

Preventing Stunting, One Steamed Snack at a Time: Introducing Tateyam Steam

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ABSTRACT

This study developed *Tateyam Steam*, a protein-rich complementary food made from tofu, egg, and chicken, to address toddler stunting. Three formulations were evaluated by 15 trained nutritionists using organoleptic tests for color, aroma, taste, texture, and overall acceptability. Formulation 2 (F2), with a 50:50 tofu-to-chicken ratio, achieved the highest scores in color, aroma, and texture, while Formulation 1 (F1) excelled in taste. Nutritional analysis of F2 revealed per-serving values of 100.4 kcal, 6.0 g protein, 6.9 g fat, and 3.9 g carbohydrates. These findings support *Tateyam Steam* as a promising functional food for stunting prevention

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Key Message

- *Tateyam Steam*, formulated with tofu, egg, and chicken, is a protein-rich complementary food that received high sensory acceptance especially Formulation 2 (50:50 tofu-to-chicken) making it suitable for toddler nutrition programs aimed at stunting prevention.
- Each serving of Formulation 2 provides balanced nutrients: 100.4 kcal of energy, 6.0 g protein, 6.9 g fat, and 3.9 g carbohydrates, confirming its potential as a functional, locally sourced food to improve early childhood growth.

INTRODUCTION

Stunting remains a critical public health issue, affecting approximately 22% of children globally, with over 149.2 million cases reported in 2020 (1). Indonesia ranked second highest in Southeast Asia for stunting prevalence after Timor Leste. Although the incidence shows a decreasing trend—from 24.4% in 2021 to 21.6% in 2022 it remains above the World Health Organization's target of less than 20% (2). This condition, defined as impaired linear growth due to chronic undernutrition, poses long-term consequences for children's physical and cognitive development, and increases their vulnerability to illness and mortality.

Stunting typically emerges during the first 1,000 days of life from conception to two years of age and becomes clinically evident after a child reaches two years old. The condition is classified into *stunted* and *severely stunted* based on height-for-age metrics using WHO growth standards (3). Key contributing factors include maternal nutrition, breastfeeding practices, inadequate complementary feeding, and recurrent infections. Addressing early childhood nutritional deficits is crucial to prevent irreversible developmental setbacks and to improve health outcomes in adulthood.

One of the strategic interventions to mitigate stunting is the provision of *Pemulihan* Complementary Feeding, aimed at enhancing the nutritional status of children with growth faltering, involves offering high-quality, safe, and nutrient-dense snacks tailored to meet children's dietary requirements (4). Incorporating local functional foods into PMT is considered cost-effective and culturally acceptable, thereby improving compliance and impact.

Among macronutrients, animal protein plays a pivotal role in promoting linear growth due to its superior amino acid profile compared to plant-based sources. Studies have consistently demonstrated the positive correlation between animal protein intake—such as meat, eggs, and dairy and growth outcomes in early childhood. Thus, developing PMT formulations rich in animal protein, like the *Tateyam Steam* (Tofu, Egg, Chicken), presents a promising approach to combat stunting in Indonesian toddlers.

Specific Objective To identify the most organoleptically acceptable formulation of *Tateyam Steam* based on sensory parameters of color, aroma, taste, and texture and to evaluate its nutritional composition as a high-protein complementary food suitable for preventing stunting in toddlers.

METHOD

The study employed a **descriptive research design**, aiming to evaluate the sensory quality and acceptability of *Tateyam Steam*, a protein-rich complementary food made from tofu, egg, and chicken. Three distinct formulations (F1, F2, and F3) were created by varying the ratios of chicken and tofu. Formulation 1 (F1) consisted of 75 grams of chicken and 25 grams of tofu, Formulation 2 (F2) had equal parts chicken and tofu (50 grams each), and Formulation 3 (F3) reversed the ratio with 25 grams of chicken and 75 grams of tofu. Each formulation underwent organoleptic testing using a hedonic scale to assess five key parameters: color, aroma, taste, texture, and overall acceptance. The goal was to determine which composition was most favored by trained panelists. The *Tateyam Steam* complementary food was developed in three distinct formulations, each designed to examine variations in ingredient composition and their sensory impact.

Formulation 1 (F1) incorporated a higher proportion of chicken (75 g) and a lower amount of tofu (25 g), aiming to enhance flavor intensity with animal protein. It also contained 55 g of egg, 50 g of carrot, 20 g of wheat flour, 10 g of tapioca flour, 5 cloves of garlic, 2 cloves of shallot, ¼ teaspoon of salt, and 5 g of cooking oil.

Formulation 2 (F2) presented a balanced ratio of tofu and chicken, with each contributing 50 g to the mixture. Eggs were added at 55 g, carrots at 25 g, wheat flour at 20 g, tapioca flour at 10 g, along with the same seasoning profile: 5 cloves of garlic, 2 shallots, ¼ teaspoon of salt, and 5 g of oil.

Formulation 3 (F3) reversed the proportion seen in F1 by increasing tofu to 75 g and reducing chicken to 25 g, while maintaining 55 g of egg. Additional ingredients included 20 g of carrot, 10 g of wheat flour, 5 g of tapioca flour, 2 cloves of garlic, 2 cloves of shallot, ¼ teaspoon of salt, and 5 g of cooking oil.

These formulations were designed to explore not only nutrient composition but also sensory acceptability among trained panelists. By adjusting the tofu-to-chicken ratio, the study aimed to identify the optimal balance between flavor, texture, and nutritional value to support stunting prevention initiatives. The materials used in this study included both kitchen instruments and raw ingredients. Tools comprised a mixing bowl, plastic spatula, chopper, molds, steaming pot, and a non-stick frying pan (*Teflon*). The food ingredients included tofu, chicken breast, eggs, grated carrot, wheat flour, tapioca flour, garlic, shallots, salt, and cooking oil. These components were selected based on their nutritional profile, sensory contribution, and compatibility with toddlers' dietary needs.

Preparation of the *Tateyam Steam* product followed a standardized procedure. Tofu and chicken were first ground separately using a chopper until smooth. Carrots were finely grated, and both garlic and shallots were chopped and sautéed lightly in a small amount of oil. All ingredients were then combined in a mixing bowl—together with eggs, flours, and seasoning—and stirred until the mixture was evenly blended. The batter was poured into pre-greased molds and steamed for 30 minutes until fully cooked. After cooling, the samples were cut into bite-sized pieces suitable for toddler consumption.

Sensory evaluation was performed by 15 trained panelists who were certified nutritionists affiliated with RSUP Prof. Dr. I.G.N.G. Ngoerah Denpasar. Prior to the study, all panelists received standardized training on organoleptic assessment to ensure consistency and reliability. Each panelist rated the product using a three-point hedonic scale across the five sensory attributes mentioned earlier. The findings from these evaluations were used to determine the most acceptable formulation based on collective preferences.

RESULTS

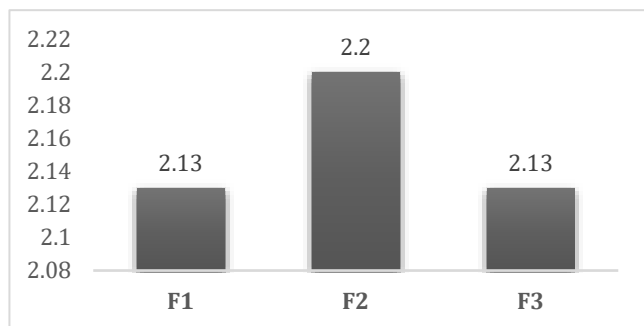
Color Acceptability

Based on the hedonic test results shown in Graphic A, the panelists' highest color preference was recorded for **Formulation 2 (F2)**, which received an average rating of 2.2 classified as "liked" on the three-point scale. Approximately 80% of the trained panelists indicated that they liked the color of F2. This suggests that the equal proportion of tofu and chicken in this formulation produced an appearance that was visually acceptable. The combination created a natural white base with a hint of orange from the grated carrot, enhancing its visual appeal for toddler-friendly food.

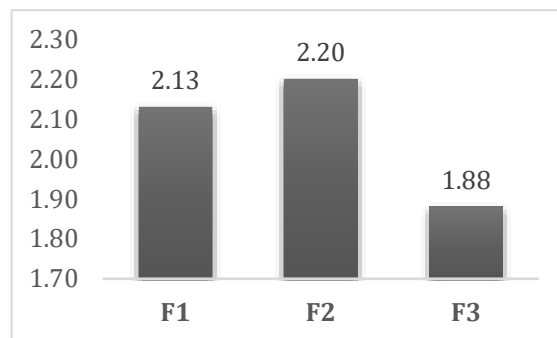
Aroma Acceptability

Graphic B displays that **Formulation 2 (F2)** also achieved the highest score for aroma, with an average panelist rating of 2.2, classified as "liked." A majority of panelists (80%) favored the aroma of F2, which was attributed to the balanced blend of tofu and chicken (50:50). The absence of a strong beany odor from tofu, combined with the appetizing scent of cooked

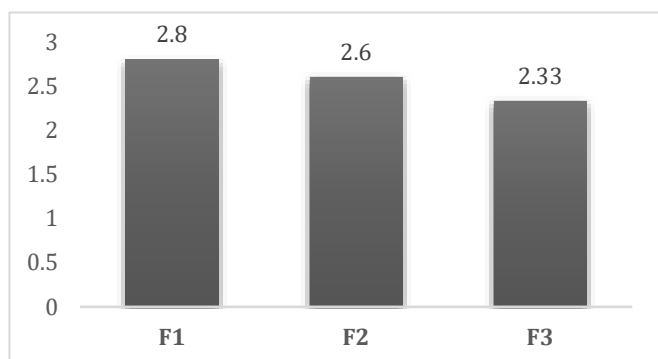
chicken and sautéed spices, contributed to a pleasant overall aroma. This formulation appears to meet olfactory expectations for supplementary foods designed for children.



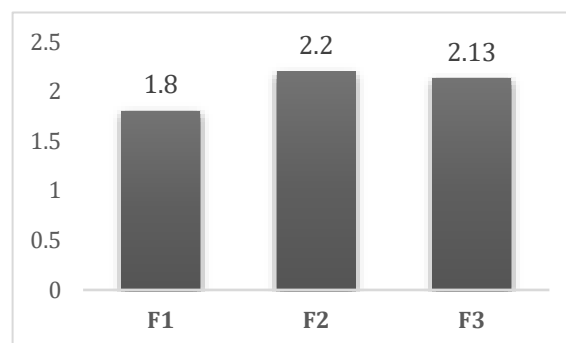
A. Color Acceptability



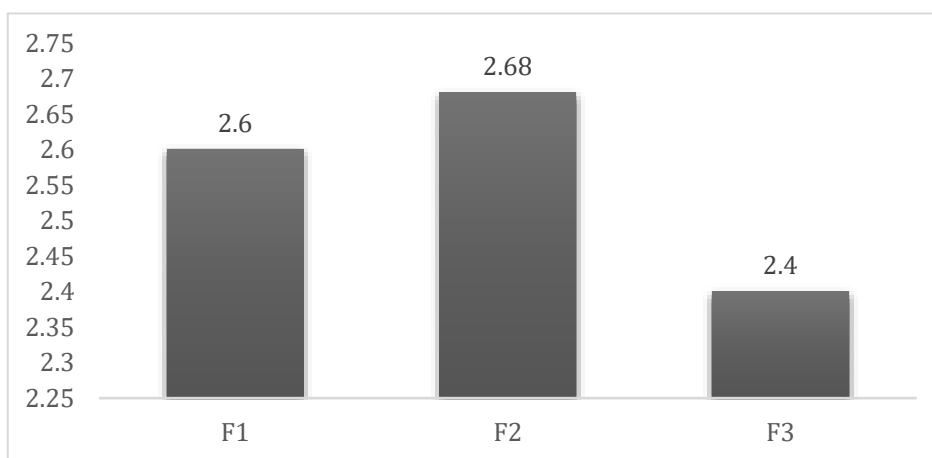
B. Aroma Acceptability



C. Taste Acceptability



D. Texture Acceptability



E. Overall Acceptability

Figure 1. Organoleptically acceptable formulation

Taste Acceptability

In terms of taste, Graphic C indicates that **Formulation 1 (F1)** was the most preferred, earning an average rating of 2.8—close to the maximum score of “very liked.” About 80% of panelists expressed a strong liking for F1’s flavor profile, which featured a higher proportion of chicken (75%) compared to tofu (25%). The dominance of savory chicken provided a rich and palatable taste that resonated strongly with panelists’ preferences. This suggests that enhancing the meat content in protein-rich snacks may improve their taste acceptability among health professionals and caregivers.

Texture Acceptability

Graphic D illustrates that **Formulation 2 (F2)** led in texture appreciation, receiving an average score of 2.2 from panelists, falling into the “liked” category. A total of 80% of panelists preferred the texture of F2, which was perceived as smooth, tender, and easy to chew—ideal for toddler consumption. The equal balance of tofu and chicken created a texture that was

neither too firm nor too mushy. This equilibrium in consistency made it more favorable across the different formulations tested.

Overall Acceptability

Graphic E summarizes the panelists' overall impressions, showing that Formulation 2 (F2) was the most preferred among all, with 66.7% rating it as "very liked" and the remainder as "liked." The average overall rating for F2 placed it at the top across all sensory parameters. Panelists considered it most acceptable in terms of color, aroma, texture, and overall balance, even though taste was highest in F1. This implies that F2 represents the most balanced and well-received product formulation, making it suitable for further nutritional development and public health application in stunting prevention.

Nutritional Composition per Serving of Tateyam Steam

One serving of Tateyam Steam—formulated from tofu, chicken, and eggs—provides a balanced nutritional profile suitable for toddler consumption. Each portion contains: Energy: 100.4 kcal, Protein: 6.0 grams, Fat: 6.9 grams, and Carbohydrates: 3.9 grams. This composition offers a dense source of animal and plant-based protein, with moderate fat and minimal carbohydrate content. The formulation is specifically designed to support early childhood growth and contribute to stunting prevention, particularly through its high protein-to-calorie ratio. The protein content exceeds the average value found in conventional snacks, making Tateyam Steam a functional food tailored for supplementary nutrition programs.

DISCUSSION

Functional foods are dietary items that, due to their active components beyond basic nutrients, provide health benefits and are a natural part of everyday meals with acceptable sensory qualities (5). In this study, a functional complementary food product Tateyam Steam was developed using tofu, eggs, and chicken as its core ingredients. Prior to final formulation, a sensory evaluation was conducted to assess its acceptability. Organoleptic testing, which involves human senses as measurement tools, was applied to determine panelists' acceptance of the product (6).

The sensory assessment involved 15 trained nutritionist panelists from RSUP Prof. Dr. I.G.N.G. Ngoerah Denpasar. Three formulations of Tateyam Steam were evaluated using a hedonic scale ranging from 1 (dislike) to 3 (like very much). Among the sensory attributes evaluated, color served as the initial visual cue and often influences overall consumer acceptance (7). Results indicated that the majority of panelists 80% preferred Formulation 2 (F2), which featured a 50:50 ratio of tofu and chicken. This variant presented a visually appealing blend of white and orange hues from the incorporated carrot, supporting its acceptance.

Aroma is a vital organoleptic attribute and plays a significant role in the food industry's quality assurance (8). The acceptability of aroma in F2 was likewise high, with 80% of panelists expressing preference. The even distribution of tofu and chicken helped create a well-balanced fragrance, enhanced by sautéed spices and free from the undesirable beany scent commonly associated with tofu. This suggests that ingredient harmony improves olfactory satisfaction.

Flavor perception is directly influenced by taste and the consistency of texture, both of which shape sensory experience (9). Among the three formulas, Formulation 1 (F1) with 75% chicken and 25% tofu earned the highest taste rating, with 80% of panelists indicating strong preference. The greater proportion of savory chicken contributed to a distinct, flavorful profile, reflecting the importance of animal protein in enhancing palatability in toddler nutrition formulations.

Food texture reflects a product's structural integrity under pressure and is shaped by base ingredients and processing techniques (7). F2 again emerged as the most favored in terms of texture, as reported by 80% of panelists. Its equal composition of chicken and tofu resulted in a soft, tender consistency—neither too firm nor overly mushy—which meets the needs of young children. Overall, F2 was identified as the most balanced and acceptable formulation across color, aroma, texture, and total impression.

Subsequently, nutritional analysis was performed for F2, which contains four pieces per serving with a total weight of approximately 52 grams. Each serving provides 100.4 kcal of energy, 6.0 grams of protein, 6.9 grams of fat, and 3.9 grams of carbohydrates. This nutrient profile highlights the product's potential as a functional complementary food to support early childhood development and stunting prevention.

CONCLUSION

The sensory evaluation of *Tateyam Steam*—a protein-rich complementary food formulated from tofu, egg, and chicken—demonstrated that Formulation 2 (F2) was the most well-received across multiple attributes. Panelists showed the highest preference for F2 in terms of color, aroma, and texture, with 80% rating it as "liked" or "very liked." While Formulation 1 (F1) led in taste due to its higher chicken content, F2 offered the most balanced organoleptic qualities and overall acceptability. These findings suggest that a 50:50 ratio of tofu to chicken produces a formulation that meets both nutritional and sensory standards suitable for toddler consumption.

The nutritional analysis further supports F2's suitability as a functional complementary food for stunting prevention. A single serving of four pieces (approximately 52 grams) provides 100.4 kilocalories, 6.0 grams of protein, 6.9

grams of fat, and 3.9 grams of carbohydrates. With its balanced nutrient profile and high acceptability, F2 presents a promising intervention for improving dietary intake among children at risk of stunting. The use of locally available, culturally accepted ingredients such as tofu, chicken, and eggs also enhances the practicality and sustainability of *Tateyam Steam* in public health nutrition programs.

REFERENCE

1. Nabwera HM, Mwangome MK, Prentice AM. Stunting of Growth in Developing Countries. *World Rev Nutr Diet*. 2022;125:14-27. doi: 10.1159/000521775. Epub 2022 Mar 4. PMID: 35249019.
2. Ministry of Health of the Republic of Indonesia. Report on the Study of Nutritional Status in Indonesia 2022. Jakarta, Indonesia
3. Nurjayanti, E. D., Oktavia, E., Susanti, I., Kesehatan, P., & Khasanah, U. (2024). The Effect of Maternal Nutrition Knowledge on Stunting in Children Under Five at Karangmojo II Public Health Center in 2024. *Jurnal Kesehatan Dan Teknologi Medis (JKTM)*, 06(03), 400–409.
4. Nelista, Y., & Fembi, P. N. (2021). The Effect of Local-Based Supplementary Food on Weight Change in Undernourished Children Under Five. *PREPOTIF : Jurnal Kesehatan Masyarakat*, 5(2), 1228–1234. <https://doi.org/10.31004/prepotif.v5i2.2426>
5. Suter, I. K. (2013). *Functional Foods: Development Prospects And Opportunities*. <https://doi.org/10.1093/ajcn/64.2.255>
6. Suryono, C., Ningrum, L., & Dewi, T. R. (2018). Preference and Organoleptic Test of 5 Packaging and Products from Thousand Islands: A Descriptive Study. *Jurnal Pariwisata*, 5(2), 95–106. <https://doi.org/10.31311/par.v5i2.3526>
7. Lestari, S. R., Dewi, T. K., Ayu Ningtyas, R., & History, A. (2022). Consumer Acceptance of Snack Bar. *Media Gizi Pangan*, 29, 2022. <https://doi.org/10.32382/mgp.v29i1.2807>
8. Khalisa, K., Lubis, Y. M., & Agustina, R. (2021). Sensory Evaluation of Starfruit Juice (*Averrhoa bilimbi*). *Jurnal Ilmiah Mahasiswa Pertanian*, 6(4), 594–601. <https://doi.org/10.17969/jimfp.v6i4.18689>
9. Arziyah, D., Yusmita, L., & Wijayanti, R. (2022). Organoleptic Quality Analysis of Cinnamon Syrup with Modified Ratio of Palm Sugar and White Sugar Concentrations. *Jurnal Penelitian Dan Pengkajian Ilmiah Eksakta*, 1(2), 105–109. <https://doi.org/10.47233/jppie.v1i2.602>