

Article

Acceptance Of Spinach And Red Bean Cookies With A Mixture Of Flour High In Protein For Preventing Anemia In Pregnant Women

Isnar Nurul Alfiyah¹, Samuel², Rahmani Azzahra^{3*}

¹ Cirebon DIII Nutrition Study Program, Tasikmalaya Ministry of Health Polytechnic; isnar.nurul@dosen.poltekkestasikmalaya.ac.id

² Cirebon DIII Nutrition Study Program, Tasikmalaya Ministry of Health Polytechnic; samuel@dosen.poltekkestasikmalaya.ac.id

³ Cirebon DIII Nutrition Study Program, Tasikmalaya Ministry of Health Polytechnic; azzahrahmani@gmail.com

* Correspondence: isnar.nurul@dosen.poltekkestasikmalaya.ac.id

Abstract

Background: Anemia in pregnancy still a problem in the world, globally the prevalence of anemia in pregnant women worldwide is 40%. The most common anemia during pregnancy is iron deficiency anemia (about 75%) and megaloblastic folate deficiency anemia, which are more common in women who have an inadequate diet and who do not receive prenatal iron and folate supplements. **Objective :** to know the ideal proportion between wheat flour and spinach so as to produce the best acceptability for anemia sufferers in pregnant women and the highest nutritional content of Fe as cookies. **Method :** experimental research in the form of making dry cookies products made from spinach flour and red beans using a Hedonic Scale Test with the addition of Post Hoc Test (Duncan's Multiple Range Test), namely providing samples to panelists (30 people), and looking for the best final product formula in terms of level of preference according to organoleptic properties. **Results :** Resulted in the F0 treatment of 0% red spinach and red bean flour being the most preferred in terms of color, taste, aroma, texture and overall. The second is F1 with the addition of 60% wheat flour, 20% red spinach and 20% red bean flour. However, the average difference between each treatment is not too different. **Conclusion :** The Hedonic Scale Test showed that the cookies were liked by the panelists. An acceptability test for pregnant women who suffer from anemia needs to be carried out so that these cookies can be applied in society.

Keywords: Fe, Spinach, Red Beans, Wheat Flour, Anemia

1. Introduction

Anemia in pregnancy is still a problem in the world, globally the prevalence of anemia in pregnant women worldwide is (40%), The most common anemia during pregnancy is iron deficiency anemia (about 75%) and megaloblastic folate deficiency anemia, which are more common in women who have an inadequate diet and who do not receive prenatal iron and folate supplements. Severe anemia can adversely affect both mother and fetus. Based on the results of Riskesdas in the previous year, the

Academic Editor: Soleman Landi

Received: 5 August 2025

Revised: 30 November 2025

Accepted: 11 December 2025

Published: 14 Decembberr 2025

Citation: Vancouver Style

Copyright: © 2025 by the authors.

Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY SA) license (<https://creativecommons.org/licenses/by-sa/4.0>).

prevalence of anemia in pregnant women continued to increase until in 2018 it reached 48.9%. This figure is quite high when compared to the prevalence of the previous year which was only 37.1%. ⁽¹⁾

Data from the Directorate of Family Health shows that 40% of the causes of death in pregnant women are bleeding and it is known that anemia is a risk factor for the occurrence of bleeding ⁽²⁾, while in adolescents, anemia is one of the factors that result in decreased learning concentration so that learning achievement is low and can reduce work productivity ⁽³⁾.

There are 3 factors that cause anemia, namely nutrient deficiency, bleeding (Loss of blood volume), and hemolytics. Nutrient deficiency anemia can be caused by an insufficiency of some nutrients a person consumes, such as iron, vitamin E, folic acid, vitamin B12 and vitamin B6 ⁽⁴⁾.

The consequences that can be caused by anemia are; decrease learning ability and concentration for adolescents, interfere with growth so that height does not reach maximum, decrease physical ability, resulting in pale face ⁽³⁾. In pregnant women, it increases the risk of bleeding before and during childbirth which can threaten the safety of the mother and her baby.

According to WHO 2021 data, 40% of pregnant women suffer from anemia. Four out of 10 ASEAN countries, namely Cambodia (51.5%), Myanmar (47.8%), Laos (47%), and Indonesia (44.2%), are included in the severe category with an anemia prevalence of 40% or more (WHO 2021). Furthermore, according to the results of Riskesdas in 2018, the incidence rate of pregnancy anemia in Indonesia was 37.1% in 2013 and 48.9% in 2018, at least Indonesia hopes to reduce this frequency to 19% by 2025 (Ministry of Health of the Republic of Indonesia 2018). Data from the DKI Jakarta Health Office (2018), shows that the anemia rate in DKI Jakarta in 2018 was (12.31%). The Thousand Islands have the highest number of anemia cases at 28.38%, and Central Jakarta is second with 18.58%. ⁽⁵⁾

The Indonesian government has been implementing anemia prevention programs since 1997. The latest anemia prevention program was created by the Indonesian Ministry of Health in 2016, namely the anemia prevention program in adolescent girls and women of childbearing age. Activities in this program are balanced nutrition guidelines, blood supplement supplementation, food fortification, and treatment of comorbidities (Ministry of Health of the Republic of Indonesia, 2018). Efforts to prevent and control anemia in women of childbearing age have been carried out by the government and health workers for a long time, but the prevalence rate of anemia in women of childbearing age in Indonesia is still increasing and is in the high category. The incidence of anemia is one of the factors that affect maternal mortality in Indonesia. ⁽⁶⁾

Nutritional anemia is influenced by several factors including insufficient amount of iron in food, there are substances that inhibit iron absorption in food, low iron absorption, blood deficiency, infectious diseases, socioeconomic status, low knowledge about iron, and unbalanced diet ⁽⁷⁾. An unbalanced diet will cause an imbalance of nutrients that enter the body and can cause malnutrition or vice versa, an unbalanced consumption pattern also results in excess of certain nutrients and causes overnutrition. Food optimization is one of the programs that is expected to address the problem of anemia pregnant women. Food optimization is to reduce or eliminate the consumption of inhibitory foods and increase or increase the amount of consumption of foods that contain high iron and foods that stimulate iron absorption consumed by pregnant women. ⁽⁸⁾

Anemia is still quite large, namely in adolescent women 26.50%, women of productive age (WUS) 26.9%, pregnant women 40.1%, and infants 47.0%. Iron deficiency is a type of anemia that is very often encountered, which occurs when we

run out of a lot of blood from the body, (either due to bleeding, injury or menstruation) or because the food consumed lacks iron.⁽⁹⁾

One alternative to meet iron needs can be done by consuming vegetables that contain iron in the food menu. Iron is found in vegetables, including spinach (*Amaranthus spp.*). Leafy green vegetables such as spinach are a source of nonheme iron. Cooked spinach contains 8.3 mg/100 grams of iron. He added that the iron content in spinach plays a role in the formation of hemoglobin.⁽¹⁰⁾

2. Materials and Methods

2.1 Study Design and Setting

The type of research used was experimental research in the form of making spinach-based pastry products that are known to be rich in iron, then iron content and acceptability testing was carried out in pregnant women suffering from iron nutritional anemia as panelists. Sensory studies, which use a variety of approaches and are based on the sensory organs, provide details about the nature of a product and the level of acceptance of that product by consumers.⁽¹¹⁾

Organoleptic assessment with the hedonic method is a testing method based on the level of preference of the panelists for the product presented. In this test, the panelists expressed personal responses whether they liked it or not, besides also stating their level of likability. The level of preference is also called the hedonic scale. The hedonic scale is transformed into a numerical scale with an ascending number according to the level of preference. With this numerical data, statistical analysis can be carried out.⁽¹²⁾ The test with the hedonic method used five scales, namely 5 (very like), 4 (like), 3 (somewhat like), 2 (dislike) and 1 (very dislike). This test is carried out on the parameters of the aroma, taste and texture color of the product produced.⁽¹³⁾ By using the Hedonic Scale Test, namely by providing samples to the panelists to be assessed and poured in the form of a hedonic test, where from different treatments it can be known which final product has the best formula reviewed from the level of preference according to organoleptic properties (color, taste, aroma and texture). The Hedonic Test in this study was carried out twice.

2.2 Population and Sampling

A population is all objects that are the object of research or observation and have the same properties. Samples are part of the population that are taken to be used as objects of direct observation and used as a basis for drawing conclusions. In other words, a population is a set of whole objects being studied, while a sample is a part taken from the population.⁽¹³⁾ This study involved students of the Nutrition Study Program DIII Cirebon, Health Polytechnic, Ministry of Health, Tasikmalaya as panelists in the acceptability test of spinach and red bean cookies. The students involved numbered 30 people and were randomly selected. Panelists are panel members or people involved in organoleptic assessments based on various subjective impressions of the products presented. Panelists are instruments or tools to assess the quality and analyze the sensory properties of a product.⁽¹²⁾

2.3 Data Analysis

The making of red spinach cookies is carried out in the laboratory of the DIII Cirebon Nutrition Study Program, starting from pre-research to making cookies for organoleptic tests. The purchase of research materials was carried out at one of the supermarkets in Cirebon City, while the purchase of red bean flour was carried out through an online store. The organoleptic test was carried out at the Organoleptic Laboratory of the Nutrition Study Program DIII Cirebon, Health Polytechnic, Ministry of Health, Tasikmalaya.

The data obtained came from the results of the panelists' organoleptic research on variation using diversity fingerprints. Furthermore, if there is a significant difference in

results between treatments, the Duncan's Multiple Range Test (DMRT) is performed with a confidence level of 95% (α 0.05)⁽¹⁵⁾

3. Results

This research has passed the pre-research stage and organoleptic test twice. The pre-research was carried out in July for 2 days. This activity was carried out to see the results of the appropriate formulation before being tested to the panelists. Selection of suitable formulations for F0, F1, F2 and F3. The formulation for making red spinach and red bean flour cookies is as follows :

F0 : is a control, 0% red spinach and 0% red bean flour

F1 : 20% red spinach : 20% red bean flour : 60% wheat flour.

F2 : red spinach 25% : red bean flour 25% : wheat flour 50%

F3 : red spinach 30% : red bean flour 30% : wheat flour 40%.

Here is the formulation of the spinach and red bean flour cookie recipe.

Table 1. Spinach Biscuit and Red Bean Flour Formulation

Ingredient	F0	F1	F2	F3
Red Spinach	-	40 gr	50 gr	60 gr
Red Bean Flour	-	40 gr	50 gr	60 gr
Flour	200 gr	120 gr	100 gr	80 gr
Margarin	100 gr	100 gr	100 gr	100 gr
Refined Sugar	80 gr	80 gr	80 gr	80 gr
Yolk	1	1	1	1
Baking Powder	1/4 tsp	1/4 tsp	1/4 tsp	1/4 tsp
Food Vanila	1/4 tsp	1/4 tsp	1/4 tsp	1/4 tsp

Here is a picture of spinach cookies and red bean flour products.

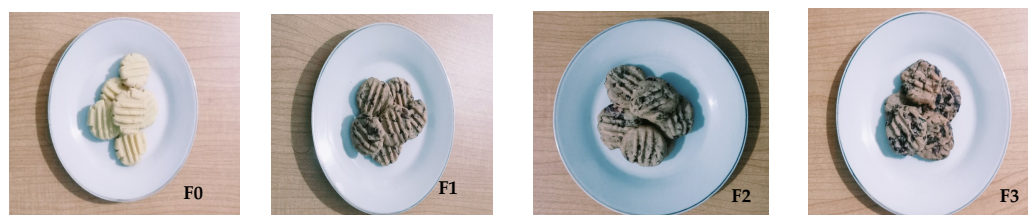


Figure 1. Red Spinach Cookies and Red Bean Flour

Organoleptic Tests on Red Spinach Cookies and Red Bean Flour

The organoleptic test was carried out on Friday, August 16, 2024 at the Organoleptic Laboratory of the DIII Nutrition Study Program, Cirebon Polytechnic of the Ministry of Health, Tasikmalaya. This test involved 30 students of the Cirebon Nutrition DIII Study Program as panelists. This activity was carried out for 1 day, at 09.00 (repetition 1) and 14.00 (repetition 2).

The Organoleptic Test Laboratory has 8 test booths. Panelists conducted organoleptic tests in their respective rooms. Before conducting the organoleptic test, the panelists were given an explanation of the product, ensuring that the panelists did not have allergies to certain ingredients and how to fill out the acceptability test form, after which, each panelist entered the test booth. The presenter distributed biscuit products and mineral water to each room. Panelists conducted organoleptic tests for 5-10 minutes. Panelists who have completed the organoleptic test immediately leave the room and receive the contact materials that have been prepared.

Here is the Hedonic Scale Test Result of the spinach and red bean flour cookies.

Table 2. Hedonic Test Results on Red Bean Flour and Red Spinach Cookies

Hedonic Test	Treatment	Repetition 1		Repetition 2	
		Avg $\pm$ SD	Category	Avg $\pm$ SD	Category
Color	F0	4,00 $\pm$ 0,74	Like	4,20 $\pm$ 0,66	Like
	F1	3,93 $\pm$ 0,83	Like	4,20 $\pm$ 0,61	Like
	F2	3,77 $\pm$ 0,90	Like	3,90 $\pm$ 0,48	Like
	F3	3,77 $\pm$ 0,86	Like	3,87 $\pm$ 0,51	Like
Fragrance	F0	4,10 $\pm$ 0,76	Like	4,33 $\pm$ 0,61	Very Like
	F1	4,07 $\pm$ 0,87	Like	4,17 $\pm$ 0,79	Like
	F2	3,97 $\pm$ 0,89	Like	3,83 $\pm$ 0,79	Like
	F3	3,50 $\pm$ 0,97	Like	3,63 $\pm$ 0,76	Like
Taste	F0	4,20 $\pm$ 0,71	Like	4,43 $\pm$ 0,63	Very Like
	F1	4,07 $\pm$ 1,01	Like	4,33 $\pm$ 0,76	Very Like
	F2	4,03 $\pm$ 0,89	Like	4,00 $\pm$ 0,87	Like
	F3	3,70 $\pm$ 0,95	Like	3,77 $\pm$ 0,86	Like
Texture	F0	4,13 $\pm$ 0,68	Like	4,27 $\pm$ 0,64	Very Like
	F1	4,07 $\pm$ 1,01	Like	4,17 $\pm$ 0,79	Like
	F2	4,00 $\pm$ 1,02	Like	3,87 $\pm$ 0,94	Like
	F3	3,87 $\pm$ 0,94	Like	3,83 $\pm$ 0,91	Like
Overall	F0	4,43 $\pm$ 0,50	Very Like	4,47 $\pm$ 0,51	Very Like
	F1	4,20 $\pm$ 0,85	Like	4,40 $\pm$ 0,56	Very Like
	F2	4,03 $\pm$ 0,93	Like	4,07 $\pm$ 0,87	Like
	F3	3,90 $\pm$ 0,84	Like	3,93 $\pm$ 0,74	Like

Ranking Test on Red Spinach Cookies and Red Bean Flour

Panelists as a whole ranked the cookie products from most liked to least liked. The ranking test for red spinach cookies and red bean flour can be seen in Table 3 below.

Table 3. Ranking Test Results on Red Bean Flour and Red Spinach Cookies

Rank	Repetition 1	%	Repetition 2	%
1 st	15 Panelists	50	15 Panelists	50%
2 nd	7 Panelists	23.33	8 Panelists	26.67
3 rd	5 Panelists	16.67	5 Panelists	16.67
4 th	3 Panelists	10	2 Panelists	6.67

4. Discussion

Cookies are products processed from various flours that are easily modified to get health benefits. Cookies are popular with people of all ages, from babies, children, teenagers to adults and the elderly, both those who live in villages and cities. ^(16,17) There are many studies related to cookie product innovations that seek to produce cookies rich in benefits and preferred by consumers. Cookies with the innovation of adding certain nutrients or substituting flour from ingredients other than wheat can enrich the nutritional content of cookies, in addition to reducing dependence on imported products. ⁽¹⁸⁾ Red spinach biscuits and red bean flour are one of the food product innovations for the prevention of anemia in pregnant women. The results of the research that have been carried out have resulted in a formulation of spinach cookies and red bean flour that is suitable both in terms of color, fragrance, taste, and texture.

Color is the external appearance of a product that is the first assessment to attract someone's attention to the product. Color will greatly determine a person's interest in a product, whether the person likes it or not, so it can arouse curiosity to try further. ⁽¹⁹⁾ The results of the study from the color aspect of red spinach cookies and red bean flour were the most preferred addition of 0% red spinach and red bean flour in the first test, but the color organoleptic test in the second test showed the same average between F0 and F1, namely the addition of 0% and the addition of 15% red spinach and red bean flour. Based

on Table 2, it can be seen that in the first test, all treatments obtained the "Like" category, with the following average values: F0 of 4.00 ± 0.74 , F1 of 3.93 ± 0.83 , F2 of 3.77 ± 0.90 , and F3 of 3.77 ± 0.86 . This value indicates that all four treatments were preferred by respondents, with F0 having the highest average score compared to the others.

In the second repetition, there was an increase in the mean value in all treatments. F0 and F1 obtained the same highest average score, at 4.20, with standard deviations of 0.66 and 0.61, respectively, indicating that the two treatments were most preferred and the ratings tended to be uniform. Meanwhile, F2 and F3 also showed an increase in the average value to 3.90 ± 0.48 and 3.87 ± 0.51 , and remained in the "Like" category.

In general, it can be concluded that all treatments were preferred by respondents on both the first and second tests. In addition, the standard deviation value that tended to decrease on the second test showed an increase in consistency in the assessment between respondents. The F0 and F1 treatments stand out as the most consistently preferred treatments.

Fragrance is something that can be captured by a person's sense of smell and comes from substances that can evaporate, slightly soluble in water, and slightly soluble in fat. The fragrance is delivered through the air into the olfactory tissue so that it can be felt by a person ⁽¹⁹⁾. The aroma of a food product can also arouse the consumer's appetite when the aroma produced is in accordance with the taste desired by the consumer. Assessments of four treatments (F0, F1, F2, and F3) were carried out in two tests to determine the level of consumer preference for each treatment. The assessment is based on the average score accompanied by the standard deviation (SD) and is classified into the category of preference level.

On the first test, all treatments were given a "Like" category, with the following average score F0: 4.10 ± 0.76 ; F1: 4.07 ± 0.87 ; F2: 3.97 ± 0.89 ; F3: 3.50 ± 0.97 . These values showed that F0 and F1 treatments received relatively high levels of favorability, while F3 received the lowest score even though they were still in the "Like" category.

On the second test, there was an increase in scores in some treatments. F0 experienced a significant increase in score to 4.33 ± 0.61 , so the favorite category increased to "Very Like". F1 also showed an increase to 4.17 ± 0.79 , remaining in the "Likes" category. The F2 treatment actually experienced a slight decrease in score to 3.83 ± 0.79 , but it was still included in the "Like" category. Meanwhile, F3 saw a slight increase to 3.63 ± 0.76 , but it was still the lowest-scoring treatment.

Overall, it can be concluded that the entire treatment was favored by the respondents. However, the F0 treatment showed the best results, with an increase in grades and a change in the category from "Likes" to "Very Likes", as well as a decrease in SD grades reflecting a more uniform assessment. Meanwhile, the F3 treatment remained the lowest level of favor despite a slight improvement on the second test.

Taste is a fairly important assessment of a food product. Taste is one of the aspects that determines a person's level of liking for a food product. The components of the ingredients that make up the product are quite influential on the taste produced so the combination of ingredients used in its manufacture is quite important to consider.⁽¹⁹⁾ Flavor is often referred to as taste is the impression received/felt by the human senses when consuming food. Taste is determined by the aroma and taste of the food ingredients consumed and is influenced by contention, irritation (caused by a spicy sensation), or other perceptions such as cold (caused when consuming menthol-flavored candies)⁽²⁰⁾

The assessment of Repetition 1 and 2 shows that there is a variation in perception based on the treatment given. In first test, the highest average was achieved by the F0 Treatment with a value of 4.20 ± 0.71 , which was included in the "Likes" category, followed by F1 (4.07 ± 1.01) and F2 (4.03 ± 0.89), both of which were also included in the "Likes" category. Meanwhile, the F3 Treatment obtained the lowest score of 3.70 ± 0.95 , although it is still in the same category.

In Repetition 2, it can be seen that the highest average was again achieved by the F0 Treatment with 4.43 ± 0.63 , which was categorized as "Very Like". This value is followed by F1 (4.33 ± 0.76), also included in the "Very Like" category. While F2 (4.00 ± 0.87) and F3 (3.77 ± 0.86) were included in the "Likes" category, indicating a decrease in the perception of this part in the higher level treatment.

In general, there is a tendency that the higher the level of treatment (F2 and F3), there is a decrease in the average value of perception, both in repetition 1 and repetition 2. The F0 treatment showed the highest perception, especially on repeat 2 that reached the "Very Like" category, which may reflect a more positive level of acceptance or understanding of the content of the article.

Texture is one of the factors that can describe the level of consumer liking the product served. When the texture and taste of the product are in accordance with the desired taste, it will encourage consumers to consume the product continuously.⁽¹⁹⁾ Assessment of food texture in the form of softness and crispiness can be done by touching the finger or chewing in the mouth.⁽¹²⁾

The greater the concentration of spinach, the less crispy the texture of the cookies obtained.⁽²¹⁾ The panelists' assessment of the texture of cookies was influenced by the composition of red spinach and red bean flour which had an impact on increasing water content. The higher the concentration of red spinach flour and red bean flour, the smoother and softer the texture of the cookies ⁽²²⁾. This is because the texture of the cookies in the addition of 15%-25% spinach has a higher moisture content compared to F0 where there is no addition of red spinach, so the crunchiness in the cookies is reduced.

Evaluation of first test and second test showed variations in average scores at each level of treatment (F0–F3), with differences in assessment categories reflecting the panelists' perception or acceptance of the content of the two tests.

On first test, all treatment levels were given a "Like" category, with the highest average at F0 (4.13 ± 0.68), followed by F1 (4.07 ± 1.01), F2 (4.00 ± 1.02), and lowest at F3 (3.87 ± 0.94). This shows that although in general the perception of repeat 1 is quite positive, there is a slight decrease in scores as the level of treatment increases.

For repetition 2, only F0 reached the "Very Like" category with a score of 4.27 ± 0.64 , indicating the highest level of acceptance of the content of the repetition. Meanwhile, F1 (4.17 ± 0.79), F2 (3.87 ± 0.94), and F3 (3.83 ± 0.91) remained in the "Like" category, with a tendency for decreasing values at higher treatments.

In general, the data showed that the F0 treatment produced the most positive perception of both replicates, specifically 2 replicates that were categorized as "Very Liked". Conversely, the higher the level of treatment (up to F3), there is a decrease in the average score, which indicates a decrease in understanding, interest, or acceptance of the product.

5. Conclusions

The Hedonic Scale Test of Red Spinach Cookies and Red Bean Flour showed that these cookies were preferred by the panelists. The addition of 0% red spinach and red bean flour showed the highest number but the result was not much different from the addition of 15% red spinach and red bean flour. This proves that these cookies are still acceptable to the panelists.

The results of the *Post Hoc Test* showed that the F0 sample was the most preferred sample by the panelists. This is because the sample that has the largest subset value is the F0 sample.

Further research is needed on the nutritional content of cookies and acceptability tests in pregnant women with anemia so that these cookies can be applied in the community.

6. Acknowledgments

We would like to express our gratitude to the Health Agency of the Republic of Indonesia (PPSDM) and the Director of the Health Polytechnic of the Ministry of Health Tasikmalaya for their support in research funding. Thank you to the enumerators and all the panelists who have been willing to support this research.

7. Conflicts of Interest

“The authors declare no conflict of interest.”

REFERENCES

1. Annisa Mudrika, Novriani Tarigan, Sudana Fatahillah Pasaribu. Studi Literatur : Hubungan Asupan Folat Dan Zink Dengan Kejadian Anemia Ibu Hamil. *J Ilm Kedokt dan Kesehat*. 2023;2(3):261–71.
2. Rohmatika D, Umarianti T. Efektifitas Pemberian Ekstrak Bayam Terhadap Peningkatan Kadar Hemoglobin Pada ibu Hamil Dengan Anemia Ringan. *J Kebidanan* [Internet]. 2017;IX(02):165–74. Available from: <https://ejurnal.stikeseub.ac.id/index.php/jkeb/article/view/318/282>
3. Mariana W, Khafidhoh N. Hubungan Status Gizi Dengan Kejadian Anemia Pada Remaja Putri Di SMK Swadaya Wilayah Kerja Puskesmas Karangdoro Kota Semarang Tahun 2013. *J Kebidanan* [Internet]. 2013;2(4):35–42. Available from: <https://ejournal.poltekkes-smg.ac.id/ojs/index.php/jurkeb/article/view/98>
4. Citrakesumasari. Anemia Gizi, Masalah Dan Pencegahannya [Internet]. Lampung: Universitas Mitra Indonesia; 2024. 1–152 p. Available from: <http://repository.umat.ac.id/id/eprint/1005>
5. Laili W, Novianty A. Hubungan Pengetahuan dan Status Gizi Ibu dengan Anemia Kehamilan di Puskesmas Johar Baru, Jakarta Pusat. *J Ilmu Gizi dan Diet*. 2024;3(4):306–11.
6. Attaqy FC, Kalsum U, Syukri M. Determinan Anemia pada Wanita Usia Subur (15-49 Tahun) Pernah Hamil di Indonesia (Analisis Data Riskesdas Tahun 2018). *Jik J Ilmu Kesehat*. 2022;6(1):48.
7. Pratiwi R, Widari D. Hubungan Konsumsi Sumber Pangan Enhancer dan Inhibitor Zat Besi dengan Kejadian Anemia pada Ibu Hamil. *Amerta Nutr*. 2018;2:283–91.
8. Ramadhanti SD, Sulistiyono P. Perubahan Jenis Makanan (Sumber, Pemacu, dan Penghambat Zat Besi) pada Ibu Hamil Anemia Sebelum dan Sesudah Optimalisasi Makanan. *NIACIN (Nutrition Food Sci Appl Journal)*. 2023;1(1):34–42.
9. Hore O, Picauly I, Toy SM. Hubungan Pola Konsumsi Pangan Dengan Kejadian Anemia Pada Remaja Putri Di Wilayah Kerja Puskesmas Waimangura Kabupaten Sumba Barat Daya. *J Pangan Gizi dan Kesehat*. 2024;13(2):75–88.
10. Rohmatika D, Supriyana S, Ramlan D. Perbandingan Pengaruh Pemberian Ekstrak Bayam Hijau Dengan Preparat Fe. *J Kesehat Kusuma Husada* [Internet]. 2016;7(Vol. 7 No. 1, Januari 2016):1–70. Available from: <https://jurnal.ukh.ac.id/index.php/JK/article/view/132>
11. Mongi RJ, Gomezulu AD. Descriptive Sensory Analysis, Consumer Acceptability, And Conjoint Analysis of Beef Sausages Prepared From A Pigeon Pea Protein Binder. *Heliyon* [Internet]. 2022;8(9):e10703. Available from: <https://doi.org/10.1016/j.heliyon.2022.e10703>
12. Ayustaningwarno F, Rustanti N, Afifah DN, Anjani G. Teknologi Pangan Teori dan Aplikasi. Vol. 53, Fakultas Kedokteran Universitas Diponegoro. 2020. 1–11 p.
13. Buah S, Cocos K. Pengaruh Substitusi Labu Kuning (*Cucurbita moschata*) Terhadap Karakteristik Sensori, Kandungan β -Karoten Dan Aktivitas Antioksidan. *J Ris Pangan*. 2025;3(2):217–29.
14. Nuryadi, Astuti TD, Utami ES, Budiantara M. Buku Ajar Dasar-dasar Statistik Penelitian. Sibuku Media. 2017. 170 p.
15. Harlianti, Muzakar MZ, Hermanto. Karakteristik Organoleptik Dan Nilai Gizi Selai Buah Pala (*Myristica fragrans*) Dengan Substitusi Ekstrak Kulit Buah Semangka (*Citrullus lanatus*). *J Ris Pangan*. 2024;2(4):355–65.
16. Mubarok AZ, Winata A. Pengaruh Substitusi Tepung Terigu dengan Tepung Umbi Dahlia dan Konsentrasi Baking Powder terhadap Karakteristik Fisik Cookies Kaya Serat. *J Apl Teknol Pangan* [Internet]. 2020;9(4):175–80. Available from: <https://ejournal2.undip.ac.id/index.php/jatp/article/view/5864>
17. Oktaviana AS, Hersoelistyorini W. Kadar Protein, Daya Kembang, dan Organoleptik Cookies dengan Substitusi Tepung Mocaf dan Tepung Pisang Kepok Protein Content, Growth Power and Organoleptic Cookies with Substitution Mocaf and Flour of Banana ' s Kepok. 2017;7(November):72–81. Available from:

- <https://jurnal.unimus.ac.id/index.php/JPDG/article/view/3178>
18. Kristanti D, Setiaboma W, Herminiati A. Karakteristik Fisikokimia Dan Organoleptik Cookies. BIOPROPAL Ind. 2020;11(1):1–8.
 19. Rauf S, Manjilala, Nursalim, Mustamin, Azisah N. Cookies Substitusi Tepung Bayam Merah dan Tepung Kacang Tolo Sebagai Makanan Tambahan Remaja Putri Anemia. Media Gizi Pangan [Internet]. 2022;29(2):81–90. Available from: <https://journal.poltekkes-mks.ac.id/ojs2/index.php/mediagizi/article/view/81>
 20. Apriyantono A. Flavor Pangan Masa Depan. Food Review Indonesia [Internet]. 2022 Apr; Available from: https://issuu.com/pustakapangan01/docs/fri_edisi_4_2022/s/15364176
 21. Rahmat M, Priawantiputri W, Gizi J, Kemenkes P. Cookie Bayam Sorgum Sebagai Makanan Tambahan Sorghum Spinach Cookies as an Iron-High Supplement. J Ris Kesehat Poltekkes Depkes Bandung. 2020;12(2):245–54.
 22. Loaloka MS, Nur A, Costa SLD V, Agung A, Mirah A. Pengaruh Substitusi Tepung Bayam Merah dan Tepung Kacang Merah terhadap Uji Organoleptik dan Kandungan Gizi Cookies The Effect of Substitution of Red Spinach Flour and Red Bean Flour on Organoleptic Tests and the Nutritional Content of Cookies. Nutr J Pangan, Gizi, Kesehat. 2021;(22):82–6.