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SUBSTITUTION OF YELLOW SWEET POTATO FLOUR AND TUNA FISH IN MAKING TAREMPA NOODLES (MI TABITU) AS A ONE DISH MEAL FOR TEENAGERS

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ABSTRACT

The study aims to: (1) finding recipe for Mi Tabitu product, (2) determining the presentation and packaging of Mi Tabitu product, (3) knowing the level of adolescents' preference for Mi Tabitu, (4) knowing the nutritional content of Mi Tabitu product, and (5) determining the selling price and BEP of Mi Tabitu product. The type of research uses R&D (Research and Development) with the 4D development model method: (1) define stage, determine 1 reference recipe from 3 different recipes, (2) design stage, determine 1 best development product recipe from 3 formulations. (3) the develop stage, determining the presentation and packaging techniques, as well as the validation test of the reference and selected development recipes through a limited preference test, and (4) the disseminate stage, the liking test of Mi Tabitu products by 80 adolescent panelists at the Wates UNY Campus, proxy test, and calculating the selling price and BEP. The place and time of the research were conducted at the UNY Wates Campus and the Chem-Mix Pratama Laboratory, Bantul, DIY in September 2024 – March 2026. The data analysis method uses quantitative descriptive and paired t-test.

The results of the study show that: (1) The right formulation for Mi Tabitu is to substitute 15% yellow sweet potato flour and 15% tuna in the manufacture of noodles, (2) Presentation and packaging Mi Tabitu is using a concave plate and a 500 ml paper bowl with a product weight of 150 g, (3) Test the preference of reference products and different development products, panelists prefer development products, (4) Information on the nutritional value of Tabitu Noodle products consists of a total energy of 421 kcal, energy from fat 250 kcal, fat 25 g (RDA 36%), protein 15 g (RDA 23%), carbohydrates 34 g (RDA 11%), and crude fiber 12 g (RDA 41%), (5) The selling price of Mi Tabitu products per package are IDR 19,800 with BEP units of 7 units and BEP rupiah of IDR 130,435.

Penelitian ini bertujuan untuk: (1) Menemukan resep produk Mi Tabitu, (2) menentukan penyajian dan kemasan produk Mi Tabitu, (3) Mengetahui tingkat kesukaan remaja terhadap Mi Tabitu, (4) Mengetahui kandungan gizi produk Mi Tabitu, dan (5) Menentukan harga jual dan BEP terhadap produk Mi Tabitu.

Jenis penelitian menggunakan R&D (*Research and Development*) dengan metode model pengembangan 4D: (1) Tahap *define*, menentukan 1 resep acuan dari 3 resep berbeda, (2) Tahap *design*, menentukan 1 resep produk pengembangan terbaik dari 3 formulasi. (3) Tahap *develop*, menentukan teknik

penyajian dan kemasan, serta uji validasi terhadap resep acuan dan pengembangan terpilih melalui uji kesukaan terbatas, dan (4) tahap *disseminate*, uji kesukaan terhadap produk Mi Tabitu oleh 80 panelis remaja di Kampus Wates UNY, uji proksimat, dan menghitung harga jual dan BEP. Tempat dan waktu penelitian dilakukan di Kampus Wates UNY dan Laboratorium Chem-Mix Pratama, Bantul, DIY pada bulan September 2025 – Maret 2026. Metode analisis data menggunakan deskriptif kuantitatif dan uji paired t-test. Hasil dari penelitian menunjukan bahwa: (1) Formulasi yang tepat untuk pembuatan Mi Tabitu yaitu mensubstitusikan 15% tepung ubi jalar kuning dan 15% ikan tuna pada tepung terigu, (2) Penyajian dan kemasan Mi Tabitu menggunakan piring cekung dan *paper bowl* 500 ml dengan berat produk 150 g, (3) Uji kesukaan produk acuan dan produk Mi Tabitu berbeda nyata, target konsumen (remaja) menerima produk Mi Tabitu, (4) Informasi nilai gizi produk Mi Tabitu terdiri dari energi total 421 kkal, energi dari lemak 250 kkal, lemak 25 g (AKG 36%), protein 15 g (AKG 23%), karbohidrat 34 g (AKG 11%), dan serat kasar 12 g (AKG 41%), (5) Harga jual produk Mi Tabitu per kemasan yaitu Rp19.800 dengan BEP unit sebesar 7 unit dan BEP rupiah Rp130.435.

1. Introduction

Adolescence is a transitional phase from childhood to adulthood which is characterized by various changes, both physically, mentally, and psychosocially (feelings, behaviors, and thoughts) [1]. Unhealthy lifestyle and eating habits among adolescents have become a growing public health concern in various countries, including Indonesia. Diet is one of the important factors that affect the nutritional status of adolescents and the fulfillment of nutrition in the body. However, today's adolescent diets tend to lead to consumption patterns with an unbalanced nutritional composition. Some teenagers have a habit of eating fast food or the like. Fast food is generally high in calories, but has a relatively low nutritional content [2].

One of the efforts that can be made to meet the nutritional needs of adolescents is to develop a concept of food that is practical and easy to consume. The dish is designed so that in one serving it contains complete nutrients, including carbohydrates, proteins, fats, and fiber. The concept of this dish is called a one-dish meal, which is a dish designed to meet nutritional needs in one meal.

Processed noodles are an example of a one-dish meal because one serving contains important nutrients, such as carbohydrates, protein, and fiber, and is served practically in one dish [3]. Indonesia has a variety of traditional noodle processed products from their respective regions. In several major cities in the Riau Islands, such as Batam, Tanjung Pinang, and surrounding islands, tarempa noodles are one of the most popular dishes, especially among teenagers to adults. Tarempa noodles are a typical food from the Riau Islands made from yellow noodles that are thicker and flatter. This dish is usually cooked with red spices combined with other spices. Tarempa noodles have significant limitations in innovating products to date. The changes made are generally still limited to the variety of complementary ingredients, such as replacing cod fish with shrimp or squid, chicken, or beef [4].

In this study, yellow sweet potato flour and tuna fish will be used as basic ingredients in the development of noodle products. The selection of the two ingredients is based on the fact that their use has not been optimal in food processing [5]. Yellow sweet potato (*Ipomea batatas L*.) is one of the food commodities that has a fairly good nutritional value because it contains important nutrients, such as carbohydrates, vitamins, fiber, minerals, and calories that are quite high [6]. Nevertheless, despite having nutritional advantages, yellow sweet potato flour has a relatively low protein content. One of the sources of animal protein that has good potential to be developed is tuna. In this study, the tuna fish used was the blue tuna species (*Thunnus Thynnus*).

This research aims to develop tarempa noodles made from yellow sweet potato flour and tuna fish named "Mi Tabitu". This research includes several aspects of the study, including finding the Mi Tabitu recipe, determining the way Mi Tabitu products are served and packaged, identifying the level of liking Mi Tabitu among adolescents, analyzing the nutritional content contained in the product, and calculating the selling price and break-even point of Mi Tabitu products.

2. Method

The type of research used in this study is the R&D (Research and Development) development procedure and the 4D development model. 4D consists of 4 stages, namely: Define, Design, Develop, and Disseminate [7].

This research was conducted at the Culinary Laboratory and Chemistry Laboratory, Department of Culinary Fashion and Makeup, Faculty of Vocational, Yogyakarta State University and Chem-Mix Pratama Laboratory, Bantul, Special Region of Yogyakarta. This research began from September 2025 to March 2026.

The ingredients used in this study were wheat flour, yellow sweet potato flour, tuna, chicken eggs, salt, xanthan gum, onion, garlic, red cayenne pepper, red chili, sweet soy sauce, tomato sauce, and bean sprouts. Then, the tools used are a comb, blender, cutting board, knife, noodle mold/noodle grinder, scales, stock pot, and stove.

The first stage starts from *define*, which is to set 1 reference recipe from 3 different recipes. Followed by organoleptic tests on 5 trained panelists. Then, the *design stage*, namely the selected reference recipe, is designed with 3 different formulations to establish 1 development recipe. Followed by organoleptic tests on 5 trained panelists.

Furthermore, the *development stage*, determining the presentation and packaging techniques of the product by conducting a validation test 1. After that, the last stage is *disseminate.* This stage spreads the product to find out the level of consumer preference for the development product. In this stage, it also determines the nutritional content through proximate tests and calculates the selling price and *BEP* on development products.

3. Results and Discussion

3.1 Results

a. Recipe

1) Define Stage

The *define stage* is the process of determining the most appropriate reference recipe that will be used for the next stage.

Table 1. Reference Recipe from 3 References

No	Ingredients	R1	R2	R3
1	High protein wheat flour (g)	500	500	300
2	Chicken eggs (btr)	2	4	3
3	Air (ml)	130		
4	Salt (g)	5	5	5
5	Oil (g)		10	10
6	Baking soda (g)		1	

Description :

R1 : CR Cook, 2019

R2 : Jobsheet TPMM, 2016

R3 : Cookpad

The three reference recipes above were organoleptically tested by 5 trained panelists and resulted in R1 being the selected reference recipe that will be used for the next stage. The

characteristics of the R1 are flat, long, and slightly wide. It has a yellowish-white color, has a floury flavor, a floury taste, and has a chewy texture.

2) Design Stage

At this stage, two processes are carried out, the first stage is a trial of adding yellow sweet potato flour with three formulations. At this stage, xanthan gum is also added so that the texture produced is optimal.

Table 2. Design Stage 1 Recipe

No.	Ingredients	F0	Product Development		
			F1 (15%)	F2 (20%)	F3 (25%)
1	Wheat flour	500 gr	425 gr	400 gr	375 gr
2	Yellow sweet potato flour	-	75 gr	100 gr	125 gr
3	Chicken eggs	100 gr	100 gr	100 gr	100 gr
4	Air	130 ml	130 ml	130 ml	130 m1
5	Salt	5 gr	5 gr	5 gr	5 gr
6	*Xanthan Gum*	-	5 gr	5 gr	5 gr

The three formulations above were organoleptically tested by 5 trained panelists and resulted in F1 (15%) being the selected development recipe to be used for the next stage. The characteristic of F1, which is the shape of a rather large, long skewer. It has a yellow color, has a yellow sweet potato flavor, has a yellow and sweet sweet potato taste, and has a chewy texture.

At this stage, it is to make three formulation recipes for adding tuna fish to *the* selected stage 1 design recipe, namely F1.

Table 3. Design Stage 2 Recipe

No.	Bahan	F0	Product Development		
			F1 15%	F2 20%	F3 25%
1	Wheat flour	425 gr	361.25 gr	340 gr	318.75 gr
2	Yellow sweet potato flour	75 gr	75 gr	75 gr	75 gr
3	Tuna fish	-	63.75 gr	85 gr	106.25 gr
4	Chicken eggs	100 gr	100 gr	100 gr	100 gr
5	Air	130 ml	130 ml	130 ml	130 m1
6	Garam	5 gr	5 gr	5 gr	5 gr
7	*Xanthan Gum*	5 gr	5 gr	5 gr	5 gr

The three formulations above were organoleptically tested by 5 trained panelists and resulted in F1 (15%) being the preferred development recipe. The characteristics of F1 are straight, long. It has a pale yellow color, has a yellow sweet potato and tuna flavor, tastes savory and sweet, and has a chewy texture.

3) **Stages of Develop**

At this stage, the development recipe that had been set in the previous stage was continued with the addition of spices and complementary ingredients.

Tabel 4. Mi Tabitu Recipe

Ingredients	Quantity	How to make
Wheat flour	361,25 gr	1. Prepare all the ingredients 2. Clean the fish, take the meat. Soak with water and lime juice for about 10 minutes.
Yellow sweet potato flour	75 gr	
Tuna fish	63,75 gr	
eggs	100 gr	

Ingredients	Quantity	How to make
Water	130 ml	3. Noodle batter: Mix wheat flour, yellow sweet potato flour, salt, *xanthan gum.* Stir until evenly distributed. 4. Add the tuna, chicken eggs, and water. Stir until well combined. 5. Mix until the dough is mixed (no need until smooth). 6. Let the dough rest for about 15 minutes. 7. Grind the dough to a thickness of 2 mm, then cut the dough about 3 mm wide. Sprinkle with tapioca flour. 8. Boil the noodles in boiling water that has been salted and oil for about 3 minutes. 9. Cooked noodles coated with oil.
Salt	5 gr	
Xanthan Gum	5 gr	
Red chili peppers		1. Prepare all the ingredients 2. Puree the whole chili, onion. 3. Sauté the mashed spices until cooked. 4. Add 500 ml of water, sweet soy sauce, oyster sauce, ketchup, and salt. Wait for it to boil. Taste correction. 5. When it is boiling, add the chicken eggs and stir. 6. When the gravy has thickened and the flavor is just right, turn off the heat.
Red cayenne pepper	10 pieces	
Shallots	5 pieces	
Garlic	7 pieces	
Chicken eggs	2 pieces	
Salt	additional	
Soy sweet sauce	30 ml	
Oyster sauce	10 ml	
Tomato sauce	20 ml	
Tauge		1. Blanch beans, set aside. 2. The tuna that has been soaked earlier is stir-fried, add salt and pepper. 3. The cooked noodles were arranged on a plate, drizzled with gravy and bean sprouts, tuna, green onions, and fried onions. 4. Tabitu noodles are ready to be served.
Tuna fish	500 gr	
Leeks	additional	
Fried onions	additional	

The product was validated 1 by 2 *experts*, then got the results without the need for improvement. At this stage, nothing needs to be updated anymore, so it can be continued to a limited preference test by testing reference products and development products on 30 semi-trained panelists (food students).

4) Stages Disseminate

At this stage, the product was tested on a wide scale, a panelist test was carried out on general adolescents with approximately 80 teenagers at the Wates campus, Yogyakarta State University. Testing is done by testing sensory properties, including color, aroma, taste, texture, and the overall product.

b. Presentation and Packaging

The presentation of Mi Tabitu uses a plate made of slightly concave ceramics. The noodles are laid out on a plate equipped with spices and various complementary ingredients, such as minced tuna, bean sprouts, fried onions, and green onions. The arrangement aims to increase attractiveness, so that the product is more attractive to consume.

Figure 1. Serving Mi Tabitu (Private document, 2025)

The packaging of Mi Tabitu is a *closed paper bowl* with a size of 500 ml and a fork made of bamboo. The packaging is also labeled with information, such as composition, nutritional value, allergen content, product weight, product name, *expiration date*, manufacturer identity.

Figure 2. Packaging and labels (Personal documents, 2025)

c. Favorite Levels

The level of likeness on a limited scale for Mi Tabitu products was obtained by the results of sensory tests that had been carried out on 30 semi-trained panelists from the culinary students (batch 23).

Tabel 5. Paired *T-test* Preferred Level Limited Scale

Sensory	Reference product			Product Development			p-value	Remarks
Color	4,2	±	0,7	4	±	0,7	0,1	No real difference
Aroma	4,2	±	0,8	4,15	±	0,6	0,9	No real difference
Flavor	4,05	±	0,7	4	±	0,7	0,5	No real difference
Texture	4,0	±	0,7	3,9	±	0,6	0,3	No real difference
Overall	4,1	±	0,6	4	±	0,5	0,2	No real difference

Based on the table above, the results of a limited preference test with a panelist test of 30 D4 UNY culinary students class of 2023, it is concluded that there is no significant difference between the Products. Reference and Product Development in terms of color, aroma, taste, texture, and overall at a significance level of 0.05 because all p-value results are greater than 0.05.

Tabel 6. *Wide-Scale Preferred Paired T-test*

Sensory properties	Mold Products			Product Development			p-value	Remarks
Color	4,2	±	0,6	4,6	±	0,6	0,0003	Real differences
Aroma	4,1	±	0,7	4,5	±	0,5	0,00001	Real differences
Taste	4,3	±	0,6	4,7	±	0,5	0,00001	Real differences
Tekstur	4,2	±	0,7	4,6	±	0,6	0,0005	Real differences
Overall	4,3	±	0,5	4,7	±	0,4	0,0000003	Real differences

The level of panelists' likability in development products is greater than the reference product, so the Mi Tabitu product can be well received by the panelists (teenagers).

d. Nutritional Content and Nutritional Value Information

Mi Tabitu products are tested in the laboratory to find out their nutritional content. The results of laboratory tests are known, then *a paired t-test is carried out* to find out the difference in nutritional content between the reference product and the development product.

Tabel 7. Paired *T-test* for Nutritional Content

Campaign (%)	Reference product			Development product			p-value	Information
Water	66,7	±	0,08	68,2	±	0,03	0,02	Really different
Ash	1,2	±	0,02	1,2	±	0,04	0,06	No real difference
Protein	5,0	±	0,09	5,4	±	0,07	0,06	No real difference
Fat	9,2	±	0,02	9,0	±	0,01	0,06	No real difference
Carbohydrate	14,7	±	0,03	12,0	±	0,05	0,06	No real difference

Based on the table above, it shows that the nutritional content of development products has increased from reference products. However, after calculation through *the paired t-test*, the nutritional value content showed differences in the components of ash, protein, fat, carbohydrates, energy, crude fiber in the reference and development products, which were not significantly different, but in the water components were significantly different.

Tabel 8. Information on the Nutritional Value of Tabitu Noodles

NUTRITIONAL VALUE INFORMATION		
Serving size	150 gram	
Number of servings per package	1	
Total energy		421 kkal
Energi dari lemak		250 kkal
		%AKG
Fat	25 g	36%
Protein	15 g	23%
Carbohydrate	34 g	11%
Coarse Fiber	12 g	41%
Persen AKG berdasarkan kebutuhan energi 2100 kkal. Kebutuhan energi anda mungkin lebih tinggi atau rendah		

The product developed with a serving size of 150 grams contains nutritional content, namely, total energy of 421 kcal, energy from fat 250 kcal, fat 25 g (AKG 36%), protein 15 g (AKG 23%), carbohydrates 34 g (AKG 11%), and crude fiber 12 g (AKG 41%). It can be concluded that the nutritional value information for development products is that total energy, protein, and crude fiber have increased, but there has been a decrease in fat and carbohydrate content.

Selling Price and BEP

Selling Price = HPP + (% profit x COGS)
= IDR 15,228+ (30% x IDR 15,228)
= IDR 19,796.4, rounded to 19,800/product

BEP Unit $= \frac{Fixed\ cost}{Price\ per\ unit - Variable\ cost\ per\ unit}$

$= \frac{30.000}{19.800 - 15.228}$

$= \frac{30.000}{4.572}$

= 6,56 unit = 7 unit

BEP IDR $= \frac{Fixed\ cost}{1 - (variable\ cost\ per\ unit : selling\ price)}$

$= \frac{30.000}{1 - (15.228 : 19.800)}$

$= \frac{30.000}{1-0,77} = \frac{30.000}{0,23}$ = 130.434,8 = IDR 130.435

3.2 Discussion

After several stages were carried out, this study used the 4D method (Define, Design, Develop, Disseminate). Therefore, the most appropriate recipe in making noodles is to substitute 15% yellow sweet potato flour from 100% wheat flour, 15% tuna from 75% wheat flour, and add 1% Xanthan Gum from 100% wheat flour. With this formulation recipe, you will get a good shape, aroma, texture, and taste of noodles.

After getting the right recipe for Mi Tabitu products, of course in terms of presentation and packaging, it is necessary to pay attention. The presentation used for Mi Tabitu products uses a slightly concave plate. Tabitu noodles are arranged on a plate with a splash of gravy that is not too much. Then, the products are given complementary ingredients, such as minced tuna, bean sprouts, sliced green onions, and fried onions. The packaging of Mi Tabitu is using a 500 ml paper bowl packaging, with a net weight of 150 gr. The choice of paper bowls is due to several advantages, namely environmentally friendly materials, practical packaging because it is easy to carry, and can withstand hot and wet conditions, so it is safer for products with a little soup.

Based on the results of the paired t-test, the level of large-scale preference in 80 panelists for reference and development products showed that sensory characteristics in color, aroma, taste, texture, and overall were significantly different. The average result of the sensory characteristics of color, taste, taste, and texture of the development product has greater value. In the average result, the overall reference product has a value of 4.3 while the development product is 4.7. It can be concluded that development products are preferred and accepted by the wider community, especially teenagers in the Wates District area, Kulon Progo Regency, Special Region of Yogyakarta. Based on the results of the average test on the composition of the nutritional value of the reference product, the water content was 66.7%, ash 1.2%, protein 5.1%, fat 9.2%, carbohydrates 14.7%, energy 161.5 kcal/100 g, and crude fiber 3.2%. Meanwhile, the development product obtained a water content of 68.3%, ash 1.2%, protein 5.3%, fat 9%, carbohydrates 11.2%, energy 150.5 cal/100 g, and crude fiber 4.2%. Based on these results, it can be concluded that the nutritional content of Mi Tabitu products has increased in the components of water, protein, calories, and crude fiber. Meanwhile, the fat and carbohydrate components have decreased. The increase and

decrease in some of these components is considered good because the product has a higher protein, calorie and fiber content, but is low in fat.

In the calculation of the production cost of Mi Tabitu products of IDR 15,228/product, the selling price of Mi Tabitu products is determined to be IDR 19,800/product with a mark up of 30%. Then, based on the results of the BEP calculation, it is known that the BEP unit is 7 units and the BEP rupiah is IDR 130,435. So, Mi Tabitu products will reach break-even if each production is sold as many as 7 units and gets an income of IDR 130,435. The results of the comparison show that Mi Tabitu products can compete with the price of tarempa noodles in the market. Tabitu noodles are considered superior because the ingredients used are healthier because they are all produced in-house (*homemade*), so they are cleaner and healthier.

4. Conclusion

The right recipe in making Mi Tabitu is with the substitution of yellow sweet potato flour and tuna fish is yellow sweet potato flour of 15% at 100% wheat flour, then substituted again with tuna fish by 15% at 75% wheat flour. Good presentation is to use ceramic plates that are somewhat concave because of damp products. Then, it is given a complementary ingredient of leeks and fried onions on top. The packaging of Mi Tabitu products is using 500 ml paper bowl packaging, a fork serving tool made of bamboo and containing labels with information (product name, composition, allergen content, nutritional value information, product weight, expiration date, produced by).

The acceptability of Mi Tabitu in a large-scale panelist test of 80 panelists obtained results that were significantly different from the reference products in terms of color, aroma, taste, texture, and overall. It can be concluded that the target consumer (teenagers) accepts and likes Mi Tabitu products.

Mi Tabitu products with a serving size of 150 gr/serving contain nutritional content, namely, total energy of 421 kcal, energy from fat 250 kcal, fat 25 g (AKG 36%), protein 15 g (AKG 23%), carbohydrates 34 g (AKG 11%), and crude fiber 12 g (AKG 41%). The selling price of Mi Tabitu products is IDR 19,800/product, while the calculation of BEP units is 7 units and BEP rupiah is IDR 130,435.

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