Papua Medicine and Health Science (PMHS)
Volume 3, Nomor 1, 2026
https://jurnal.fk-unipa.com/index.php/PMHS

Acceptability, Protein Content, and Iron Content of Red Bean Spread Supplemented with Mung Beans

Nur Ifti Hatim[1*], Hendrayati[2], Retno Sri Lestari[3]

[1,2,3] Program Studi Profesi Dietisieni, Politeknik Kesehatan Kementerian Kesehatan Makassar, Sulawesi Selatan, Indonesia

ARTICLE INFO

Article history

Received: 18 August 2025
Revised: 05 December 2025
Accepted: 25 June 2026

Keywords:

Acceptability, Red Bean Spread, Mung Beans, Protein, Iron, Adolescent Girls' Nutrition

ABSTRACT/ ABSTRAK

ABSTRACT. *Stunting, a growth disorder caused by chronic malnutrition, remains a major public health challenge in Indonesia. According to the 2023 Indonesian Health Survey, the prevalence of stunting reached 21.5% nationally and 32% in South Sulawesi Province. The development of nutritious local foods rich in protein and iron is one strategy to support stunting prevention during adolescence. This study aimed to analyze the acceptability, protein content, and iron (Fe) content of red bean spread supplemented with mung beans as an alternative nutritious food for adolescent girls. This experimental study evaluated four formulations: F0 (100% red beans), F1 (50% red beans and 50% mung beans), F2 (75% red beans and 25% mung beans), and F3 (25% red beans and 75% mung beans). Acceptability testing was conducted using a hedonic test involving 50 semi-trained panelists, while protein and iron analyses were performed on the selected formulation. Formulation F2 was identified as the best formulation, with the highest acceptability score (590), containing 2.05% protein and 8.6896 µg/g iron. Red bean spread supplemented with mung beans has the potential to be developed as an alternative local food to support the nutritional requirements of adolescent girls and contribute to anemia and stunting prevention efforts.*

Kata kunci:

Daya Terima, Selai Kacang Merah, Kacang Hijau, Protein, Zat Besi, Gizi Remaja Putri

ABSTRAK. Stunting merupakan masalah pertumbuhan akibat kekurangan gizi kronis yang masih menjadi tantangan kesehatan masyarakat di Indonesia. Berdasarkan Survei Kesehatan Indonesia tahun 2023, prevalensi stunting mencapai 21,5% secara nasional dan 32% di Provinsi Sulawesi Selatan. Pengembangan pangan lokal bergizi yang kaya protein dan zat besi merupakan salah satu upaya pencegahan stunting sejak masa remaja. Penelitian ini bertujuan menganalisis daya terima serta kandungan protein dan zat besi (Fe) pada selai kacang merah dengan penambahan kacang hijau sebagai alternatif pangan bergizi bagi remaja putri. Penelitian eksperimental ini menggunakan empat formulasi selai, yaitu F0 (100% kacang merah), F1 (50% kacang merah dan 50% kacang hijau), F2 (75% kacang merah dan 25% kacang hijau), dan F3 (25% kacang merah dan 75% kacang hijau). Uji daya terima dilakukan pada 50 panelis semi terlatih menggunakan uji hedonik, sedangkan analisis protein dan zat besi dilakukan pada formula terpilih. Formula F2 merupakan formulasi terbaik dengan skor kesukaan tertinggi (590) serta mengandung protein sebesar 2,05% dan zat besi sebesar 8,6896 µg/g. Selai kacang merah dengan penambahan kacang hijau berpotensi dikembangkan sebagai pangan lokal alternatif untuk mendukung pemenuhan kebutuhan gizi remaja putri serta upaya pencegahan anemia dan stunting.

Corresponding Author:
Nur Ifti Hatim
Program Studi Profesi Dietisieni, Politeknik Kesehatan Kementerian Kesehatan Makassar, Sulawesi Selatan, Indonesia
Email: nuriftihatim28@gmail.com

INTRODUCTION

Stunting is a chronic nutritional problem characterized by a child's length or height being below the standard for their age due to prolonged nutritional deficiencies. This condition primarily occurs during the first 1,000 days of life, from pregnancy until a child reaches two years of age. Stunting not only affects physical growth but also impairs cognitive development, reduces productivity, and increases the risk of degenerative diseases in adulthood. Globally, approximately 148 million children under five were stunted in 2022, making this condition one of the major public health challenges in many developing countries (WHO, 2023).

In Indonesia, the prevalence of stunting remains a public health concern despite showing a declining trend. According to the 2023 Indonesian Health Survey, the national prevalence of stunting reached 21.5%. South Sulawesi Province is one of the regions where the prevalence of stunting remains above the national average, reaching 32%. The high prevalence of stunting is influenced by various factors, including inadequate nutrient intake, limited access to nutritious foods, and insufficient public knowledge regarding the importance of adequate nutrition during growth. Therefore, continuous stunting prevention efforts through a life-course nutritional approach are essential.

One of the key strategies for stunting prevention is improving the nutritional status of adolescent girls as future mothers. The nutritional status of adolescent girls affects their reproductive health and future pregnancy outcomes. Several studies have shown that adolescent girls continue to face significant nutritional problems, particularly anemia and chronic energy deficiency (CED). Handayani (2024) reported that the prevalence of anemia among adolescent girls reached 41.4%, accompanied by a high prevalence of malnutrition. Deficiencies in protein, iron, and other essential micronutrients, such as vitamin B6 and vitamin C, may increase the risk of anemia and CED, which ultimately affect maternal health and increase the risk of stunting in the next generation (Muliani, 2022). Moreover, most adolescent girls have been reported to have inadequate iron intake, highlighting the need to increase the consumption of nutritious foods rich in protein and iron.

One approach to improving nutrient intake among adolescent girls is the development of nutritious local foods. The utilization of local food resources not only contributes to improving community nutritional quality but also supports food security and the sustainability of local resources (Gardiarini et al., 2021; Kariani et al., 2024). The development of functional foods based on local ingredients has been widely explored to meet the energy, protein, and essential micronutrient requirements of vulnerable populations, including adolescent girls (Darawati et al., 2016; Arinda et al., 2025). One potentially promising product is spread because it is practical, easy to consume, favored by various age groups, and can serve as a vehicle for fortifying essential nutrients (Rotua et al., 2024).

Red beans (*Phaseolus vulgaris* L.) are local food commodities containing approximately 23% protein and are rich in carbohydrates, dietary fiber, and essential minerals such as iron, calcium, and phosphorus (Fonseca et al., 1974; Iqbal et al., 2012; Utami et al., 2024). In addition, red beans contain bioactive compounds, such as flavonoids, which act as antioxidants (Utami et al., 2024). Meanwhile, mung beans (*Vigna radiata* L.) are recognized as a good source of plant-based protein and contain iron, calcium, phosphorus, and B-complex vitamins that play important roles in growth, cognitive function, and hemoglobin formation (Hayat et al., 2014). The high protein and iron contents of these two legumes make them potential ingredients for the development of functional foods to help meet the nutritional requirements of adolescent girls.

Several studies have demonstrated that the incorporation of legumes into food products can increase protein and iron contents while maintaining good consumer acceptability. Red bean-based food products have been reported to enhance protein and iron contents and exhibit good acceptability in terms of color, aroma, taste, and texture (Putri et al., 2023; Ghassani et al., 2023). Likewise, mung beans have been shown to be effective in increasing hemoglobin levels due to their relatively high iron content (Lubis et al., n.d.; Unyil & Fitriani, 2024). However, studies on the development of spreads based on a combination of red beans and mung beans, particularly those evaluating acceptability, protein content, and iron content, remain limited.

Therefore, this study aimed to analyze the acceptability, protein content, and iron content of red bean spread supplemented with mung beans as an alternative nutritious local food that may support anemia prevention and stunting prevention efforts among adolescent girls.

RESEARCH METHOD

This laboratory experimental study aimed to develop formulations of red bean spread supplemented with mung beans and to analyze the product's acceptability, protein content, and iron (Fe) content. The study was conducted in June 2025 at the Organoleptic Laboratory of the Department of Nutrition, Makassar Health Polytechnic of the Ministry of Health, and the Makassar Central Health Laboratory.

The study was conducted in three stages. The first stage involved the formulation of red bean spread supplemented with mung beans. Product formulations were determined using a trial and error approach by the researchers. Four formulations were developed: F0 (100% red beans and 0% mung beans), F1 (50% red beans and 50% mung beans), F2 (75% red beans and 25% mung beans), and F3 (25% red beans and 75% mung beans). The ingredients used in each formulation consisted of red beans, mung beans, glutinous rice flour, sugar, salt, and coconut oil.

The second stage involved organoleptic testing to determine the best formulation. The organoleptic evaluation included hedonic and hedonic quality tests conducted by 50 semi-trained panelists who were students of the Nutrition Study Program at Makassar Health Polytechnic of the Ministry of Health. The number of panelists was based on the Indonesian National Standard (SNI) 01-2346-2006, which recommends the use of 30-50 semi-trained panelists.

The inclusion criteria for the panelists were being in good health, having no allergies to the ingredients used in the spread, having no taste or olfactory disorders, and not being excessively hungry or full during the evaluation. All panelists received an explanation of the study objectives and procedures and voluntarily agreed to participate in the study.

The hedonic test assessed the panelists' preferences for color, aroma, taste, and texture using a four-point hedonic scale: 1 (dislike), 2 (slightly like), 3 (like), and 4 (strongly like). The best formulation was determined using the Exponential Comparison Method (ECM) based on the total preference scores of the panelists.

The third stage involved nutritional analysis of the selected formulation, including protein and iron (Fe) contents. Nutritional analyses were performed at the Makassar Central Health Laboratory following the standard procedures and methods applied by the laboratory.

Data obtained from the organoleptic tests were analyzed using IBM SPSS version 25. Univariate analysis was performed descriptively and presented as means and standard deviations. Data normality was assessed using the Shapiro-Wilk test. Normally distributed data were analyzed using one-way ANOVA followed by Duncan's post hoc test, whereas non-normally distributed data were analyzed using the Kruskal-Wallis test followed by the Mann-Whitney test. A p-value of <0.05 was considered statistically significant.

The equipment used for spread preparation included a frying pan, spatula, bowls, a blender, spoons, a digital scale, and a food strainer. The equipment used during the acceptability test included questionnaires, stationery, sample labels, plastic containers, and mineral water as a palate cleanser. The ingredients used for preparing the spread consisted of red beans, mung beans, glutinous rice flour, sugar, salt, and coconut oil.

RESULTS

The preparation of red bean spread supplemented with mung beans began with soaking the beans overnight, followed by boiling until soft and cooling to room temperature. The beans were then blended and filtered to obtain a smooth texture. Subsequently, the bean paste was reheated with the addition of granulated sugar, coconut oil, salt, and glutinous rice flour solution until a homogeneous and smooth spread was obtained.

Table 1. Formulations of Red Bean Spread Supplemented with Mung Beans

Ingredients	Ingredient Weight			
	F0	**F1**	**F2**	**F3**
Red beans	100	50	75	25
Mung beans	0	50	25	75
Glutinous rice flour	15	15	15	15
Sugar	50	50	50	50
Salt	1	1	1	1
Coconut oil	15	15	15	15

Source: Primary data, 2025.

Table 2. Hedonic Test Results of Red Bean Spread Supplemented with Mung Beans

Parameter	Formulation	Mean	p-value
Color	F0	2.88 ± 0.10	0.024*
	F1	2.56 ± 0.11	
	F2	3.02 ± 0.15	
	F3	2.66 ± 0.12	
Aroma	F0	2.50 ± 0.11	0.210
	F1	2.62 ± 0.12	
	F2	2.84 ± 0.14	
	F3	2.78 ± 0.11	
Taste	F0	2.88 ± 0.09	0.370
	F1	2.88 ± 1.13	
	F2	3.08 ± 0.12	

	F3	3.06 ± 0.13	
Texture	F0	2.44 ± 0.14	0.090
	F1	2.84 ± 0.11	
	F2	2.86 ± 0.15	
	F3	2.82 ± 0.13	

Source: Primary data, 2025.

Based on Table 2, the hedonic test results showed that the mean preference scores for color ranged from 2.56 to 3.02, aroma from 2.50 to 2.84, taste from 2.88 to 3.08, and texture from 2.44 to 2.86. The highest scores for all sensory attributes were obtained by formulation F2.

The results of the Kruskal-Wallis test indicated that only the color attribute differed significantly among the formulations ($p = 0.024$), whereas aroma ($p = 0.210$), taste ($p = 0.370$), and texture ($p = 0.090$) showed no significant differences ($p > 0.05$). Therefore, further analysis using the Mann-Whitney test was performed for the color attribute.

Table 3. Mann-Whitney Test Results for the Color Attribute

Formulation Comparison	p-value	Interpretation
F0 vs F1	0.049	Significant difference
F0 vs F2	0.252	Not significant
F0 vs F3	0.175	Not significant
F1 vs F2	0.008	Significant difference
F1 vs F3	0.612	Not significant
F2 vs F3	0.036	Significant difference

Source: Primary data, 2025.

Based on Table 3, significant differences in color preference were observed between formulations F0 and F1 ($p = 0.049$), F1 and F2 ($p = 0.008$), and F2 and F3 ($p = 0.036$). In contrast, no significant differences were found between formulations F0 and F2, F0 and F3, or F1 and F3 ($p > 0.05$). These findings indicate that formulation F2 tended to be more preferred in terms of color than the other formulations.

Table 4. Determination of the Best Formulation Based on Preference Scores

Product	Score				
	Color	Aroma	Taste	Texture	Total
Formula 0	144	125	144	122	535
Formula 1	128	131	144	142	545
Formula 2	151	142	154	143	590
Formula 3	133	139	153	141	566

Source: Primary data, 2025.

Based on Table 4, formulation F2, consisting of red bean spread supplemented with mung beans at a ratio of 75%:25%, was identified as the best formulation, obtaining the highest total preference score of 590. Formulation F2 demonstrated better acceptability in terms of color, aroma, taste, and texture than the other formulations.

Table 5. Protein and Iron (Fe) Contents of Red Bean Spread Supplemented with Mung Beans per 100 g

Nutrient	Laboratory Analysis	IFCT Calculation
Protein (%)	2.05	23.6
Iron (Fe) (µg/g)	8.6896	10.2

Source: Primary data, 2025.

Based on Table 5, laboratory analysis showed that formulation F2 contained 2.05% protein and 8.6896 µg/g iron (Fe). Compared with the values calculated using the Indonesian Food Composition Table (IFCT), the laboratory-determined protein content was lower than the calculated value (2.05% vs. 23.6%). Similarly, the laboratory-determined iron content was lower than the calculated value based on the IFCT (8.6896 µg/g vs. 10.2 µg/g).

DISCUSSION

Acceptability

The acceptability of a food product is influenced by various sensory attributes, including color, aroma, taste, and texture, which are subjectively evaluated by panelists. Acceptability testing is essential to determine consumers' acceptance of a newly developed product (Suryani et al., 2020). In the present study, formulation F2 (75% red beans and 25% mung beans) exhibited the highest acceptability scores across all sensory attributes compared with the other formulations.

The color attribute showed a significant difference among the formulations ($p = 0.024$), with the highest mean score observed for formulation F2 (3.02). The high acceptability of the color in formulation F2 was likely attributable to the higher proportion of red beans, which produced a more appealing and consistent color. Red beans contain anthocyanin pigments that contribute to the color formation of food products. This finding is consistent with the study by Lestari et al. (2020), which reported that the ingredient ratio in legume-based products may affect color intensity and stability. Furthermore, Astuti et al. (2022) reported that changes in color resulting from differences in ingredient composition may influence consumer acceptability.

The Mann-Whitney test demonstrated significant differences between formulations F0 and F1 ($p = 0.049$), F1 and F2 ($p = 0.008$), and F2 and F3 ($p = 0.036$). These findings indicate that increasing the proportion of red beans in the formulation had a positive effect on color quality and panelists' acceptability scores. This result is in agreement with Astuti and Kurniawati (2019), who reported that the addition of red beans could improve color intensity and visual acceptability.

The aroma attribute did not differ significantly among the formulations ($p = 0.210$), although formulation F2 exhibited the highest mean score (2.84). This finding suggests that the addition of mung beans at certain proportions did not result in a meaningful change in aroma. The combination of the characteristic aroma of red beans and the mild aroma of mung beans produced a balanced aroma profile that was acceptable to the panelists. According to Handayani et al. (2021), aroma balance is one of the important factors influencing the acceptability of legume-based food products.

Similar findings were observed for the taste and texture attributes. The taste attribute had the highest mean score in formulation F2 (3.08), although the difference was not statistically significant ($p = 0.370$). The combination of red beans and mung beans may have produced a more complex, mild, and slightly sweet flavor that was preferred by the panelists. This finding is consistent with Sari et al. (2023), who reported that combining two types of legumes could produce better flavor characteristics than using a single type of legume.

For the texture attribute, formulation F2 also achieved the highest score (2.86), although the difference was not statistically significant ($p = 0.090$). The resulting texture was

considered smoother and easier to spread while maintaining an appropriate consistency. This characteristic may have been influenced by the use of glutinous rice flour as a binding agent, which can increase viscosity and maintain product softness (Ningrum, 2020).

Based on the overall evaluation, formulation F2 achieved the highest total hedonic score of 590, followed by F3 (566), F1 (545), and F0 (535). These findings indicate that the combination of 75% red beans and 25% mung beans was the most optimal formulation in terms of color, aroma, taste, and texture. In addition to producing better sensory characteristics, the combination of these two ingredients may also improve the nutritional value of the product. Red beans are known to be rich in protein and iron, whereas mung beans are good sources of plant-based protein, dietary fiber, vitamins, and minerals that are essential for the body. Therefore, formulation F2 has the potential to be developed as a functional food that supports the nutritional requirements of adolescent girls.

Analysis of Protein and Iron Contents

Laboratory analysis showed that formulation F2 contained 2.05% protein per 100 g, which was lower than the value calculated using the Indonesian Food Composition Table (IFCT) of 23.6%. This difference may be attributed to processing methods such as boiling, filtering, and heating, which can reduce nutrient contents. In addition, the incorporation of other ingredients, including sugar, coconut oil, and glutinous rice flour, may have caused a dilution effect, resulting in a lower final protein content. Pratama and Nugroho (2019) reported that the use of filler ingredients in food products may reduce the protein content of the final product.

The iron (Fe) content of formulation F2 (8.6896 μg/g) was also lower than the value calculated using the IFCT (10.2 μg/g). Nevertheless, the iron content of this product still indicates its potential as a source of plant-based iron because both red beans and mung beans are good sources of non-heme iron. Regular consumption of legumes is known to contribute to meeting daily iron requirements, particularly among vulnerable groups such as adolescent girls and women of reproductive age (Siregar et al., 2022).

The protein and iron contents of red bean spread supplemented with mung beans indicate that this product has the potential to be developed as an alternative local food to support the nutritional requirements of adolescent girls. Adequate protein and iron intake among adolescent girls is essential for anemia prevention and improving nutritional status before pregnancy, thereby indirectly contributing to stunting prevention efforts in the next generation.

CONCLUSION

This study demonstrated that formulation F2, consisting of red bean spread supplemented with mung beans at a ratio of 75%:25%, was identified as the best formulation based on the acceptability test, achieving the highest total preference score of 590. Formulation F2 contained 2.05% protein and 8.6896 μg/g iron (Fe). The hedonic test results showed that the color attribute differed significantly among the formulations ($p < 0.05$), whereas the aroma, taste, and texture attributes showed no significant differences ($p > 0.05$). Owing to its favorable sensory characteristics and its protein and iron contents, red bean spread supplemented with mung beans has the potential to be developed as an alternative local food to support the nutritional requirements of adolescent girls and contribute to anemia and stunting prevention efforts.

Future studies are recommended to involve panelists from more diverse age groups and backgrounds to obtain a more representative understanding of consumer acceptability. In addition, further analyses of other nutrients, such as dietary fiber, vitamins, and minerals, as well as shelf-life testing and product acceptability evaluation on a broader scale, are needed to support the development of red bean spread supplemented with mung beans as a functional food.

REFERENCES

Arinda, D. F., Sari, I. P., & Ningsih, W. I. F. (2025). Pengembangan snack bar berbasis pangan lokal: Analisis gizi dan optimasi formulasi. *Jurnal Sago Gizi dan Kesehatan, 6*(1), 152. https://doi.org/10.30867/gikes.v6i1.2201

Astuti, R., & Kurniawati, T. (2019). Pengaruh penambahan kacang merah terhadap warna dan daya terima sereal instan. *Jurnal Pangan Fungsional, 4*(2), 45–52.

Astuti, R., Wulandari, M., & Dewi, K. (2022). Analisis preferensi konsumen terhadap warna makanan berbasis kacang. *Gizi dan Pangan, 17*(3), 155–162.

Darawati, M., Riyadi, H., Damayanthi, E., & Kustiyah, L. (2016). Pengembangan pangan fungsional berbasis pangan lokal sebagai produk sarapan untuk remaja gemuk. *Jurnal Gizi dan Pangan, 11*(1). https://doi.org/10.25182/JGP.2016.11.1

Fitriani, R. S., & Taryono, T. (2022). Pengembangan kacang hijau organik sebagai komoditas pangan Indonesia. *Agrotechnology Innovation (Agrinova), 4*(2), 7. https://doi.org/10.22146/a.77008

Gardiarini, P., Dianovita, C., Gafur, A., & Rustika, R. (2021). Penyuluhan dan pelatihan pembuatan olahan berbahan pangan lokal kaya zat besi guna cegah anemia santriawati Pondok Pesantren Subulusalam Balikpapan. *Jurnal Abdi Masyarakat Indonesia, 1*(1), 165–170. https://doi.org/10.54082/jamsi.61

Ghassani, R., Sumarjo, D., Widartika, W., Saleky, Y. W., Sulaeman, A., & Rahmat, M. (2023). Brownies kacang merah dan daun kelor sebagai makanan selingan tinggi protein dan zat besi bagi siswa sekolah dasar. https://doi.org/10.34011/jibpm.v2i1.1299

Handayani, R., et al. (2021). Evaluasi warna dan daya terima selai legum. *Agroindustri, 9*(1), 34–40.

Handayani, S. (2024). Identification of nutritional status problems in adolescent girls aged 13–18 years. *JKM (Jurnal Kebidanan Malahayati), 10*(12), 1227–1231. https://doi.org/10.33024/jkm.v10i12.18585

Hayat, I., Ahmad, A., Masud, T., Ahmed, A., & Bashir, S. (2014). Nutritional and health perspectives of beans (*Phaseolus vulgaris* L.): An overview. *Critical Reviews in Food Science and Nutrition, 54*(5), 580–592. https://doi.org/10.1080/10408398.2011.596639

Iqbal, A., Nehvi, F. A., Dar, S. A., & Ali, G. (2012). Health benefits associated with consumption of dry beans (*Phaseolus vulgaris* L.). *Trends in Biosciences, 5*(2), 97–100. http://www.indianjournals.com/ijor.aspx?target=ijor:tbs&volume=5&issue=2&article=003

Kariani, N. K., Tole, N. C., Palalu, J. E. M., Taruangi, L. L., Hasanah, U., Tedengki, S. V., & Soelo, M. A. (2024). Edukasi kandungan gizi dan daya terima beragam produk makanan fungsional berbahan baku nabati dan hewani sebagai alternatif cemilan sehat untuk berbagai kelompok usia. *Jurnal Pengabdian Masyarakat Bangsa, 2*(9), 3693–3704. https://doi.org/10.59837/jpmba.v2i9.1539

Kurniawati, E., & Yuliasari, T. (2023). Karakteristik sensorik produk kombinasi legum. *Jurnal Teknologi Gizi, 11*(2), 61–68.

Lestari, R., Aprilianti, H., & Dewi, K. (2020). Pengembangan pasta kacang dengan variasi legum. *Jurnal Teknologi Pangan, 5*(1), 39–47.

Lubis, A. Y. S., Safera, M. I., & Abilowo, A. (n.d.). Puding Kayfe sebagai makanan alternatif pencegah anemia defisiensi zat besi. https://doi.org/10.53770/amhj.v1i2.40

Muliani, U. (2022). Perbedaan asupan protein, Fe, vitamin B6, vitamin C, dan status KEK pada remaja putri anemia dan non-anemia. *HEALTHY: Jurnal Inovasi Riset Ilmu Kesehatan, 1*(2), 81–91. https://doi.org/10.51878/healthy.v1i2.1115

Ningrum, A., et al. (2020). Pengaruh kelembutan tekstur terhadap daya terima selai. *Gizi dan Kuliner, 6*(1), 48–54.

Nugroho, D., & Ratnasari, D. (2019). Formula terbaik minuman kacang hijau dengan tambahan susu kedelai. *Jurnal Gizi Seimbang, 6*(2), 92–99.

Pratama, A., & Nugroho, D. (2019). Dampak substitusi bahan terhadap kandungan protein makanan olahan. *Teknologi Pangan Indonesia, 7*(3), 112–118.

Putri, C., Nasution, A., & Angkat, A. H. (2023). The effect of red bean flour (*Phaseolus vulgaris* L.) and green spinach (*Amaranthus* L.) addition on the organoleptic and chemical quality (protein and iron) tests of pancakes as a snack meal. https://doi.org/10.55927/marcopolo.v1i9.6563

Rotua, M., Angelina, A., Telisa, I., & Sriwiyanti, S. (2024). Daya terima cookies substitusi hati ayam selai nanas sebagai alternatif makanan tambahan pencegahan anemia pada remaja putri. *Jurnal Pustaka Padi, 3*(3), 72–78. https://doi.org/10.55382/jurnalpustakapadi.v3i3.803

Sari, M., Widya, N., & Budianto, R. (2023). Pengaruh kombinasi kacang merah dan hijau terhadap cita rasa produk pangan. *Jurnal Teknologi Pangan Lokal, 13*(1), 50–58.

Siregar, L., Mawarni, A., & Yuliani, D. (2022). Peran konsumsi legum dalam pemenuhan kebutuhan zat besi. *Jurnal Kesehatan Masyarakat Indonesia, 17*(4), 190–197.

Suryani, M., Oktaviani, D., & Hartati, S. (2020). Daya terima dan analisis sensori produk inovatif. *Jurnal Teknologi Hasil Pertanian, 13*(2), 100–108.

Unyil, R. F., & Fitriani, R. (2024). Peningkatan kadar hemoglobin remaja putri anemia melalui suplementasi bubur kacang hijau dan merah. *Jurnal Lentera, 4*(2), 182–194. https://doi.org/10.57267/lentera.v4i2.382

Utami, C. R., Darojah, M. Z., & Utomo, D. S. C. (2024). The potential of instant red bean porridge (*Phaseolus vulgaris* L.) for MP-ASI companion to baby growth. *Journal Research of Social Science, Economics, and Management, 4*(5), 644–652. https://doi.org/10.59141/jrssem.v4i5.731

World Health Organization. (2023). *Levels and trends in child malnutrition: UNICEF/WHO/The World Bank Group joint child malnutrition estimates: Key findings of the 2023 edition*. Geneva: World Health Organization. https://www.who.int/publications/i/item/9789240073791

Yuliani, I., Prasetyo, B., & Rahayu, W. (2020). Inovasi olahan kacang kombinasi untuk selai sehat. *Jurnal Gizi Terapan, 7*(1), 70–77