

REGULAR ARTICLE

ECONOMIC ANALYSIS AND PRODUCT DEVELOPMENT OF CHICKEN-CHEESE SAUSAGE FORTIFIED WITH MORINGA (*MORINGA OLEIFERA*) LEAF POWDER AND NUTMEG FOR IMPROVED SENSORY CHARACTERISTICS*Annisa Nurani Hardini*^{*1}, *Dianita Kumalasari*²**Address:**¹Universitas Pembangunan Nasional "Veteran" Jawa Timur, Faculty of Engineering, Department of Food Technology, Jl. Rungkut Madya, Gn. Anyar, Surabaya, East Java 60294, Indonesia.²Universitas Pembangunan Nasional "Veteran" Jawa Timur, Faculty of Engineering, Department of Food Technology, Jl. Rungkut Madya, Gn. Anyar, Surabaya, East Java 60294, Indonesia.*Corresponding author: 23033010100@student.upnjatim.ac.id**ABSTRACT**

This study investigates the economic analysis and product development of chicken-cheese sausage fortified with Moringa (*Moringa oleifera*) leaf powder and nutmeg for improved sensory characteristics. Chicken-cheese sausage is widely favored by consumers, yet it is typically low in fiber and health-promoting bioactive compounds. Moringa leaf powder was added as a fortificant to enhance nutritional value, while nutmeg was incorporated as a natural flavoring agent to improve the aroma and sensory profile. The study employed three treatments based on Moringa leaf powder concentration: P0 (0 g), P1 (8 g), and P2 (16 g). The research utilized a hedonic preference test to evaluate parameters including color, aroma, texture, and taste. The results indicated significant differences among treatments for all sensory parameters, with higher concentrations of Moringa leaf powder negatively impacting consumer preference due to an unpleasant grassy odor and bitter taste. Economic analysis, including Break Even Point (BEP) and Net Present Value (NPV), was conducted to determine business feasibility. With a positive NPV of 9,608,159, the findings indicate that the business is profitable at a selling price of Rp 8,000 and a production capacity of 960 units/year.

Keywords: chickencheese sausage, Moringa oleifera, fortification, sensory characteristics, and economic analysis.

INTRODUCTION

Chicken-cheese sausage is a popular processed meat product widely favored by the public due to its convenience and palatable taste. However, this product is generally low in fiber, vitamins, and health-promoting bioactive compounds. One approach to enhancing the nutritional value of processed meat is through fortification with Moringa (*Moringa oleifera*) leaf powder, which is rich in vitamins, minerals, antioxidants, and other bioactive substances.

Previous research on broiler chicken meatballs indicated that the addition of Moringa leaf powder at concentrations of 2.5–3.5% significantly influenced organoleptic parameters such as taste, aroma, color, texture, and elasticity, although it did not significantly affect physical qualities such as pH, cooking loss, and springiness (Yulisriani *et al.*, 2024). The study further noted that higher levels of Moringa inclusion could induce a bitter taste due to the presence of saponins and flavonoids; therefore, an optimal formulation is required to improve the sensory characteristics and ensure consumer acceptance (Yulisriani *et al.*, 2024).

Nutmeg (*Myristica fragrans*) is used as a natural flavoring agent to enhance the aroma and improve the sensory profile of the sausage. Nutmeg is rich in volatile compounds, such as myristicin, (E)-isoeugenol, and methoxyeugenol, which are known to improve the aroma and flavor of processed food products (Frag *et al.*, 2018). By combining Moringa leaf powder as a fortificant with nutmeg to enhance and improve sensory characteristics, it is expected that the resulting chicken-cheese sausage will not only be nutritious but also possess a taste and aroma that is more appealing to consumers.

MATERIAL AND METHODS**Materials**

The ingredients used in the production of chicken-cheese sausage. The formula consisted of chicken meat, tapioca flour, egg white, oil, ice cubes, cheese, and seasoning agents (garlic, salt, pepper, sugar, powdered broth, and baking powder). Moringa (*Moringa oleifera*) leaf powder was added as the fortificant, and nutmeg (*Myristica fragrans*) was used as a natural flavoring agent to enhance the sensory profile. The treatments consisted of three variations based on the concentration of Moringa leaf powder: P0 (0 g), P1 (8 g), and P2 (16 g).

Equipment

The equipment utilized in the chicken-cheese sausage production process included a chopper for mincing the meat and blending all ingredients uniformly to form a smooth and elastic sausage batter emulsion. A spatula was used to assist in mixing the batter within the container and transferring it into the stuffer, while a digital scale ensured the accuracy of all ingredient measurements. A knife was employed to cut the meat into smaller pieces, facilitating the processing within the chopper. Following the filling process, a stove and a cooking pot were used to provide a stable heat source and a vessel for boiling the sausages, ensuring uniform heat distribution throughout the cooking process. Finally, twine was used to secure the ends of the sausage casings and section the sausages to maintain a uniform shape and prevent them from bursting during boiling.

Sausage Production Process

The production of the chicken-cheese sausage followed a structured process starting with meat preparation. The chicken meat was cleaned and cut into smaller pieces to facilitate efficient grinding. Using a chopper, the meat was minced and blended with tapioca flour, egg white, oil, ice cubes, and the seasoning mixture (garlic, salt, pepper, sugar, powdered broth, and baking powder). During this process, the Moringa leaf powder and nutmeg were incorporated into the mixture. The blending continued until a smooth and elastic sausage batter emulsion was achieved (Kurniawati *et al.*, 2023).

Once the batter was consistent, 50 grams of cheese was added and mixed gently to ensure even distribution. The prepared batter was then transferred into a stuffer to be filled into the sausage casings. After the casings were filled, they were securely tied with twine at uniform intervals to maintain shape and structural integrity. Finally, the sausages were boiled in a cooking pot until fully cooked, ensuring uniform heat distribution throughout the process, before being cooled and stored (Kurniawati *et al.*, 2023).

Moringa Leaf Powder Production Process

The production of Moringa leaf powder commenced with the preparation of necessary equipment and fresh Moringa leaves. The leaves were first separated from the stems, followed by a sorting process to ensure high-quality material; leaves that did not meet the quality standards were discarded. Selected leaves were then thoroughly washed and drained to remove impurities. Subsequently, the leaves underwent a drying process, followed by grinding and sieving to obtain fine Moringa leaf powder. Finally, the resulting powder was packaged and stored under appropriate conditions to maintain its quality and shelf life (Harsita & Najah, 2024).

RESULTS AND DISCUSSION

This study was conducted by adding moringa leaf powder to sausages to observe its effect on product quality. The results of the treatment are shown in Figure 1, which illustrates the differences between the sausage without the addition of moringa (P1) and the sausages with 2% (P2) and 4% (P3) moringa leaf powder added.



Figure 1 Sausage Product Results Based on the Addition of Moringa Leaf Powder. (a) P1 with 0% Moringa leaf powder; (b) P2 with 2% Moringa leaf powder; (c) P3 with 4% Moringa leaf powder.

The data from the hedonic preference test for sausage products with varying concentrations of moringa leaf powder are presented in Table 1 and Figure 2. These show a comparison of the average scores

and a visualization via a radar chart, illustrating the panelists' level of acceptance for each treatment tested, across the parameters of color, aroma, texture, taste, and the overall preference score for treatments P1, P2, and P3.

Table 1 The table title is centered in Arial 10 font and placed above the table

No	Parameter	P1 (0% Moringa)	P2 (2% Moringa)	P3 (4% Moringa)
1	Color	3.44 ± 0.651*	2.92 ± 1.038*	1.56 ± 0.768*
2	Aroma	3.28 ± 0.542*	2.60 ± 0.957*	1.88 ± 0.666*
3	Texture	2.76 ± 1.012*	1.84 ± 0.688*	1.60 ± 0.707*
4	Taste	3.28 ± 0.160*	2.36 ± 0.757*	1.64 ± 0.700*
5	Overall	2.92 ± 0.812*	2.12 ± 0.726*	1.64 ± 0.700*

Legend: ns = non-significant at 5% level of significance, * = Significant at 5% level of significance

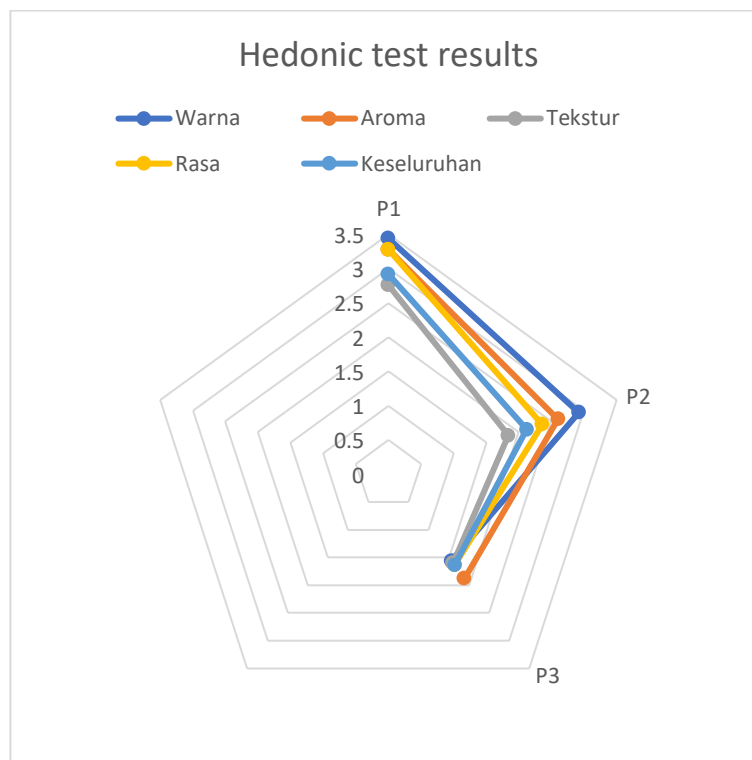


Figure 2 Hedonic Test Results Graph

Analysis of Color Sensory Characteristics

The Kruskal Wallis test results for the color parameter showed a P value less than 0.05, meaning the null hypothesis was rejected and there was a significant difference between treatments P1, P2 and P3 regarding the addition of Moringa leaf powder to the chicken cheese sausage. To identify which groups differed, a Mann Whitney test was performed. The results indicated that the color preference for chicken cheese sausage with the addition of Moringa leaf powder did not differ significantly with a P value greater than 0.05 between P1 and P2. However, there were significant differences with a P value less than 0.05 between P1 and P3 and between P2 and P3 regarding the color preference of the chicken cheese sausage with the addition of Moringa leaf powder. This shows that the addition of Moringa leaf powder influences the color aspect due to the green chlorophyll content in the leaves as noted by (Yulisriani *et al.*, 2024)..

The higher the amount of Moringa powder used the more influence it has on the sausage color by providing a green tint that depends on the concentration of Moringa leaf powder added. This is consistent with previous research showing that panelist preference for color tends to decrease as the concentration of Moringa leaf powder increases as cited by Yulisriani *et al.* in 2024. Based on the organoleptic analysis conducted on the sausage products with treatments P1, P2 and P3, it is known that the resulting color characteristics have met the normal criteria according to the SNI 3820 2015 standard. This indicates that the sausage without the addition of Moringa powder in P1 and with the addition of Moringa powder in P2 and P3 did not cause deviations in color quality parameters, so the product still possesses an acceptable organoleptic profile. This indicates that treatments P1, P2 and P3 are able to maintain the basic color characteristics of the sausage in accordance with the quality limits set by national standards.

Analysis of Aroma Sensory Characteristics

The Kruskal-Wallis test results for the aroma parameter showed a P value less than 0.05, indicating that the null hypothesis was rejected and there was a significant difference between treatments P1, P2, and P3 regarding the addition of Moringa leaf powder to the chicken-cheese sausage. A Mann-Whitney test was performed to identify the differing groups, revealing significant differences ($P < 0.05$) among all treatments (P1, P2, and P3) in terms of aroma preference. This suggests that the addition of Moringa leaf powder significantly impacts the aroma, as higher concentrations intensify the grassy or "langu" odor caused by lipoxidase enzymes present in the leaves, consistent with findings by (Yulisriani *et al.*, 2024)..

In the P1 treatment, a warm, characteristic aroma of nutmeg was evident, as the volatile compounds in nutmeg actively enhanced the aroma and successfully masked the fishy smell typically associated with raw meat. However, the addition of nutmeg was insufficient to minimize the grassy aroma originating from the Moringa leaf powder; consequently, the P2 and P3 formulations retained a distinct grassy, raw plant-like odor that was sensorially undesirable. Organoleptic analysis confirmed that while the P1 treatment met the quality standards for aroma according to SNI 3820:2015, the P2 and P3 treatments did not. The persistent grassy odor in P2 and P3 deviates from the normal requirements defined by SNI 3820:2015, leading to the conclusion that the addition of Moringa leaf powder at these concentrations negatively affects the organoleptic quality of the sausage, resulting in products that do not comply with the prevailing national quality standards.

The organoleptic analysis of the sausage products showed that the aroma parameter for the P1 treatment was within normal conditions and met the quality requirements specified by SNI 3820:2015. Sausages from the P1 treatment exhibited a warm, distinctively fragrant aroma characteristic of nutmeg. The addition of nutmeg provided a robust aroma due to its volatile compounds, which successfully masked the fishy odor typically associated with raw meat. However, this addition was unable to neutralize the grassy or "langu" odor arising from the Moringa leaf powder. In the P2 and P3 treatments, a grassy aroma characterized by an unpleasant, raw plant-like or herbaceous smell was detected. This resulted in sausages that possessed an abnormal aroma profile, failing to meet the quality requirements stipulated by SNI 3820:2015. Consequently, it can be concluded that the P2 and P3 treatments had a significant negative impact on the organoleptic quality of the product regarding aroma, rendering the sausages non-compliant with applicable national quality standards.

Analysis of Taste Sensory Characteristics

The Kruskal-Wallis test results for the taste parameter showed a P value less than 0.05, indicating that the null hypothesis was rejected and there was a significant difference between treatments (P1, P2, and P3) regarding the addition of Moringa leaf powder to the chicken-cheese sausage. A Mann-Whitney test was performed to identify the differing groups, revealing significant differences ($P < 0.05$) among all treatments (P1, P2, and P3) in terms of taste preference. This suggests that the addition of Moringa leaf powder significantly impacts the taste, as higher concentrations result in a less preferred product due to bitterness and a "langu" (raw/grassy) taste. This is consistent with previous research indicating that bitterness is caused by saponin compounds in Moringa leaves, and as the concentration of Moringa powder increases, the bitterness and astringency from tannins become more pronounced, thereby decreasing panelist preference (Yulisriani *et al.*, 2024)..

The P1 sausage sample exhibited a characteristic warm flavor from nutmeg. The compounds in nutmeg play an active role in enhancing the flavor profile and masking the fishy odor of the meat. However, the addition of nutmeg proved insufficient to minimize the raw, grassy taste originating from the Moringa leaves. Consequently, the P2 and P3 formulations retained a distinct raw plant-like or grassy flavor that was sensorially undesirable. Organoleptic analysis showed that the P1 treatment possessed a normal flavor profile that met the quality requirements of SNI 3820:2015. The addition of nutmeg provided a slightly spicy, warm flavor with woody sweetness, enriching the complexity and depth of the savory meat flavor. However, the nutmeg could not mask the bitterness/grassy taste in the sausages fortified with Moringa leaf powder. In the P2 and P3 treatments, the presence of this grassy taste a sensation resembling unpleasant raw green vegetables was detected. The emergence of this taste indicates that the Moringa powder concentration in P2 and P3 had a significant negative impact on the sensory characteristics of the product, resulting in sausages that did not meet the flavor standards established by SNI.

Analysis of Texture Sensory Characteristics

The Kruskal-Wallis test results for the texture parameter showed a P value less than 0.05, indicating that the null hypothesis was rejected and there was a significant difference between treatments (P1, P2, and P3) regarding the addition of Moringa leaf powder to the chicken-cheese sausage. A Mann-Whitney test was performed to identify the differing groups, revealing significant differences ($P < 0.05$) between P1 & P2 and P1 & P3. However, there was no significant difference ($P > 0.05$) between P2 and P3 regarding texture preference.

The addition of Moringa leaf powder caused a change in texture preference, as sausages with higher concentrations tended to be harder and more brittle. This is consistent with previous research showing that increasing the amount of Moringa leaf powder can decrease panelist preference. Moringa leaf powder contains high levels of fiber (Yulisriani *et al.*, 2024).. As the proportion of added Moringa leaf powder increases, the

fiber content in the product also rises, which tends to result in a harder texture. Furthermore, the low starch content in Moringa leaf powder can affect the elasticity of the sausage due to the limited ability of amylopectin in the starch to form a gel (Yulisriani *et al.*, 2024)..

Analysis of Overall Sensory Characteristics

he Kruskal-Wallis test results for the overall parameter showed a P value less than 0.05, indicating that the null hypothesis was rejected and there was a significant difference between treatments (P1, P2, and P3) regarding the addition of Moringa leaf powder to the chicken-cheese sausage. A Mann-Whitney test was performed to identify the differing groups, revealing significant differences ($P < 0.05$) among all treatments (P1, P2, and P3) in terms of overall preference. This is consistent with previous research showing that hedonic quality tests for treatments without the addition of Moringa leaf powder yield high scores, whereas those with the addition of Moringa leaf powder receive lower scores (Yulisriani *et al.*, 2024).

Economic Analysis: Break Even Point (BEP)

Fixed Cost Analysis

Based on Table 2 and table 3, the fixed cost calculation was performed by applying several assumptions, including that the residual value was obtained at 10% of the initial price, and the depreciation method used was the straightline method.

Table 2 Investment Cost Analysis of Equipment and Depreciation Amount for Moringa Leaf Sausage

No	Description	Quantity (Unit)	Useful Life (Years)	Unit Price (Rp)	Total Price (Rp)	Residual Value (Rp)
1	Digital Scale	1	1	20,000	20,000	2,000
2	Chopper	1	5	70,000	70,000	7,000
	Total				90,000	9,000

Table 3 Fixed Cost Analysis for Moringa Leaf Sausage Production

No	Type of Fixed Cost/Year	Fixed Cost/Year (Rp)
1	Depreciation Costs	
	Depreciation cost of digital scale	18,000
	Depreciation cost of chopper	12,600
2	Other Fixed Costs	
	Labor (2 people)	100,000
	Water	300,000
	Electricity 900 watts	360,000
	Total Fixed Cost Per Year	790,600

Variable Cost Analysis

Variable costs are costs that fluctuate depending on production activities. Variable costs increase or decrease in accordance with the quantity of products manufactured. In the production of cheese sausage with the addition of moringa leaf, variable costs include the materials used, such as chicken meat, cheese, moringa leaf powder, and other ingredients.

One production cycle yields 20 packs. Production activities are conducted 4 times per month. The production capacity in one year is 960 packs. The assumption used in calculating variable costs is the material requirements for one production cycle of moringa leaf cheese sausage.

This economic analysis aims to determine whether the chicken cheese sausage business with the addition of moringa leaf can run smoothly and be profitable. To calculate this, a breakdown of capital and business expenditures is required, which is divided into three parts: capital breakdown for purchasing equipment and its depreciation costs in Table 2; fixed costs that must be incurred annually in Table 3; and variable costs or costs of raw materials consumed during the production process in Table 4. With the BEP (Break Even Point), it can be determined how many sausages must be sold for the business to avoid losses or reach the break-even point.

No	Description	Quantity (Unit)	Unit Price (Rp)	Total/Month (Rp) (4x)	Total/Year (Rp)
1	Chicken meat	1000 grams	36,000/kg	144,000	1,728,000
2	Tapioca flour	500 grams	6,000/500g	24,000	288,000

3	Moringa leaf powder	18 grams	3,780/18g	15,120	181,440
4	Cooking oil	50 ml	1,900/50ml	7,600	91,200
5	Egg white	3 items	2,000/item	24,000	288,000
6	Cheese	150 grams	27,600/150g	110,400	1,324,800
7	Baking powder	5 grams	100/10g	20	240
8	Ice cubes	30 grams	5/100g	8	96
9	Garlic powder	5 grams	200/10g	400	4,800
10	Salt	2 grams	1,000/sachet	4,000	48,000
11	Pepper	3 grams	1,000/sachet	4,000	48,000
12	Sugar	3 grams	1,000/sachet	4,000	48,000
13	Powdered broth	3 grams	1,000/sachet	4,000	48,000
14	Nutmeg	1 item	1,000/item	4,000	48,000
	Total				
	Variable Cost			273,548	4,146,576
	Variable Cost/Unit				4,319

The Break Even Point (BEP) is a condition where the total revenue equals the total capital expended (Putri *et al.*, 2025). In this state, a business neither makes a profit nor incurs a loss, meaning the financial position is in equilibrium. The BEP is often used to determine the minimum sales threshold that must be reached so that the costs incurred can be covered.

$$\text{BEP (Unit)} = \frac{TFC}{P - VC} = \frac{790,600}{8,000 - 4,319} = 215 \text{ pack}$$

$$\text{BEP (Rupiah)} = \frac{TFC}{1 - \frac{VC}{P}} = \frac{790,600}{1 - \frac{4,319}{8,000}} = \text{Rp. 1.718.228}$$

Legend / Description:

VC = Variable Cost (Rp/Unit)

TFC = Total Fixed Cost (Rp/Year)

P = Selling Price/Unit (Rp)

Based on the Break Even Point (BEP) analysis in terms of units and currency (rupiah), it was found that the entrepreneur must sell 215 packs of product/year to reach the break-even point, or the equivalent of Rp 1,718,228/year in sales. This means that at this sales volume, the revenue has covered all fixed and variable costs, so the business neither incurs a profit nor a loss.

Economic Analysis: Net Present Value (NPV).

Fixed Cost Analysis

Based on Table 2 and table 3, the fixed cost calculation was performed by applying several assumptions, including that the residual value was obtained at 10% of the initial price, and the depreciation method used was the straightline method.

$$NPV = \sum_{t=1}^n \frac{CF_t}{(1+r)^t} = C_0$$

Legend / Description

NPV = Net Present Value

CF_t = Cash flow in year t

C₀ = Initial expenditure (initial investment)

r = Cost of capital / interest rate

n = Project lifespan

t = 1, 2, 3, 4, etc.

Fixed Cost per year (TFC) = Rp 790,600
Variable Cost per unit (VC) = Rp 4,319
Selling price per unit (P) = Rp 8,000
Production per year = 960 units
Discount rate = 10%

Calculate the net cash flow per year
Annual revenue:

$$\text{Annual} = P \times \text{Unit} = 8.000 \times 960 = 7.680.000$$

Total variable cost per year:

$$VC \times \text{Unit} = 4.319 \times 960 = 4.146.240$$

Gross profit before fixed costs:

$$7.680.000 - 4.146.240 = 3.533.760$$

Net cash flow after fixed costs:

$$3.533.760 - 790.600 = 2.743.160$$

Discounted cash flow per year

$$\frac{CF_1}{(1+r)^1} = \frac{2.743.160}{1,1^1} = 2.493.781$$

$$\frac{CF_2}{(1+r)^2} = \frac{2.743.160}{1,1^2} = 2.267.074$$

$$\frac{CF_3}{(1+r)^3} = \frac{2.743.160}{1,1^3} = 2.061.000$$

$$\frac{CF_4}{(1+r)^4} = \frac{2.743.160}{1,1^4} = 1.873.615$$

$$\frac{CF_5}{(1+r)^5} = \frac{2.743.160}{1,1^5} = 1.703.289$$

$$NPV = 10.398.759 - 790.600 = 9.608.159$$

Based on the positive NPV calculation results of [insert value here], this indicates that the business is profitable with a selling price of Rp 8,000 and a production capacity of 960 units/year.

CONCLUSION

The addition of Moringa leaf powder and nutmeg significantly influences the sensory and economic aspects of chicken-cheese sausage. While Moringa leaf powder enhances nutritional potential, sensory evaluation revealed that higher concentrations (P2 and P3) resulted in a distinct, undesirable grassy odor and bitter taste, causing these treatments to fail in meeting SNI 3820:2015 quality standards for aroma and taste. Conversely, the P1 treatment maintained normal quality characteristics and effectively utilized nutmeg to mask the fishy smell of raw meat. Economically, the business demonstrates strong potential for viability, as evidenced by the positive Net Present Value (NPV) and a clear break-even threshold, indicating that the production of chicken-cheese sausage can be both profitable and sustainable under the analyzed conditions. Future formulations should aim for an optimal balance of Moringa fortification to maximize nutritional benefits while maintaining acceptable sensory profiles for consumer acceptance.

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REFERENCES

- Farag, M. A., Mohsen, E., & El-gendy, A. E. N. G. (2018). Sensory metabolites profiling in *Myristica fragrans* (Nutmeg) organs and in response to roasting as analyzed via chemometric tools. *LWT - Food Science and Technology*. <https://doi.org/10.1016/j.lwt.2018.08.002>
- Harsita, P. A., & Najah, S. (2024). Daya Ikat Air , Keempukan , Kadar Abu , dan Susut Masak Naget Ayam KUB dengan Penambahan Tepung Daun Kelor Water Holding Capacity , Tenderness , Ash Content , and Cooking Loss of KUB Chicken Nuggets with Moringa Leaf Flour Addition. *Jurnal Peternakan*, 21(September), 224–237. <https://doi.org/http://dx.doi.org/10.24014/jupet.v21i2:31832>
- Kurniawati, E., Onoyi, N. J., Yantri, O., Windayati, D. T., Manajemen, P., Ekonomi, F., & Batam, U. (2023). Pelatihan Sosis Sehat Homemade sebagai Sumber Protein Keluarga dan Potensi Penghasilan Tambahan Keluarga di Kampung Bagan Kelurahan Tanjung Piayu, Sei Beduk - Batam. *Jurnal Pengabdian Kepada Masyarakat*, 2(9), 6115–6120. <https://doi.org/https://doi.org/10.53625/jabdi.v2i9.4825>
- Putri, N. A., Wijayanti, R., & Ariyetti. (2025). Analisis Break Event Point (BEP) Produk Mie Basah di Kecamatan Kamang, Sumbar. *Jurnal Hasi Penelitian Dan Pengkajian Ilmiah Eksakta*, 04(02), 185–189. <https://doi.org/https://doi.org/10.47233/jppie.v4i2>
- Yulisriani, R., Qurniawan, A., Lestari, A., Irmawaty, & Nurul, A. D. (2024). Pengaruh Penambahan Tepung Daun Kelor (*Moringa oleifera*) dengan Level Berbeda terhadap Kualitas Fisik Bakso Daging Ayam Broiler. *Jurnal Ilmiah Fillia Cendekia*, 9(2). <https://doi.org/Doi: 10.32503/ fillia.v9i2.6145>