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Development of ready-to-serve breadfruit cream soup for the elderly

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Abstract - The number of elderly people in 2022 is 10.48% of the total population in Indonesia. The health condition of the elderly is determined by the quality and quantity of nutritional intake. To obtain sufficient nutritional intake, commodities are needed that meet the nutritional needs of the elderly. One of the commodities that is rich in nutrition for the elderly is breadfruit (Artocarpus altilis). Breadfruit cream is a processed product that is practical for the elderly. The purpose of this study was to make a ready-to-serve breadfruit cream soup for the elderly which is practical in serving and has nutritional content. The method used is trial and error to determine the formulation of breadfruit cream soup. Furthermore, the calculation of nutrient content in the breadfruit cream soup. The results of the study obtained a formula with energy content106 KCal. This energy content fulfills the 0,06% nutritional adequacy of the elderly.

Keywords: breadfruit, cream soup, energy content

1 Introduction

Based on data from the Central Statistics Agency, since 2022 Indonesia has entered the age population structure, where around 1 in 10 residents are elderly. Data from the March 2022 National Socioeconomic Survey shows that 10.48 percent of the population is elderly. According to Elvia et al. [6], health conditions in the elderly are largely determined by the quality and quantity of nutritional intake. Good nutrition plays a role in efforts to reduce the incidence of disease and mortality in old age. On the other hand, biological deterioration, the mental adaptation that accompanies the aging process is often an obstacle for the elderly. Physiological problems such as indigestion, decreased sensitivity of the senses of taste and smell, malabsorption of nutrients and several other physical deteriorations can cause low intake of nutrients. The pattern of elderly diseases suffered in general is degenerative diseases, namely rheumatic hypertension, diabetes mellitus, heart, osteoporosis and stroke. Based on this fact, it is necessary to create a manual food formula to increase appetite to meet nutritional intake. Dietary fiber is one of the nutritional intakes that is needed to reduce the risk of degenerative diseases. Flour from breadfruit (Artocarpus altilis) is a food that has fiber content which is quite good for the elderly.

Breadfruit (Artocarpus altilis) or breadfruit is one of the members of the genus Moraceae consisting of about 50 species of trees and plants in the Tropics including Indonesia. Among traditional starches, breadfruit has been a recognized crop that has a positive impact on hunger in tropical regions and developing countries. One breadfruit tree produces 200-400 kg or more of fruit per year and can be processed in many ways such as baked, boiled, dried, pickled, fermented or used

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in bread making [10]. Kahinde et al. [7] stated that breadfruit starch has swelling power, water binding ability, water absorption index, and higher dispersibility ability compared to rice and cassava starch. In breadfruit utilization, it has limitations due to lower levels of water insolubility, therefore breadfruit starch must be modified to suit industrial-level applications. Cream soup is a thick soup that is thickened by adding a thickening agent to the brothor thickened from the main ingredients of vegetables and fruits, and enriched with animal protein ingredients [5].

By considering the condition of the elderly and the potential of breadfruit flour, it is necessary to develop a processed food product that can support their nutritional intake needs. One of these products is ready-to-eat breadfruit cream soup. With this soup, ready-to-eat food is available for the elderly that suits their physical condition and nutritional needs and is easy to prepare. There are currently not many ready-to-eat foods on the market. As is fast food that remains nutritionally valuable, provides convenience for people who consume it. Development of breadfruit as a cream soup dish by instant serving as an effort to utilize locally produced food ingredients to increase nutrition in the elderly population that is safe and easy to consume. In addition, breadfruit flour and the ingredients used in the research came from Micro, Small and Medium Enterprises (MSMEs), thus contributing to increasing the added value of MSME products and utilizing breadfruit commodities which currently still have not many alternative management even though the benefits contained are very good for the body as an alternative source of carbohydrates other than wheat flour and rice. The aim of this research is to determine the formulation of ready-to-eat breadfruit cream soup with the appropriate taste, nutritional intake in the selected formula, and nutritional adequacy figures.

2 Materials and method

Tools and materials used include scales, mixers, containers, sealers, spoons, breadfruit flour, corn starch, potato starch, Non Dairy Creamer, chicken extract powder, dried red bean flake, cornstarch, garlic powder, dried flask machete, dried flake tomatoes, dried flake pakcoy, dried flake leeks, pepper powder, and aluminum packaging. At this stage, the cream soup production process is carried out by paying attention to hygiene and sanitation production standards such as washing hands before carrying out production activities, using masks and gloves, using clean equipment and implementing a production quality assurance system. After the production process is complete, the cream soup will be packed with aluminum foil poch and sealed in order to maintain product quality.

This research is exploratory with the method used is trial and error design with 3 revisions. The production process of Breadfruit cream soup is carried out with the following steps:

1 Formula design based on energy intake from Breadfruit cream soup mixture;
2 Weighing of materials according to the formula plan;
3 Dry mixing or mixing ingredients until homogeneous;
4 Water preparation as much as 200 mL;
5 Pour the weighed formula ingredients along with water into the pot;
6 Cooking the mixture of water and formulated ingredients on the stove and cooked for 3-5 minutes
7 Serving Breadfruit cream soup. Breadfruit cream soup taste testing. Recording of Breadfruit cream soup test results;
8 Calculation of nutritional intake for the selected formula based on the taste and appearance received per serving.
9 Determining the percentage (%) nutritional adequacy rate (AKG) of ready-to-eat breadfruit cream soup.

3 Result and discussion

Formula 1 Breadfruit cream soup produces a bitter taste and too green color. This taste and appearance has not met the expected criteria. The bitter taste and too green color are thought to come from too much pakcoy dried flake. The formula 1 Pakcoy dry flake islisted in Table 1.

Table 1. Formula Trial

No	Raw Material	Raw Material Formulation			Unit
		%	Gramasi	Gramasi Trial	
1	Breadfruit Flour	10.00%	3.000	3,00	Gram
2	NDC	53.00%	15.900	15,90	Gram
3	Dried Flake Pumpin	4.00%	1.200	1,20	Gram
4	*Dried Flake* pakcoy	1.32%	395	0,40	Gram
5	Garlic Powder	1.30%	390	0,39	Gram
6	Corn Flour	18.00%	5.400	5,40	Gram
7	Corn Starch	2.60%	780	0,78	Gram
8	*Dried Flake Leek*	1.00%	300	0,30	Gram
9	Pepper Powder	1.00%	300	0,30	Gram
10	Salt	0.50%	150	0,15	Gram
11	*Dried Flake Tomato*	2.28%	685	0,68	Gram

Formula 2 Breadfruit cream soupproduces too salty taste. This too salty taste is thought to come from chicken flavor and salt which is not in accordance with formulation 2 (Table 2).

Table 2. Trial Formula 2

No	Raw Material	Raw Material Formulation			Unit
		%	Gramasi	Gramasi Trial	
1	Breadfruit Flour	10.00%	3.000	3,00	gram
2	NDC	52.83%	15.900	15,90	gram
3	Dried Flake Pumpin	1.50%	1.200	1,20	gram
4	*Dried Flake* Pakcoy	1.00%	395	0,40	gram
5	Garlic Powder	1.30%	390	0,39	gram
6	Corn Flour	16.00%	5.400	5,40	gram
7	Corn Starch	2.60%	780	0,78	gram
8	*Dried Flake* Leek	1.00%	300	0,30	gram
9	Pepper Powder	1.00%	300	0,30	gram
10	Salt	0.50%	150	0,15	gram
11	*Dried Flake* Tomato	2.28%	681	0,68	gram
12	*Chicken flavour*	0,50 %	150	0,15	gram

In formula 3, a reduction in ingredients and the number of ingredients from formula 2 is made. The reduction of chicken flavor ingredients is done with the aim of reducing saltiness, while reducing the number of ingredients in pakcoy dry flakes. Formulation 3 gives the appropriate taste.

Table 3. Trial Formula 3

No	Raw Material	Raw Material (%)	Raw Material (g)
1	Breadfruit Flour	15,00%	4,50
2	Corn Flour	26,00%	7,80
3	Potato Flour	22,57%	6,771
4	Non Dairy Creamer	10,00%	3,00
5	Chicken flavor	9,00%	2,70
6	Dried Flake Red bean	7,00%	2,100
7	Corn Starch	2,60%	0,78
8	Garlic Powder	2,13%	0,64
9	Dried Flake Pumkpin	2,00%	0,60
10	Dried Flake Tomato	2,00%	0,60
11	Dried Flake Pakcoy	0,80%	0,24
12	Dried Flake Leek	0,50%	0,15
13	Pepper Powder	0,40%	0,12
TOTAL		**100,00%**	**30,00**

3.1 Selection of ready-to-serve breadfruit cream soup formulas

After the ready-to-eat breadfruit cream soup formulation is produced, taste, appearance and serving weight are selected. Based on these criteria, the results of Formula 3 were obtained as a formula that matched taste, appearance and serving weight. The packaging and serving of ready-to-eat breadfruit cream soup can be seen in Figures 1 and 2.

In the three formulas, sensory tests are carried out which include appearance, viscosity, taste, color and aroma. Data analysis of sensory test results was carried out using the Bayes Method (Rubilar et al. 2012). The Bayes method is used to determine a formula suitable for a particular circumstance.

3.2 **Nutritional intake of ready-to-serve breadfruit cream soup formulas**

The formula of instant cream soup Breadfruit cream soup that is suitable is Formula 3. the dishes are in Table 3. Calculation of Energy Content in Breadfruit cream soup Based on the analysis of sensory test data, it is known that Formula 3 is suitable for taste. The next step is to calculate the energy content of the formula in each serving dose (30gr). Energy calculations are carried out based on the conversion of the average nutritional value of food contained in DKGBM (List of Nutritional Content of Food Ingredients). The calculation results of Formula 3 Breadfruit cream soup are in Table 4. The total energy in each serving of Formula 3 Breadfruit cream soup is 106 kcal and this means that it provides 43.59% of the energy needs of the elderly per day. Based on the amount of intake, Formula 3 Breadfruit cream soup is suitable for snacks for the elderly.

Fig. 1. Presentation of Formula 3 Breadfruit Cream Soup

Fig. 2. Packaging Formula 3 Breadfruit Cream Soup

The table of information on the nutritional value of Breadfruit Cream Soup in 30 gram sachets calculated based on the Daily Value (RDA) for the elderly aged 65-80 years according to the Minister of Health Regulation No. 28 of 2019 concerning the Recommended Daily Value for the People of Indonesia is in table 4.

Table 4. Recommended Daily Value

Nutrition Facts		
Serving Size : 30 g		
Serving per container : 1		
Amount per serving		
Calories 106 kkal		
Total Fat: 11 kkal		
		%AKG
Total fat	1.19g	2.38%
Protein	3.11 g	4.86%
Total Carbohydrate	19.27 g	7.01%
Dietary Fiber	0.91 g	3.65%
Natrium	5.35 mg	0.49%
Vitamin B1		8%
Vitamin B2		1%
Cholestrol		0%
Calium		2%
Phospor		5%
Calsium		1.2%
Zinc		2%
Iron		6%
**%AKG tells you is how much a nutrient in serving a food contribution to daily 1800 calories a day is used for general nutrition adviced.*		

Based on BPOM Regulation No. 1 of 2022 concerning Supervision of Claims on Processed Food Labels and Advertisements, processed food is food or beverages processed in certain ways or methods with or without additional ingredients. In this case, Breadfruit Cream Soup is a processed food produced from the process of mixing dry raw materials without food additives.In the regulation, it is stated that lactose claims can only be listed for products that commonly contain lactose such as milk powder, yogurt, and substitute products such as soy drinks, almond juice drinks. Breadfruit Cream

Soup products using non-dairy creamer (NDC) as a substitute for milk can be claimed as lactose-free food products if in sustainability an analysis has been carried out and it is known that the lactose content is less than equal to 10 mg / 100 Kcal.

Based on BPOM Regulation No. 1 of 2022 concerning Supervision of Claims on Processed Food Labels and Advertisements, gluten claims can only be listed on Processed Foods made from ingredients such as wheat (all Triticum species, such as durum wheat, spelt, and khorasan wheat), rye, barley, or oats or their crossbred varieties that have been processed to reduce gluten content and/or raw materials intended to replace the use of these raw materials, namely rice, corn, sago, sorghum, cassava/cassava, sweet potato, potato, taro, and gadung. Breadfruit Cream Soup products are made using breadfruit flour, corn starch and potato starch as a source of carbohydrates that replace wheat. So that Breadfruit Cream Soup can be claimed as a gluten-free food product if in its sustainability an analysis has been carried out and it is known that the gluten content is no more than the same as 20 mg / kg.

Based on BPOM Regulation No. 1 of 2022 concerning Supervision of Claims on Processed Food Labels and Advertisements, glycemic claims can only be listed on processed foods that contain carbohydrates of at least 25 grams per serving, excluding dietary fiber. So Breadfruit Cream Soup has not been able to include glycemic claims because in 30 g serving size only contains total carbohydrates of 19.27 g. But the source of carbohydrates used in its manufacture is carbohydrates that have a low glycemic index compared to other carbohydrate sources.

Breadfruit flour has a low glycemic index of 59. This figure is lower than rice which has a glycemic index of 96, so that consumption of processed foods that use breadfruit flour can help control blood sugar levels at a safe level because of hypoglycemic activity including alkaloids, glycosides, polysaccharides, terpenoids, peptidoglycan, amino acids and organic ions (Shabella, 2012). Other carbohydrate sources in Breadfruit Cream Soup are corn starch and potato starch. Corn has a glycemic index of 52 so it is still classified as a food with a low glycemic index. Potatoes have a glycemic index of 82 which is classified as a food with a high glycemic index. But the carbohydrate content in potatoes is a complex carbohydrate that is able to make you full longer. Potatoes have glucose levels that are not high enough and can be used as an alternative food to replace rice for people with diabetes militus (Lutfi et al, 2020).

Based on BPOM Regulation No. 1 of 2022 concerning Supervision of Claims on Processed Food Labels and Advertisements, food products can be claimed as very low-sodium foods if the sodium content is not more than equal to 40 mg in 100 g. The sodium content of Breadfruit Cream Soup products in 30 g packs is 5.35 mg or in 100 g equals 17.84 mg. So the product can be claimed to be very low in sodium.

Based on BPOM Regulation No. 1 of 2022 concerning Supervision of Claims on Labels and Advertisements of Processed Foods, claims for vitamin and mineral sources can be included in processed foods that meet at least 15% of the nutritional adequacy rate (RDA) of vitamins and minerals in 100 g. It can be seen in the Information Table of Nutritional Value of Breadfruit Cream Soup in 30 grams to meet the needs of phosphorus as much as 5% RDA or in 100 grams to meet 15% RDA for the elderly aged 65-80 years.So it can be claimed as a source of phosphorus. In the table, Breadfruit Cream Soup in 30 grams meets the needs of iron as much as 6% RDA or in 100 grams meets 18% RDA for the elderly aged 65-80 years. So it can be claimed as a source of iron. Then Breadfruit Cream Soup in 30 grams meets the needs of vitamin B1 as much as 7% RDA or in 100 grams meets 21% RDA for the elderly aged 65-80 years. So it can be claimed as a source of vitamin B1. All these claims must of course be scientifically proven by further testing.

The type of packaging used is aluminum foil sachets that have a good density to avoid air and water permeability. Breadfruit Cream Soup powder is recommended to be stored in sealed packaging, avoiding water and direct light. It is estimated that the product can be stored for one year assuming it is equated with similar similar fast food cream soup products that have been commercialized.

4 Conclusion

The results of this research show that:

1 Formula 3 is a formula that is suitable for the elderly because it has the right taste with a quite attractive appearance (bright color)
2 Based on calculations, it is known that the nutritional intake in formula 3 contains total fat, protein, carbohydrates, dietary fiber, sodium, vitamins and minerals in each serving size of 30 grams. Calorie content per serving size 106 kcal.
3 The contribution of Breadfruit Cream Soup to the nutritional adequacy rate (RDA) for the elderly based on energy (1800 kcal) is 5.89% per serving (30 grams).

It is recommended that:

1 It is necessary to formulate with more diverse flavor variants in order to provide broad market opportunities;
2 It is necessary to conduct laboratory tests to take into account more valid gozo values;
3 It is necessary to test the biovailabitas of Formula 3 Breadfruit Cream Soup in order to obtain valid data on the reception capacity of elderly consumers.
4 It is necessary to test consumer preferences for those selected (Formula 3)

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