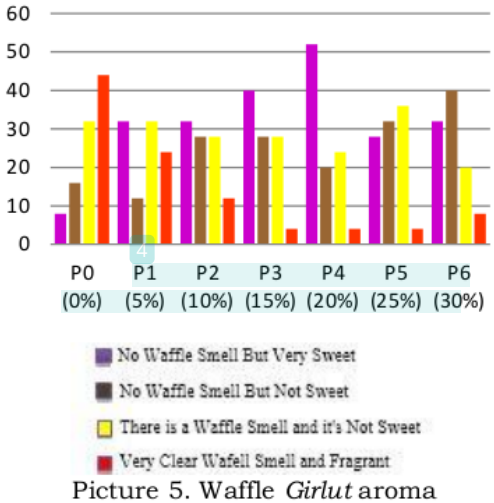


Figure 4. Waffle Girlut color

The graph shown in Figure 4., provides information that the average waffle product color in each treatment is creamy, but the intensity of dark brown increases with the increase in the percentage of mackerel fish flour used. The formation of brown color comes from the reaction between reducing sugars and amino acids which is known as the Maillard reaction. The high protein content in mackerel fish flour and the presence of reducing sugars in Kelulut honey are the causes of this reaction so that the waffles are creamy to brown in color.

The Maillard reaction will take place more quickly under acidic conditions, so the addition of Kelulut honey strongly supports this reaction. However, based on the Kruskal Wallis statistical test on the acceptability of the waffle *girlut* color, it is found that there is no significant difference in all treatments with a significance of 0.461 (p-value > 0.05).

The graph shown in Figure 4., provides information that the distinctive waffle aroma decreases with the increase in the percentage of substituted mackerel fish flour, but the amine aroma decreases due to the larger portion of the addition of Kelulut honey. Based on the Kruskal Wallis statistical test on the acceptability of the waffle *girlut* aroma, it is found that there is a significant difference in all treatments with a significance of 0.012 (p-value < 0.05).



Picture 5. Waffle *Girlut* aroma

The results of this study are in line with what was conveyed in previous studies that, the fishy smell of fish can be minimized, one of which is by using honey. This is because honey contains a high water content. Besides, proline, which is an important amino acid found in fish, is alkaline and can carry out a breakdown that produces a fishy aroma—can be minimized by acidic compounds, and one of the ingredients containing acidic compounds is honey. The acidity contained in honey is determined by the dissociation of hydrogen ions present in aqueous solutions and most also contain various minerals (including Ca, Na and K). Honey that has more mineral content, has higher pH. Thus the more the addition of Kelulut honey in the processing of waffle girlut substituted with mackerel fish flour, the more it can help minimize the fishy smell of mackerel fish flour (Oktarina & Sudiarti, 2013; Solihin et al., 2013; Aridiyah et al., 2015).

The processing of waffle girlut substituted with mackerel fish flour with the addition of Kelulut honey, can be used as a nutritious snack for children because childhood is a time when changes in growth and development occur very quickly in terms of physical, motor and cognitive aspects of children. Nutritional status is influenced by the level of protein and calcium nutrion intake, which can cause stunting. The height growth of children who have a protein deficiency will be slower than those who have sufficient protein consumption. In addition to protein, calcium also plays an important role in the process of bone growth. If the calcium consumption is lacking continuously over a long period of time, it will result in the process of bone formation being not optimal. Therefore, the use of mackerel fish flour as a substitute material in making waffle is one of the efforts

done to increase the nutritional value of protein and calcium. Also, with the addition of Kelulut honey in the processing of this waffle, it can help reduce the fishy smell obtained from mackerel fish flour and provide a sweet taste. So, when it is consumed by children, it can be accepted as a nutritious snack (Wahyudi & Maharani, 2017; Karnia et al., 2020; Raysita, 2013; Mataram, 2017).

Conclusion

This study concludes that waffle *girlut* with high nutritional value can be an alternative as additional food for children under five years old who experience nutritional problems, especially stunting. There is no effect of substitution of mackerel fish flour with the addition of Kelulut honey on the acceptability of the waffle taste, texture and color, but it does affect the acceptability of the waffle aroma. On average, the panelists stated that the Waffle *Girlut* taste is sweet, creamy in color and has waffle aroma but not fishy. If you want to make this product, you can use the formula in treatment P3 with the substitution of 15% mackerel fish flour consisting of 18.7 grams of fish flour, 106.2 grams of wheat flour, 3 tablespoons of Kelulut honey and 250 ml of liquid milk. Because chemical analysis has not been carried out, it is recommended to do a chemical analysis of nutrients (protein and calcium).

References

Akhmazillah, M. F. N., Farid, M. M., & Silva, F. V. M. (2013). High pressure processing (HPP) of honey for the improvement of nutritional value. *Innovative Food Science & Emerging Technologies*, *20*, 59-63. https://doi.org/10.1016/j.ifset.2013.06.012

Aridiyah, F. O., Rohmawati, N., & Ririanty, M. (2015). Faktor-faktor yang Mempengaruhi Kejadian Stunting pada Anak Balita di Wilayah Pedesaan dan Perkotaan (The Factors Affecting Stunting on Toddlers in Rural and Urban Areas). *Pustaka Kesehatan*, *3*(1), 163-170.

Duranti, M., & Gius, C. (1997). Legume seeds: protein content and nutritional value. *Field Crops Research*, *53*(1-3), 31-45. https://doi.org/10.1016/S0378-4290(97)00021-X

Grantham-McGregor, S. M., Powell, C. A., Walker, S. P., & Himes, J. H. (1991). Nutritional supplementation, psychosocial stimulation, and mental development of stunted children: the Jamaican Study. *The Lancet*, *338*(8758), 1-5. https://doi.org/10.1016/0140-6736(91)90001-6

Grantham-McGregor, S. M., Walker, S. P., Himes, J. H., & Powell, C. A. (1996). Stunting and mental development in children. *Nutrition Research*, *16*(11-12), 1821-1828. https://doi.org/10.1016/S0271-5317(96)00206-0

Humphrey, J. H., Mbuya, M. N., Ntozini, R., Moulton, L. H., Stoltzfus, R. J., Tavengwa, N. V., ... & Kaswa, T. (2019). Independent and combined effects of improved water, sanitation, and hygiene, and improved complementary feeding, on child stunting and anaemia in rural Zimbabwe: a cluster-randomised trial. *The Lancet Global Health*, *7*(1), e132-e147. https://doi.org/10.1016/S2214-109X(18)30374-7

Karnia, I., Hamidah, S., & Thamrin, G. A. R. (2020). Pengaruh Masa Simpan Madu Kelulut (Trigona SP) Terhadap Kadar Gula Pereduksi Dan Keasaman. *Jurnal Sylva Scienteae*, *2*(6), 1093-1099.

Mataram, I. K. A. (2017). Stunting cause factors in the village of traditional Bali. *International Research Journal of Engineering, IT & Scientific Research*, *3*(2), 157-164. Retrieved from https://sloap.org/journals/index.php/irjeis/article/view/543

Moreira, M. P. S., Espinoza, L. A. V., Manzaba, F. D. M., & Chávez, L. L. R. (2021). Depression and anxiety in learning of children and adolescents. *International Research Journal of Engineering, IT & Scientific Research*, *7*(4), 107-115. https://doi.org/10.21744/irjeis.v7n4.1548

Oktarina, Z., & Sudiarti, T. (2013). Faktor risiko stunting pada balita (24—59 bulan) di sumatera. *Jurnal gizi dan pangan*, *8*(3), 177-180.

Raysita, N. (2013). Pengaruh proporsi tepung terigu dan tepung mocaf (modified cassava flour) terhadap tingkat kesukaan chiffon cake. *Jurnal Tata Boga*, *2*(2).

Ridoni, R., Radam, R., & Fatriani, F. (2020). Analisis kualitas madu kelulut (Trigona sp) dari Desa Mangkauk Kecamatan Pengaron Kabupaten Banjar. *Jurnal Sylva Scienteae*, *3*(2), 346-355.

Rosida, D. F. (2011). Reaksi Maillard: Mekanisme dan Peran Dalam Pangan dan Kesehatan. *Edisi Pertama. Yayasan Humaniora: Yogyakarta*.

Sahlan, M., Mahira, K. F., Wiratama, I., Mahadewi, A. G., Yohda, M., Hermansyah, H., & Noguchi, K. (2019). Purification and characterization of proteins in multifloral honey from kelulut bee (stingless bee). *Heliyon*, *5*(11), e02835. https://doi.org/10.1016/j.heliyon.2019.e02835

Saran, S., Gopalan, S., & Krishna, T. P. (2002). Use of fermented foods to combat stunting and failure to thrive. *Nutrition*, *18*(5), 393-396. https://doi.org/10.1016/S0899-9007(01)00790-0

Sartimbul, A., Iranawati, F., Sambah, A. B., Yona, D., Hidayati, N., Harlyan, L. I., ... & Fuad, M. A. Z. (2017). *Pengelolaan Sumberdaya Perikanan Pelagis di Indonesia*. Universitas Brawijaya Press.

Semba, R. D., de Pee, S., Sun, K., Sari, M., Akhter, N., & Bloem, M. W. (2008). Effect of parental formal education on risk of child stunting in Indonesia and Bangladesh: a cross-sectional study. *The lancet*, *371*(9609), 322-328. https://doi.org/10.1016/S0140-6736(08)60169-5

Semba, R. D., Shardell, M., Ashour, F. A. S., Moaddel, R., Trehan, I., Maleta, K. M., ... & Manary, M. J. (2016). Child stunting is associated with low circulating essential amino acids. *EBioMedicine*, *6*, 246-252. https://doi.org/10.1016/j.ebiom.2016.02.030

Solihin, R. D. M., Anwar, F., & Sukandar, D. (2013). Kaitan antara status gizi, perkembangan kognitif, dan perkembangan motorik pada anak usia prasekolah (relationship between nutritional status, cognitive development, and motor development in preschool children). *Nutrition and Food Research*, *36*(1), 62-72.

Wahyudi, R., & Maharani, E. T. W. (2017). Profil protein pada Ikan Tenggiri dengan variasi penggaraman dan lama penggaraman dengan menggunakan metode SDS-PAGE. In *Prosiding Seminar Nasional & Internasional*.

Yegge, M. A., Fauzi, N. A. M., Talip, B. A., Jaafar, M. B., Othman, M. B., Yaacob, M., ... & Ngajikin, N. H. (2021). Reduction in moisture content of dehumidified and microwave-heated stingless bee (Kelulut) honey and its quality. *Materials Today: Proceedings*, *42*, 75-79. https://doi.org/10.1016/j.matpr.2020.09.803

Analysis of Nutritional Value

ORIGINALITY REPORT

19%	17%	5%	2%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	www.researchgate.net Internet Source	11%
2	Evahelda, I Setiawan, S N Aini, Z L Afriani. "Chemical characteristics of kelulut honey (Trigona sp.) in Bangka Tengah District, Indonesia", IOP Conference Series: Earth and Environmental Science, 2021 Publication	1%
3	www.neliti.com Internet Source	1%
4	unsworks.unsw.edu.au Internet Source	1%
5	biotechnologyjournal.usamv.ro Internet Source	1%
6	jurnalbidankestrad.com Internet Source	1%
7	Submitted to Sogang University Student Paper	1%
8	Eva Yuliani, Muzakkir, Junaedi Yunding, Indrawati, Muhammad Irwan, Immawanti, Muspirah Djalal. "Age to start eating fish is a	1%

determinant factor of stunting in children age 25–60 months in Majene Regency, 2018", Enfermería Clínica, 2020
Publication

9	Kaniz Jannat, Md. Abdul Kader, Sarker Masud Parvez, Russell Thomson et al. "Faecal markers of intestinal inflammation in slum infants following yogurt intervention: A pilot randomized controlled trial in Bangladesh", Frontiers in Microbiomes, 2023 Publication	1 %
10	Nadimin, Veni Hadju, Suryani As'ad, Agussalim Bukhari, Andi Imam Arundhana, Imrawati. "A comparison between extract Moringa oleifera and iron tablet on prevention low birth weight in pregnant mothers in Makassar, Indonesia", Enfermería Clínica, 2020 Publication	1 %
11	link.springer.com Internet Source	1 %

Exclude quotes	On	Exclude matches	< 1%
Exclude bibliography	On		

Analysis of Nutritional Value

GRADEMARK REPORT

FINAL GRADE

/0

GENERAL COMMENTS

Instructor

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9