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Dietetic Food Products Based on Pumpkin Flour (*Curcuma Moschata*)

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Abstract. The general objective of this research is to develop food diversification based on pumpkin flour to increase food security. Pumpkin contains an active component ie -carotene which has potential as a raw material for making diet food formulas for infants, elderly and people with degenerative diseases. The formula used in the development of diet foods is based on applicable standard methods (Ministry of Health and FAO). Elderly food products were made from pumpkin flour, soybean flour, skim milk, and sucralose sugar in the form of porridge. The best instant pumpkin porridge formula has the characteristics of bulk density 0.6235 g/mL, rehydration time 57 seconds, contains 4.98% water, 5.81% ash, 5.90% fat, 10.77 % protein, 8.10% crude fiber, 62.44% carbohydrates, and 3673.06 g/g -carotene. Dietetic products for diabetics were pumkin noodles with addition of glucomannan as a binder and palm sago starch. The selected pumkin noodle product was made from treatment of pumpkin flour and palm sago starch with a ratio of 30:70. The selected treatment pumkin noodles had physical characteristics, namely the value of hardness 530.25 gf, adhesiveness 0.62 gf and elasticity 0.76 mm. This product contains 57.75% water, 1.44% ash, 6.87% protein, 392.15 g/g -carotene and 563.214 ppm antioxidant activity.

1. Introduction

Pumpkin is another name for Cucurbitaceae moschata which is a kind of vegetable plant. In Indonesia, it is also known as yellow pumpkin, abroad as a pumpkin. The yellow color indicates a high content of beta carotene. According to Tamer et al.[1] pumpkin is rich in nutrients and has bioactive components such as phenolics, flavonoids, vitamins (including beta carotene, vitamin A, vitamin B12, tocopherols, vitamin C,and vitamin E), amino acids, carbohydrates, and minerals (especially potassium) and contains quite low energy (about 17 Kcal/100 g of fresh pumpkin) and contains quite high fiber. According to Usmiati[2], pumpkin contains water (93.64%) protein (0.63%), fat (0.09%), fiber (66%) and beta carotene (17.5 g/g).

Some of the advantages of pumpkin have been widely studied, including reducing blood sugar levels for 14 days of giving pumpkin water extract due to the content of flavonoids, vitamins C and E and beta

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carotene [3]. According to Ratulangi et al.[4] pumpkin extract can lower total cholesterol in experimental rats. Content dietary fiber in pumpkin is relatively high, ranging from15.5-26.5 % [5]. Dietary fiber can prevent constipation or constipation (complex bowel movements) and the formation of lumps in the intestines, which are problems that many elderly suffer from [6]. Consumption of high-fiber foods is recommended for people with diabetes because it can improve blood glucose control [7]. The previous study's crude fiber in yellow pumpkin flour was 18.50% [8]. It shows that yellow pumpkin is a food that can reduce the risk of developing diabetes [9]. Beta carotene in pumpkin is an antioxidant that can inhibit the activity of free radicals in conditions of oxidative stress caused by hyperglycemia. The pumpkin location is quite widely in several regions in Indonesia. The pumpkin products are into vegetable dishes, compote, lunkhead, and chips. This study aims to increase the diversification of local food as pumpkin flour. People are making pumpkin flour by various drying techniques to protect its beta carotene content. According to Bastan [10], drying techniques with spray drying, fluid bed coating, and freeze-drying can protect the active compounds in the material to be dried. The pumpkin flour obtained will be made food for the elderly and diet food for degenerative diseases.

This research aims to make diet food to provide nutritious food and increase the elderly and people with degenerative diseases. The formulas of elderly food are base on energy and protein needs. For dietetic food, wet noodle products are similar to *pumkin* noodles, a traditional noodle product from the Bogor area.

2.Research Methods

2.1 Materials and Tools

The main ingredient is pumpkin flour. The pumpkin from the garden belonging to the Silih Asuh, Farmers Group in the Ciburuy area, Cigombong, Bogor. Additional components for the elderly porridge formulation consisted of soybean flour, skim milk, sucralose sugar, coconut oil, salt, and flavored vanilla cap Koepoe-Koepoe obtained from supermarkets. At the same time, the ingredients for making *pumkin* noodles are sago palm flour, glucomannan flour (*Amorphophallus muelleri*). The chemicals used are aquadest, Na-metabisulfite, and other materials for chemical analysis.

The equipment in making instant porridge is a stove, knife, slicer, slicer board, pan, wooden spatula, tray dryer, drum dryer, disc mill, stainless container, food processor, scales, and large pot. Tools for physical testing include scales, measuring flask, thermometer, measuring cup, stopwatch, and stirrer. The tools used in chemical analysis are oven, kiln, desiccator, condenser, soxhlet, Kjeldahl flask, distillation apparatus, Erlenmeyer, Spectrophotometer, and HPLC.

2.2.Research time and place

The research was conducted from June to August 2020 at Djuanda University, Bogor. The manufacture of pumpkin instant porridge products at the Food Laboratory of Djuanda University and the SEAFAST Laboratory of the University of IPB in Darmaga Bogor and the Cimanggu Post-Harvest testing laboratory. Chemical and physical analysis at the Chemistry and Food Laboratory of Djuanda University and the Biological Nutrition Laboratory of LIPI – Cibinong. Organoleptic tests to determine selected formula at the University of Djuanda and PT Tulus Indojaya, Bogor. Acceptance test of the selected formula in the elderly (over 60 years old) was carried out in Landau Village, Cipanas Village - Cianjur.

2.3Research methods

2.3.1 Pumpkin Flour Making. The technique of making pumpkin flour is according to research [8]. It starts with the process of peeling the pumpkin, slicing the pumpkin flesh with a thickness of ±2 mm, soaking in 0.3% sodium metabisulfite solution for 15 minutes, washing, draining, drying with a tray dryer at 60°C for 8 hours, cooling, and flouring/milling to obtain 60 mesh pumpkin flour.

The technique of making soybean flour is carried out according to Widowati [11], starting with a sorting process to select good quality soybeans and remove dirt and damaged or broken soybeans. Then

the soybeans are soaked for 8-12 hours and drained. Next, the soybeans are boiled for 30 minutes, exhausted, and removed from the husks. After that, it was dried in a tray dryer at a temperature of 60°C for 8 hours. The last stage is flouring to obtain 60 mesh size soybean flour.

2.3.2 Pumpkin Instant Porridge Formulation.

The formulation of the pumpkin instant porridge product refers to the fulfillment of the elderly RDA standards issued by the Ministry of Health [12], with the distribution of energy from 10-15% protein, 20-25% fat , and 60-65% carbohydrates of total calories [13]. The content or composition of the ingredients is from proximate analysis and the Indonesian Food Composition List (DKPI). The nutritional content of other additives, namely sucralose, vanilla, and salt, are very small amounts. Therefore, these ingredients do not provide additional energy to the formula. The formulation is determined using the mass balance principle, where the number of raw materials used (input), is equal to the number of ingredients contained in the product (output).

The formulation is by modifying the composition of pumpkin flour and soybean flour. Other additives in skim milk, vegetable oil, sucralose, vanilla, and salt are made constant. The selected formulas from the calculation results and the initial trial of the resulting taste. The chosen ingredients from five recipes are from compositions that met the RDA standards for elderly food. The calculation, the formulation is made per 100 grams of product, while can adjust the portion of each serving size later

Table 1. Material formulation

Amount of ingredients (g)	F1	F2	F3	F4	F5
Pumpkin flour	75	70	65	60	55
Soy flour	5	10	15	20	25
skimmed milk	15	15	15	15	15
Coconut oil	4.5	4.5	4.5	4.5	4.5
Sucralose	0.2	0.2	0.2	0.2	0.2
Vanilla	0.1	0.1	0.1	0.1	0.1
Salt	0.1	0.1	0.1	0.1	0.1
Total	100	100	100	100	100

To get the total calorific value is to multiply the number of nutrients by the calorific value of each. Protein has an energy value of 4 kcal/gram, fat 9 kcal/gram, and carbohydrates 4 kcal/gram [14].

2.3.3 Instant Porridge Making and Research Path.

The stage of making instant elderly food products is by weighing the ingredients according to the formula specified in table 1, then adding water as much as 5:1 the number of the recipe in the procedure. The next step is to cook the mixture at 70°C for 10 minutes and dry it using a 120°C drum dryer, 2rpm, reducing it to 60 mesh.

2.3.4 Instant manual porridge analysis.

Chemical analysis on the selected product formula is water content [15], ash content [15], protein content [15], fat content[15], carbohydrate content [16] the content of crude fiber [15], beta carotene analysis [17], and antioxidant activity test [18].

2.3.5 Making Pumkin Noodle.

The initial stage of making noodles is to determine the proportions of pumpkin flour and palm sago flour with five levels of treatment with two replications. The treatment design is in Table 2.

Table 2. Treatment Design

Ingredients	Formula (%)				
	A1	A2	A3	A4	A5
Yellow Pumpkin Flour	70	60	50	40	30
Palm Sago Flour	30	40	50	60	70
Total	100	100	100	100	100

The process of making wet noodles is to make glucomannan gel from glucomannan flour first, which is to mix 4% glucomannan with 35% water, let it stand for 10 minutes until a glucomannan gel is formed [19]. The next step is to make a palm sago flour binder. It added 50% (of the total formulation) of palm sago flour with water in a ratio of 1:2, mixed until homogeneous, and cooked until thickened. These mixing two doughs were in the flour formulations listed in Table 2. Next, the dough is ground using a food processor and then printed using a mold until the noodles stick out, steaming the noodles for 15 minutes and placing them in a container that already contains cold water. Then the dough is filtered and greased with a bit of vegetable oil.

2.3.6 Pumkin noodle analysis .

The analysis of *pumkin* noodles is organoleptic, physical, and chemical analysis. Physical tests in hardness, adhesiveness, and elasticity were using a tool (Texture Analyzer TAX-2). The hedonic quality test includes the attributes of brightness, color, aroma, taste, and texture. The hedonic test has points of color brightness, smell, taste, texture, and overall. Organoleptic analysis was performed on 30 semi-trained panelists using a scale of 1-7. Chemical analyses including water content, ash, protein, fat, carbohydrate method *by difference,* crude fiber, beta carotene content , and antioxidant activity of the DPPH method.

2.3.7 Data Analysis.

The experimental design used RAL with two replications. Analysis of the data used in this study using the Statistical Product and Service Solution (SPSS) program. The statistical test used in the physical examination is the Kruskal Wallis test to determine the treatment used in the study has a significant effect or not.

3. Results and Discussion

3.1 Elderly Diet Food

The results of the water content analysis showed that the water content of the product ranged from 4.63 to 4.98%. The analysis of variance on water content showed no significant difference between the five formulas ($p>0.05$). Hariyadi [20], revealed that using a drum dryer takes a contact time of 2-20 seconds on the drum surface to get a product moisture content of less than 5%. From the measurement results of instant slurry yield after drying, the average yield ranged from 85-87%. It means that the drying process with a drum dryer in the manufacture of instant slurry can remove about 13-15% of water.

Table 3. Results of instant porridge proximate analysis

Nutrient content	Formula				
	F1	F2	F3	F4	F5
Water (%)	4.98[a]	4.63[a]	4.63[a]	4.88[a]	4.83[a]
Ash (%)	5.81[a]	5.78[a]	5.87[a]	5.60[a]	5.89[a]
Proteins (%)	10.77[a]	11.80[b]	13.87[c]	14.07[c]	14.39[c]
Fat (%)	7.90 [a]	9.13 [a]	8.84 [a]	8.09 [a]	7.89 [a]
Carbohydrates (%)	70.54 [a]	68.65 [a]	66.78 [a]	67.35 [a]	66.99 [a]
Crude fiber (%)	8.10 [a]	7.76 [a]	7.32 [a]	7.97 [a]	7.90 [a]

Note: the same superscript letters in the same line show no significant difference (p>0.05).

The ash content in the product ranges from 5.59-5.89%. From the analysis of variance, there was no significant difference between the five formulas (p>0.05). The fat content in instant porridge products ranges from 7.89-9.13%. From the analysis of variance, there was no significant difference between the five formulas (p>0.05). The highest fat content is in F2 of 9.13%, while the lowest is in F5 of 7.89%. Although there was no significant difference between the five formulas, there was a tendency to increase the formulas' fat content and soy flour. The High-fat content in soybean flour is 16.7% (DKPI [21]) compared to the fat content in pumpkin flour which is only 4%. Protein content in instant porridge products ranges from 10.77-14.39%. From the analysis of variance, there were significant differences in the protein content of the five formulas (p<0.05). Further test results using the Duncan Test method showed that the protein content in formulas F3, F4, and F5 was significantly different from the protein content in F1 and F2. The protein content in F1 was also substantially other than F2.

The highest protein content is in F5, the formula with the most soybean flour (25%) at 14.39%, while the lowest protein content is in the F1 recipe at 10.77%, which is the formula with the lowest soybean content (5%). Thus, this formula follows the purpose of adding soy flour in the recipe, namely as a source of protein.

As one energy-producing macromolecule, protein contains 4 kcal for every gram of protein [14]. The result of calculating the contribution of protein-energy in each instant porridge formula is F1 (11.84%); F2 (12.66%); F3 (14.88%); F4 (15.35 %); and F5 (15.77 %). Based on the Ministry of Health [13] recommendation regarding the distribution range of protein macronutrient energy for the elderly by 10-15%, the protein energy contribution of formulas F1, F2, and F3 can fulfill, while formulas F4 and F5 are above that range.

Calculating carbohydrate content uses the by-difference method to influence other nutrients such as water, ash, fat, and protein. The total carbohydrate content in the product ranges from 70.54 to 66.08%. Then, The carbohydrate content increased with the addition of pumpkin flour in each formula. For example, The F1 recipe with the highest pumpkin flour content (75%) had the highest carbohydrate content of 70.54%. In comparison, the F5 formula with the lowest pumpkin flour content (5%); obtained 66.08% carbohydrates which was the formula with the lowest carbohydrate content. The result of the variance test showed that the differences in the composition of pumpkin flour with soybean flour did not cause a significant difference in carbohydrate content (p>0.05).

The crude fiber content of instant pumpkin porridge ranges from 7.32-8.10%. The analysis of variance showed that there was no significant difference between the five formulas (p>0.05). However, the formula with 75% pumpkin flour content (F1) produces a crude fiber of 8.10%. The crude fiber content indicates that instant porridge products can be as high fiber foods according to BPOM standards of at least 6%.

Crude fiber is essential for the elderly because it can prevent constipation which is very often experienced by the elderly due to lack of fiber intake in their diet. This lack of fiber intake is also related to the condition of the oral organs of the elderly, who can no longer chew fibrous foods because many

teeth have fallen out. Based on research (Sari & Pitoyo[22]) there is a relationship between the incidence of constipation and fiber and water intake in the elderly.

The determination of the selected formula was determined based on the recapitulation of the instant porridge hedonic test results. As a result, the percentage of the five chosen instant porridge is instant porridge with a hedonic value of the product (5) somewhat like, (6) like, (7) like very much.

Table 4. Percentage of hedonic value for each formula

Attribute	Score	Percentage Of Hedonic Value (%)				
		F1	F2	F3	F4	F5
Color	kinda like	20.00	13.00	13.00	13.33	26.67
	Like	50.00	50.00	17.00	53.33	26.67
	really like	6.66	6.66	0.00	3.33	0.00
	Total	76.66	69.66	30	69.99	53.34
Aroma	Kinda Like	33.33	23.33	20.00	10.00	3.33
	Like	33.33	30.00	6.67	53.33	20.00
	Really Like	3.34	3.34	0.00	3.33	0.00
	Total	70	56.67	26.67	66.66	23.33
Flavor	Kinda Like	33.33	16.67	16.67	13.33	20.00
	Like	56.67	26.67	10.00	56.67	20.00
	Really Like	0.00	10.00	3.33	6.67	3.33
	Total	90.00	53.34	30.00	76.67	43.33
Texture	Kinda Like	30.00	23.33	26.67	30.00	13.33
	Like	40.00	23.33	10.00	33.33	16.67
	Really Like	0.00	0.00	0.00	0.00	3.33
	Total	70.00	46.66	36.67	63.33	33.33
All	Kinda Like	26.67	33.33	20	26.67	26.67
	Like	56.67	33.33	6.67	46.67	10.00
	Really Like	0.00	0.00	0.00	6.67	0.00
	Total	83.34	66.66	26.67	80.01	36.67

Table 4 shows that for each organoleptic attribute, the highest percentage of hedonic values obtained by the F1 formula is 76.66% (color attribute), 70% (scent attribute), 90% (taste attribute), 70 % (texture attribute), and 83.34% (overall). These results indicate that the F1 formula is the most preferred formula by the panelists, so it is determined that the formula chosen to acceptance level to the elderly panelists is the F1 formula. Furthermore, when viewed from the content of its constituent ingredients, the F1 formula is also the formula with the highest range of pumpkin. The content of active substances contained in pumpkin is also the highest.

The antioxidant activity test on the selected formula sample (F1), the IC50 value was 400 ppm, which means that the antioxidant activity is feeble because it is below 150 ppm. The antioxidant activity in this instant pumpkin porridge is better than that of the pumpkin functional powder product with almost the same essential ingredients made from 15% pumpkin flour; 35% pumpkin seed flour; and 50% tempeh flour research results by Junita et al.[23] with an IC50 value of 6765.88 ppm.

The results of the study of Pokorny *et al.*[24], said the use of high heat in the processing can damage antioxidant compounds. The same thing was reported by Purwanto *et al.*[25], that the use of high power in a microwave oven produces less ginger oil extract, due to evaporation of volatile substances. Moreira

et al, [26] revealed that antioxidant activity is also influenced by the content of antioxidants in raw materials and processing processes.

Analysis of beta carotene content was only carried out on the selected instant porridge formula, namely F1 with 75% pumpkin flour. The results of the analysis carried out using the HPLC (High Performance Liquid Chromatography) method showed that the selected formula instant porridge contained 3673.06 g/g beta carotene.

Compared with the beta carotene content in pumpkin flour of 6592.17 g/g, there is a decrease in beta carotene content compared to the original raw material. The reduction of beta carotene may be due to the occurrence of beta carotene damage due to high temperatures during cooking or drying instant porridge with a drum dryer.

3.2 Diet Food for Diabetes Mellitus

The results of the physical test of pumkin noodles formulations of yellow pumpkin flour and palm sago flour can be seen in Table 5.

Table 5. Physical Test Results of Pumkin Noodle

Parameter	Formulation				
	A1	A2	A3	A4	A5
Violence	734.70[a]	559.82[a]	578.69[a]	589.39[a]	530.25[a]
Adhesiveness	0.34[a]	0.00[a]	0.28[a]	0.66[a]	0.62[a]
Elasticity	0.73[a]	0.70[a]	0.71[a]	0.69[a]	0.76[a]

*Different letter notations show significant differences at the 5% level.
A1: yellow pumpkin flour 70% : Palm sago flour 30%; A2: yellow pumpkin flour 60% : Palm sago flour 40%
A3: yellow pumpkin flour 50%: 50% palm sago flour;A4: yellow pumpkin flour 40% : Palm sago flour 60%
A5: yellow pumpkin flour 30%: 70% palm sago flour

The results of the toughness test of pumkin noodles in five formulas appear in Table 5. Based on the results of the Kruskal Wallis test analysis, there was no significant difference in the comparison of pumpkin flour with palm sago flour on the hardness of *pumkin* noodles. *Pumkin* noodle A1 has the highest average hardness of 734.70 gf. Meanwhile, *pumkin* noodles A5 has the lowest average hardness value of 530.25 gf. According to Kurniawati[27] based on the parameters of Chinese wet noodles, the maximum quality of wet noodles hardness is 2797.2 gf. The amylose content in the material plays a role in the product's hardness (Winarno[16]). Amylose can form hydrogen bonds with the more dispersed amylose, allowing starch retrogradation to occur.

The results of the stickiness test of *pumkin* noodles in the five formulations appear in Table 5. Based on the Kruskal Wallis test analysis, there is no significant difference in the ratio of yellow pumpkin flour and palm sago flour to adhesiveness. According to Winarno[16], higher levels of amylopectin and lower levels of amylose produce a sticky dough. Because the attractive force of starch is stronger than the kinetic energy of water molecules. Amylopectin plays a role in product stickiness, while amylose plays a role in product hardness. In this study, the average value of stickiness ranged from 0.00 gf to 0.66 gf.

The record of the elasticity test of pumkin noodles is in Table 5. Based on the Kruskal Wallis test analysis, there was no significant difference in the ratio of yellow pumpkin flour and palm sago flour to elasticity *pumkin* noodles. Pumkin Noodle elasticity ranges from 0.69 mm – 0.76 mm. The highest elasticity is formula A5 i.e 0.76 mm. Meanwhile, the commercial *pumkin* noodles has a elasticity of 1.79 mm. Compared with the value of *pumkin* noodles in the formulations of yellow pumpkin flour and palm sago flour, commercial *pumkin* noodles had a higher density value. The difference in elasticity values is due to the material's composition and the different processing processes. Other than that, the ability of amylopectin to form a gel influence product characteristics. High levels of amylopectin can create a strong stickiness which is a potential in the formation of elasticity [28].

Table 6. Hedonic Quality Test Results of *Pumkin* Noodle

Parameter	Formulation				
	A1	A2	A3	A4	A5
Color	2.4333[a]	2.8667[b]	3.5833[c]	4.5333[d]	5,4000[e]
Scent	2,5333[a]	2,5000[a]	2.8333[ab]	2,9500[ab]	3.2667[b]
Flavor	2.4333[a]	2.7333[a]	3,1500[b]	3,2500[b]	3.8167[c]
Texture	3.2167[a]	3.3667[a]	3,7500[ab]	3,9500[ab]	4.6833[c]

Numbers on the same line with different letter notations mean significantly different treatments ($p < 0.05$)
A1: yellow pumpkin flour 70% : Palm sago flour 30%; A2: yellow pumpkin flour 60% : Palm sago flour 40%
A3: yellow pumpkin flour 50%: 50% palm sago flour;A4: yellow pumpkin flour 40% : Palm sago flour 60%
A5: yellow pumpkin flour 30%: 70% palm sago flour

Table 7. Determination of Selected *Pumkin* Noodles Based on Physical and Organoleptic Tests

Test Type	Formulation				
	A1	A2	A3	A4	A5
Physical Test					
Violence	734.70[a]	559.82[a]	578.69[a]	589.39[a]	530.25[a]
Adhesiveness	0.34[a]	0.00[a]	0.28[a]	0.66[a]	0.62[a]
Elasticity	0.73[a]	0.70[a]	0.71[a]	0.69[a]	0.76[a]
Organoleptic Test					
Hedonic Quality					
Color	2.4333[a]	2.8667[b]	3.5833[c]	4.5333[d]	5,4000[e]
Scent	2,5333[a]	2,5000[a]	2.8333[ab]	2,9500[ab]	3.2667[b]
Flavor	2.4333[a]	2.7333[a]	3,1500[b]	3,2500[b]	3.8167[c]
Texture	3.2167[a]	3.3667[a]	3,7500[ab]	3,9500[ab]	4.6833[c]
hedonic					
Color	2,9500[a]	3,5500[b]	4.0167[c]	5.0333[d]	5,6333[e]
Scent	3,5833[a]	3.6667[a]	4.0500[ab]	4.3833[bc]	4.7833[c]
Flavor	3.3333[a]	3,7500[ab]	3.9833[bc]	4.0167[bc]	4.3167[c]
Texture	3.2667[a]	3.5333[a]	4.0333[b]	4,1000[b]	4.8333[c]
Overall	3.4833[a]	3.7833[ab]	4,2000[bc]	4,5167[cd]	4,8000[d]

A1: yellow pumpkin flour 70% : Palm sago flour 30%; A2: yellow pumpkin flour 60% : Palm sago flour 40%
A3: yellow pumpkin flour 50%: 50% palm sago flour;A4: yellow pumpkin flour 40% : Palm sago flour 60%
A5: yellow pumpkin flour 30%: 70% palm sago flour

The tested chemically for chosen formula included water, ash, protein, fat, crude fiber, beta carotene, and antioxidant activity tests. The record of the chemical testing of the selected *pumkin* noodles products is in Table 8.

The pumpkin flour used has a moisture content of 8.03% and has a fiber content of about 7.83%. The high fiber content in pumpkin flour can increase water because the fiber can absorb water. According to Jacobo *et al* [29], pumpkin flour also has a high pectin content which can bind water. The high water content in the *pumkin* noodles (57.75%) is due to glucomannan (from *Amorphopahllus* sp). According to Faridah and Thomas [19] glucomannan flour can absorb 200 times more water than its initial weight.

Table 8. Chemical Analysis Results of Selected *Pumkin* Noodles Products

Parameter	Rate
Water (%)	57.75
Ash (%)	1.44
Proteins (%)	6.87
Crude fiber (%)	17.43
Fat (%)	4.43
Carbohydrates (%)	29.51
Beta carotene (μg/g)	392.15
Antioxidant Activity (ppm)	563,214

The selected formula for pumkin noodle has an ash content of 1.44%. Compared with the maximum ash content requirements of SNI wet noodles, the ash content of these *pumkin* noodles is below the ash content requirements of SNI 01-2897-1992, which is a maximum of 3%. In conclusion, the ash content of the pumkin noodle formulation five has met the quality requirements of wet noodles.

Pumkin noodles formula 5 has a beta carotene content of 392.15 (μg/g). Compared with the beta carotene content of pumpkin flour (6592.17 g/g), the beta carotene content in the selected formula was shallow. This study decreased beta carotene levels due to the heating process, namely the steaming of pumkin noodles. The high-temperature heating process can reduce beta carotene levels. Beta carotene is very sensitive to oxidation reactions when exposed to air, metal, peroxide, light, and heat during production and its application. The sensitivity of beta carotene is due to a large number of double bonds in the chemical structure of beta carotene [30].

Beta carotene is one of the compounds that can act as an antioxidant that can reduce complications of diabetes mellitus, the role of beta carotene as a hypoglycemic occurs through the mechanism of inhibiting free radicals and can suppress lipid peroxides in tissues [31]. In people with diabetes mellitus, peroxide-free radicals and oxidative stress will occur [32]. According to Sharma[33], beta carotene can prevent oxidative stress and lower blood glucose. Research by Soviana et al.[32] showed that beta carotene influenced blood glucose levels in male Sprague Dawley rats induced by STZ BB given via a probe every two days in 30 days with a graded dose of beta carotene 1 mg/kg BW., 10 mg/kg body weight, 20 mg/kg.

The IC50 value in the antioxidant activity test of selected *pumkin* noodles was 563.214 ppm. According to Rahmawati [34], a compound is classified as a very strong antioxidant if the IC50 value is less than 50 ppm, strong (50 ppm < IC50 < 100 ppm), moderate (100 ppm < IC50 < 150 ppm), weak (150 ppm < IC50 < 200 ppm) and very weak (IC50 > 200 ppm). In this study, the antioxidant activity of the selected *pumkin* noodles as a very weak category.

4. Conclusion

The selected instant pumpkin porridge formula contains 75% pumpkin flour and 5% soybean flour, with an elderly acceptance rate of 93.22%. The results of the chemical and physical analysis showed that the selected slurry formula had a bulk density of 0.6235 g/mL, a rehydration time of 57 seconds, water content (4.98%), ash content (5.81%), fat content (7.90%), protein content (10.77%).), crude fiber content (8.10 %), total carbohydrate content (70.54 %), and beta carotene 3673.06 g/g. Antioxidant activity test showed that instant pumpkin pulp had very weak antioxidant activity (574.04 ppm).

The proportion factor of yellow pumpkin flour: palm sago flour in the manufacture of noodles had no significant effect ($p > 0.05$) on the parameters of hardness, stickiness, and elasticity. In the hedonic quality test, the proportion factor of yellow pumpkin flour: palm sago flour in the manufacture of noodles had a significant effect ($p < 0.05$) on the parameters of color, aroma, taste, and texture also has a significant impact ($p < 0.05$) on the preference test (hedonic). Based on the parameters of the

organoleptic test, The selected formula is *pumkin* noodles with 3% yellow pumpkin flour proportions: 70% palm sago flour (formula A5). The physical characteristics of the selected treatment noodles were having a hardness value of 530.25 gf, a stickiness of 0.62 gf and elasticity of 0.76 mm. The chosen noodles had a slight light color characteristic, a slight pumpkin aroma, a slight pumpkin taste, and medium elasticity. The selected formula noodles had a water content of 57.75%, ash 1.44% protein 6.87%, beta carotene 392.15 (μg/g), and antioxidant activity 563.214 ppm.

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