LUX MENSANA **Volume 3, Issue 4, 2024**
Hal. 382-391

Original Research Article

NUTRITIONAL CONTENT OF DRY NOODLES SUBSTITUTED WITH CHICKEN LIVER AND RED BEAN FLOUR AS A HIGH-Fe ALTERNATIVE

Wiwid Sulistyo Febiyanti[1)]*, Dian Ayu Ainun Nafies[2)]
[1,2)]Faculty of Health, Institute of Health Sciences Nahdlatul Ulama, Tuban, Indonesia
*Corresponding Author, E-mail : febiyanti067@gmail.com

ABSTRACT

Introduction. Anemia is a common nutritional problem in developing countries such as Indonesia with a prevalence of 48.9% in adolescent girls who are vulnerable to this condition. Anemia can cause serious health problems. Therefore, additional foods that can increase daily iron intake are needed. One of them is with dry noodles substituted with chicken liver flour and red bean flour. The purpose of this study was to determine the nutritional content of dry noodles substituted with chicken liver flour and red bean flour as a high Fe alternative. **Methods.** True Experimental Design using a completely randomized design (CRD) with 4 levels of treatment of chicken liver flour substitution and red bean flour, namely P0 (100:0:0), P1 (60:10:30), P2 (60:15:25), P3 (60:20:20). **Results&Analysis.** The results showed that there was an effect of increasing iron levels in dry noodles. The highest iron content was found in the P3 treatment, which used a substitution of 60% wheat flour, 20% chicken liver flour, and 20% red bean flour, with an iron content of 2.1 mg. **Discussion.** Dry noodles substituted with chicken liver flour and red bean flour have an effect on increasing iron (Fe) levels. The highest formula is found in formula P3 and the dried noodles have met the quality standards of dried noodles.

Keywords: Anemia, Chicken Liver Flour, Dried Noodles, Iron, Red Bean Flour.

INTRODUCTION

Anemia is one of the most common nutritional problems in the world, both in developed countries and in developing countries such as Indonesia (Paramita et al., 2022). Anemia can affect anyone, without exception adolescents who are still at an early age. Adolescent girls are an age group that needs to pay attention to their nutritional status because they need to prepare themselves for fertile age or preconception in order to realize 1000 HPK (First Day of Birth). Physical changes due to growth that occur will affect their health and nutritional status. (Maulida et al., 2021)

Based on data from the World Health Organization (WHO) in 2019, the prevalence of anemia in women of reproductive age (15-49 years) in the world is around 29.9%. Data in Indonesia itself reached a level of around 48.9%, with anemia sufferers aged 15-24 years with a percentage of 84.6%, age 23-54 years by 33.7%, age 35-44 years by 33.6%, and age 45-54 years by 24% (Riskesdas, 2018). The percentage of anemia in East Java itself is 42%, still below the national target of 28% (Paramita et al., 2022). Meanwhile, data from the Tuban Health Office in 2020 as many as (452) 0.28% of 157,527 adolescent girls aged 10-18 years experienced anemia,

and this figure is expected to increase every year if anemia is not overcome (Patty et al., 2023). Adolescent girls are one of the groups that are prone to anemia compared to young men. This is because adolescent girls experience menstruation every month, during menstruation blood will continue to come out which causes adolescents to lose iron an average of 20 mg per month so adolescents need iron (Fe) intake to help hemoglobin production in the body (Hestiningtyas et al., 2022). The problem of anemia in adolescent girls must be addressed immediately because otherwise, it can lead to high maternal mortality, incidence of low birth weight babies (LBW), and prenatal death (Meral et al., 2023).

Iron deficiency anemia can be prevented by adopting a good diet and ensuring the consumption of iron-rich foods. (Prihayati & Purwani, 2024). The use of domestically produced local food ingredients in product development can increase diversity and add nutritional quality to the product. Local food ingredients that can be used to increase Fe content are chicken liver and kidney beans.

Chicken liver is one of the organs that includes waste or by-products that have high nutrient content compared to liver sourced from other livestock. The iron content in chicken liver is 15.8 mg per 100 g which is higher than beef liver which only has an iron content of 4 mg per 100 g (Sunarto et al., 2023). Chicken liver is a good source of heme iron is easily found in the community and has a higher bioavailability rate than iron sources from vegetables. (Amertaningtyas et al., 2023).

Red bean is one of the legumes with good production in Indonesia. Red kidney beans have a relatively short shelf life and therefore need to be ground. Kidney beans rank high on the list of foods that contain iron compared to other types of beans. (Rhodiyah et al., 2024). The iron content of kidney beans is higher at 10.3 mg per 100 g, compared to mung beans which only have an iron content of 7.5 mg per 100 g (TKPI, 2020). Kidney beans contain iron which can help the formation of red blood cells and prevent anemia in adolescents. 10 grams or 1 cup of kidney beans can increase hemoglobin levels. (Bakara et al., 2024).

Fulfillment of intake in adolescents can be given food in the form of dried noodles to fulfill the intake of minerals, vitamins, and iron. Dry noodles are one type of noodle that has been popular in all circles including adolescents because of their ease of consumption (Hestiningtyas et al., 2022). Dry noodles are made through a drying process and have a long shelf life of about 6-12 months and can maintain good color intensity when stored (N.F. et al., 2023) One of the food alternatives that can increase the iron (Fe) content in dry noodles is by adding or substituting chicken liver flour and red bean flour into the making of dry noodles.

Based on this description, it is necessary to develop a dry noodle product substituting chicken liver flour and red bean flour to increase the nutritional content of dry noodles, so that it is expected to be utilized as an alternative food to meet

nutritional needs, especially iron in adolescent girls, so a study was made entitled “Nutritional content of dry noodles substituted with chicken liver flour and red bean flour as a high Fe alternative”.

METHOD AND ANALYSIS

This study uses the True Experimental Design method by controlling all external variables that can affect (Rauf et al., 2022). Experimental research to test the effect of the substitution of chicken liver flour and red bean flour on the Fe content of dry noodles. Determination of the formulation in this study there are 4 levels of treatment of chicken liver flour substitution and red bean flour, which are as follows:

P0 = 100% wheat flour: 0% chicken liver flour: 0% red bean flour

P1 = 60% wheat flour: 10% chicken liver flour: 30% red bean flour

P2 = 60% wheat flour: 15% chicken liver flour: 25% red bean flour

P3 = 60% wheat flour: 20% chicken liver flour: 20% red bean flour.

The research was conducted in May-July 2024 at the Culinary and Food Processing Laboratory of the Bachelor of Nutrition Program, Nahdlatul Ulama Institute of Health Sciences, Tuban during the product manufacturing process. Meanwhile, testing of nutritional content and iron (Fe) was carried out at the Chemistry Laboratory, Faculty of Science and Mathematics, Satya Wacana Christian University.

The tools used in making dry noodles substituted with chicken liver flour and red bean flour include an electric oven, mixer, basin, noodle maker, baking sheet, spoon. While the tools used for chemical analysis consist of scales, petri dishes, ovens, hot plates, furnaces, measuring flasks, test tubes, and vortices. The ingredients used in making dry noodles are wheat flour, chicken liver flour, red bean flour, tapioca flour, chicken eggs, salt, coconut oil, and water.

The first procedure is flour making and then dry noodle making. The process of making dry noodles starts with the preparation of ingredients. After that, all ingredients are mixed for 15-20 minutes until the dough becomes smooth. Then, the dough is flattened into sheets with a final thickness of 2 mm. The sheets are then cut using a noodle maker to form strands of noodles. Next, the noodles were molded in a 5 cm diameter pan and steamed at 100°C for 10 minutes. After that, the noodles were dried in an electric oven for 3 hours at 60°C. Finally, the noodles were removed and cooled for 15 minutes at room temperature. Before the favorability test, the finished dried noodles were boiled for 3 minutes at 100°C.

After the noodle-making process is complete, the next step is to conduct testing to assess the quality and nutritional content of the noodles. This test includes calorie, protein, fat, carbohydrate, water, ash, and iron (Fe) levels. The data collection method used is an objective assessment carried out using laboratory tests to determine the

calorie content, protein, fat, carbohydrates, water, ash, and iron (Fe) levels contained in dry noodles substituted with chicken liver flour and red bean flour. ur. Proximate analysis included calorie measurement using the bomp calorimeter method, protein using the Kjehldal method, fat using the Soxhlet method, carbohydrate content using the Antron method, water content using the moiture analyzer method, and ash content using the furnis method (Halder et al., 2023). For laboratory tests of iron (Fe) content using the HACH spectrophotometer method, the mineral content is determined using a linear equation (Khofifah et al., 2023).

Figure 1. Dry Noodles Substituted with Chicken Liver Flour and Red Bean Flour

RESULT

In this study, researchers chose untrained panelists from the community of Sumurgung village, Palang sub-district as many as 30 people with female gender. In this study, the age range of panelists was 16-18 years.

Calorie Content

Based on the results of the calorie content test of dry noodles with substitutions of chicken liver flour and red bean flour, the highest calorie content is in treatment P1 (417.5 kcal) with a wheat flour formulation of 60% chicken liver flour 10% and red bean flour 30% and the lowest calorie content test results are in treatment P2 (355.04 kcal) with a wheat flour formulation of 60% chicken liver flour 15% and red bean flour 25%.

Table 1. Results of Nutrient Analysis of Dry Noodles Substituted with Chicken Liver Flour and Red Bean Flour

Nutrient Content	Dry Noodles Substituted with Chicken Liver Flour and Red Bean Flour			
	P0	P1	P2	P3
Calories (kcal)	417.15	417.5	355.04	361.13
Protein (g)	15.73	15.11	7.76	8.18
Fat (g)	7.91	9.19	9.44	10.25
Carbohydrate (g)	70.76	68.61	59.76	59.04
Water (%)	3.65	7.75	4.00	7.76
Ash (%)	1.84	2.02	3.03	2.08

Protein Content

Based on the results of the protein content test, the highest protein content was found in the P1 treatment, which amounted to 15.11 g/100 g, while the lowest protein content was in the P2 dry noodles with a protein content of 7.76 g/100 g. The protein content of the dry noodles was the highest in the P1 treatment.

Fat Content

Based on the results of the protein content test, dry noodles substituted with chicken liver flour and red bean flour have higher fat content compared to dry noodles without substitution. In the treatment group, the fat content of dry noodles formula P3 ranks the highest at 10.25 g/100 g, while the lowest fat content is in dry noodles formula P1 with a fat content of 9.18 g/100 g. The highest fat content is in dry noodles formula P3 with a fat content of 9.18 g/100 g.

Carbohydrate Content

Based on the results of the analysis of carbohydrate content in dry noodles substituted with chicken liver flour and red bean flour, there is a significant difference, the highest carbohydrate content is found in the P1 treatment which is 68.61 g/100 g and the treatment that has the lowest carbohydrate content is in the P3 treatment with a carbohydrate content of 59.04 g/ 100g.

Water Content

Based on the results of the analysis of water content in dry noodles with substitutions of chicken liver flour and red bean flour that have been boiled, the highest water content is found in the P3 treatment, which is 7.76%/100 g, while the treatment that has the lowest ash content is found in the P2 treatment at 4%/100 g.

Ash Content

Based on the results of the analysis, the highest ash content was found in the P2 treatment, which amounted to 3.03%/100 g while the treatment with the lowest ash content was found in the P1 treatment, which amounted to 2.02%/100 g.

Iron (Fe) Content

Table 2. Results of Analysis of Iron (Fe) Content of Dry Noodles Substituted with Chicken Liver Flour and Red Bean Flour

Treatment of Dry Noodles Substituted with Chicken Liver Flour and Red Bean Flour	Iron (Fe) Content
P0	1.1 mg
P1	1.2 mg
P2	1.9 mg
P3	2.1 mg

Based on the analysis of iron (Fe) levels in dry noodles that have gone through the boiling process have higher iron (Fe) levels than dry noodles without substitution. In the treatment group, the highest iron (Fe) content was found in the P3 treatment which amounted to 2.1 mg/100 g and the treatment that had the lowest iron (Fe) content was found in the P1 treatment at 1.3 mg/100 g.

DISCUSSION

Calorie Content

Based on the calorie content analysis in Table 1, the cause of the high calorie content in dry noodles substituted with chicken liver flour and red bean flour is due to the content of macronutrients such as protein, fat, and carbohydrates. Among the three macronutrients, protein has the highest contribution to caloric value in treatment P1 which causes high calorie content. The results of this study are in line with previous research conducted by Khairiah dan Juliana (2023) which states that the most influential factors on energy are the content of protein, fat, and carbohydrates in the product so that the greater the content of protein, fat, and carbohydrates, the greater the energy produced, where the energy value is directly proportional to the content of protein, fat, and carbohydrates in the product.

Protein Content

Based on the analysis of protein content in Table 1, the decrease in protein content occurs due to the repeated heating process during flour making until it becomes dry noodles, which results in protein denaturation. In the early stages of flour making, repeated heating is carried out from the boiling process to grinding using a blender, which causes heating in the

grinding machine and results in a denaturation process so that protein levels decrease. The results of this study are in line with previous research conducted by Situmorang (2024) which states that the higher the addition of chicken liver flour, the more protein levels will decrease or decrease in chicken liver and moringa leaf-based meatball products due to denaturation. According to research from Quintieri et al (2023) states that proteins are very sensitive to physical influences, chemicals, and heating so that they easily change shape or denaturation. Causes of denaturation include heat, pH, pressure, electricity, and the presence of chemicals so that the heating process greatly affects protein quality.

Fat Content

Based on the analysis of fat content in Table 1, the high fat content is due to the high composition of chicken liver flour with high fat content and the addition of red bean flour. This resulted in higher fat content compared to the treatment with less chicken liver flour. The results of this study are in line with the research conducted by Sunarto et al (2023) which states that the higher the percentage of chicken liver flour addition, the higher and higher the fat content in biscuits.

Carbohydrate Content

Based on the analysis of carbohydrate content in Table 1, the cause of high and low carbohydrate content in dry noodles is because the carbohydrate content in red bean flour is higher than the carbohydrate content in chicken liver flour. The results of this study are in line with previous research conducted by Annisa and Suryaalamsah (2023) which states that the less the ratio of wheat flour in cookies substituted with chicken liver flour, the lower the carbohydrate content of the cookies, the study also states that the carbohydrate content in wheat flour is high compared to chicken liver flour. According to Cahyani's theory (2022) in 100 g of wheat flour contains 77.3 g of carbohydrates, while red bean flour is 64.16 g/100 g of material, and most of the carbohydrates in red beans are starch.

Water Content

Based on the analysis of water content in table 1, water content is influenced by the ingredients used because each ingredient has different properties towards the ability to bind water and the results of research on dry noodles substituted with chicken liver flour and red bean flour that have been boiled show an increase in water content. The results of the study are in line with research conducted by Rohmalia and Dainy (2023) explaining that the addition of the proportion of chicken liver flour also affects the moisture content of wet noodle products. The results of the study were strengthened by research conducted by Hastuti et al (2023) which also explained that water content tends to increase with increasing ratios of red bean flour in tortillas. This is because red bean flour contains quite high water content, which is 20% higher than the water content of wheat flour, which is 14%.

Ash Content

Based on the ash content analysis in Table 1, the ash content increased along with the increase in the ratio of chicken liver flour and kidney bean flour substitution. In addition, according to the research mentioned above, this study shows that the high ash content in dried noodle products is also influenced by the high iron (Fe) mineral content in dried noodles so that the ash content increases. The results of the study are in line with research conducted by Permatasari et al (2020), which stated that the ash content of instant baby porridge showed that the higher the concentration of red bean flour in instant baby porridge, the higher the ash content. Reinforced by research by Annisa and Suryaalamsyah (2023) stated that high ash content was also influenced by the addition of chicken liver flour because chicken liver stored several minerals such as iron and zinc which caused high ash content in hedonic chicken liver of 1.6%.

Iron Content

Based on the analysis of iron content in Table 2, the increase in iron (Fe) content occurs when the proportion of chicken liver flour in dry noodles increases because chicken liver flour has a higher Fe content. The results obtained are in accordance with the supporting theory which states that the addition of chicken liver flour and red bean flour can have an effect on increasing iron (Fe) levels in dry noodles that have gone through the boiling process, the facts produced are also appropriate, namely an increase in iron (Fe) levels in dry noodles. Increased iron in the product will be able to help donate iron (Fe) to the body, especially in adolescents.

The results of the study are in line with research conducted by Annisa and Suryalaamsyah (2023) explaining that the more the composition of chicken liver flour added in cookies, the more iron content so that iron levels in cookies can increase significantly. According to the theory of Prawira et al (2018) chicken liver flour contains Fe of 17 mg/100 g, and the Fe content of red bean flour is 10 mg/100 g, while the Fe content of wheat flour is only 1.2 mg/100 g.

Recommendation for Provision

Based on the dry noodle research, the highest Fe content is found in dry noodles with formula P3 with a substitution of 20% chicken liver flour and 20% red bean flour which contains Fe content of 2.1 mg/100g. Based on the analysis results, dry noodles formula P3 has fulfilled all the quality requirements set out in the Indonesian National Standard (SNI) 8217:2015 for dry noodle products. The protein content in dry noodle formula P3 reached 8.18% per 100 g, exceeding the minimum limit required by SNI. In addition, its water content of 7.76% per 100 g is below the permitted range, and its ash content of only 2.08% per 100 g is far below the maximum limit set. Thus, it can be concluded that dry noodles formula P3 has fulfilled all the quality criteria specified in the SNI.

The need for iron in adolescent girls aged 16-18 according to the AKG (2019) is

15 mg, in boiled dry noodles formula P3 contains iron levels of 2.1 mg/100 g, so that by consuming 1 serving of dry noodles per day which is consumed 100 g per meal can meet the daily iron requirement of 14% and for the daily requirement for iron in the main food is 20-25%. To meet the daily Fe requirement for adolescent girls, consumption of about 1 ½ servings of dried noodles with P3 formula that has been boiled (150 g) can meet up to 105% of the Fe requirement and balanced with the consumption of Blood Addition Tablet (TTD) supplements and other sources of iron when consuming dried noodles, such as side dishes, vegetables, and fruits so that iron (Fe) can meet the nutritional adequacy rate (AKG).

CONCLUSION AND SUGGESTION

Conclusion

The use of chicken liver flour and red bean flour in dry noodles has an effect on increasing iron (Fe) levels with formula P3 having the highest iron levels. The dried noodles in formula P3 contain 2.1 mg of iron which can meet the daily iron (Fe) requirement of 105% in adolescent girls by consuming 1 ½ servings (150 g) and the dried noodles have met the quality standards of dried noodles.

Suggestion

It is hoped that further research can be carried out regarding the nutritional content analyzed through laboratory tests. In addition, it is hoped that further research can be carried out by substituting food ingredients that have high protein content or vitamin C along with heme iron.

REFERENCES

Annisa, S. N., & Suryaalamsah, I. I. (2023). Formulasi cookies dari tepung hati ayam dan tepung kedelai sebagai makanan sumber zat besi pencegah anemia pada remaja putri. *Muhammadiyah Journal of Nutrition and Food Science (MJNF)*, *4*(1), 14-27. https://doi.org/10.24853/mjnf.4.1.14-27

Amertaningtyas, D., Mu'tashim, F., & Chamidah, L. R. (2023). Quality of chicken liver nuggets to the addition of spinach flour from fat content, p content and ash content. *Developing Modern Livestock Production in Tropical Countries*, 39–43. https://doi.org/10.1201/9781003370048-10

Bakara, T. L., Julianti, E., Sinaga, H., & Lubis, Z. (2024). Utilization of composite flour (red bean, catfish, oyster mushroom and tempeh formula flour) in making cookies. *IOP Conference Series: Earth and Environmental Science*, *1302*(1), 12093. https://doi.org/10.1088/1755-1315/1302/1/012093

Halder, S., Nandi, S., & Chatterjee, A. (2023). Proximate Analysis, Functional and Sensory Evaluation of Buckwheat and Water Chestnut Composite Flour. *International Journal of Science and Research (IJSR)*, *12*(9), 718–721. https://doi.org/10.21275/sr23905190103

Hastuti, W., Aminah, M., Mulyo, G. P. E., Amelia, S., Khoerunnisa, A., & Aeni, M. N. (2023). Potential Local Food Material Based On Flour (Catfish, Red Beans, And Kepok Banana) As An Alternative Snack For Young Women With Anemia. *International Conference On Interprofessional Health Collaboration And Community Empowerment*, *4*(1), 154–159. https://doi.org/10.34011/icihcce.v4i1.235

Hestiningtyas, K. A., Wardani, H. E., & Kurniawan, A. (2022). Proximate

Analysis of Noodles with Substitution of Jackfruit Seed Flour and Branch Flour as Alternative Food for Diabetes Patients. *Advances in Health Sciences Research*. https://doi.org/10.2991/ahsr.k.220108.017

Khairiah, R., & Juliana. (2023). Efektivitas Bahan Pangan Lokal (Tepung Sagu, Tepung Kacang Merah, Dan Sari Buah Merah) Sebagai Bahan Dasar Pemberian Makanan Tambahan Ibu Hamil Kekurangan Energi Kronis Terhadap Peningkatan Berat Badan Ibu Hamil Kekurangan Energi Kronis. *Jurnal Ilmiah Keperawatan (Scientific Journal of Nursing)*, *9*(3), 117–123. https://doi.org/10.33023/jikep.v9i3.1597

Khofifah, N. A., Nafilah, N., & Siska, S. (2023). The Effect of Substitution of Soy Tempe Flour and Mung Bean Flour on Biscuits PMT for Stunting in Aged 6 – 59 Months. *Nutriture Journal*, *2*(2), 124. https://doi.org/10.31290/nj.v2i2.3872

Maulida, F., Setiarini, A., & Achadi, E. L. (2021). Evaluation of The Implementation of Fe Tablets for Adolescent Girl in 2019 at Pekanbaru City. *Amerta Nutrition*, *5*(2), 19. https://doi.org/10.20473/amnt.v5i2sp.2021.19-29

Meral, R., Kutlu, N., Alav, A., & Kılınççeker, O. (2023). The possibilities of using quinoa flour in the production of chicken meat patties. *Journal of the Hellenic Veterinary Medical Society*, *73*(4), 5031–5038. https://doi.org/10.12681/jhvms.29784

N.F., A. N. R., Hartati, F. K., & Hariyani, N. (2023). Chemical and Organoleptic Quality of Free-Gluten Dry Noodles from Sorghum (Sorghum bicolor) and Modified Cassava Flour with Different Drying Temperature. *SAGA: Journal of Technology and Information System*, *1*(3), 64–71. https://doi.org/10.58905/saga.v1i3.69

Paramita, B. L., Sahubawa, L., & Ratnawati, S. E. (2022). Physicochemical Properties and Sensory Evaluation of Wheat-Mocaf-Based Dried Noodles Enriched with Catfish Bone Flour (Clarias sp.). *Indonesian Food and Nutrition Progress*, *18*(2), 60. https://doi.org/10.22146/ifnp.68032

Patty, M. D., Murtini, E. S., & Putri, W. D. R. (2023). Physicochemical Characteristics Of Starch Noodles Based On Sorghum Flour (Sorghum Bicolor L. Moench) And Sago Flour (Metroxylon Sp). *Jurnal Pangan Dan Agroindustri*, *11*(3), 147–157. https://doi.org/10.21776/ub.jpa.2023.011.03.5

Prihayati, D. A., & Purwani, E. (2024). The Effect of Composite Flour Composition (Sorghum, Mocaf, and Wheat) on the Elongation, Tensile Strength, and Acceptance of Noodles. *The 7th Mechanical Engineering, Science and Technology International Conference*. https://doi.org/10.3390/engproc2024063017

Quintieri, L., Nitride, C., Angelis, E. De, Lamonaca, A., & ... (2023). Alternative protein sources and novel foods: benefits, food applications and safety issues. *Nutrients*. https://www.mdpi.com/2072-6643/15/6/1509

Rauf, S., Manjilala, M., Nursalim, N., Mustamin, M., & Azisah, N. (2022). COOKIES SUBSTITUSI TEPUNG BAYAM MERAH DAN TEPUNG KACANG TOLO SEBAGAI MAKANAN TAMBAHAN REMAJA PUTRI ANEMIA Cookies substitution of red spinach flour and cowpea flour as complementary food of anemic adolescent girls. *Media Gizi Pangan*, *29*(2), 90. https://doi.org/10.32382/mgp.v29i2.3117

Rhodiyah, A. N., Christyaningsih, J., Wijayanti, E. J., & Intiyati, A. (2024). Acceptance Test and Iron Content Test Churros Formulation of RALE Flour (Red Beans and Soybeans) as an Alternative Snack to Prevent Anemia for Teenage Girls. *Journal of Nutrition Explorations*, *1*(4), 165–173. https://doi.org/10.36568/jone.v1i4.28

Situmorang, B. (2024). Formulasi Dan Analisis Kandungan Zat Gizi Bakso Berbasis Hati Ayam Dan Daun Kelor (Moringa Oleifera) Sebagai Pangan Sumber Zat Besi Bagi Remaja Putri Pada Masyarakat Pesisir Di Desa Mela Ii Kecamatan Tapian Nauli Kabupaten

Tapanuli Tengah Tahun 2023. *Sinergi: Jurnal Riset Ilmiah*, *1*(7), 571-576. https://doi.org/10.62335/6ej86d10

Sunarto, S., Hendrayati, H., & Siska, A. (2023). Acceptance And Iron Levels Of Chicken Liver Nuggets With Spinach Combination And Soybean Flour. *Media Gizi Pangan*, *30*(1), 68. https://doi.org/10.32382/mgp.v30i1.3072

World Health Organization (WHO). (2019). *Global Health Observatory Data Repository: Prevalence of Anaemia in Women Estimates by Country*. World Health Organization. Geneva, Switzerland.