Jurnal Kebidanan
UNIVERSITAS MUHAMMADIYAH SEMARANG

Jurnal Kebidanan – Vol 14, No 1 (2025), 51-58
ISSN 2301-8372 (print); ISSN 2549-7081 (online)
DOI: 10.26714/jk.14.1.2025.51-58

Development of Low- Fat Firin Sutlac Pudding with Yellow Pumpkin for The Elderly with Heart Disease

Lara Ayu Lestari[1]*, Sessy Paramita Lirizka[2], Aftulesi Nurhayati[1], Putri Rahmah Alamsyah[1], Matthew Nathaniel Handoko[3]

[1]Universitas Aisyah Pringsewu, Indonesia
[2]Universitas Sriwijaya, Indonesia
[3]University College London, United Kingdom

Abstract

Malnutrition is an important prognostic factor in elderly patients with coronary heart disease (CHD). Puddings can support nutritional intake in elderly patients with CHD. This study aims to develop a special dietary food product Firin Sutlac Pumpkin, a low-fat pudding. This study uses a complete random design with three formulas that combine yellow pumpkin and rice with different ratios, namely S1 (60:40), S2 (50:50), and S3 (40:60). The samples obtained were analyzed by organoleptic tests (hedonic test and hedonic quality). This study showed that increasing yellow pumpkin puree affected panelists' preference for color, aroma, texture, and taste attributes. The estimated nutritional content of fiber also increased according to the increment of yellow pumpkin puree usage. The most optimal formula is 60% yellow pumpkin puree pudding (S3). S3 Firin Sutlac pudding contains 99.08 kcal of energy, 4.5 g of protein, 2.89 g of fat, 17.17 g of carbohydrates, and 0.89 g of fiber. A 100 g serving of S3 pudding contributes to 5.21-6.39% of the energy requirement for elderly aged 65-80 years and is eligible to be claimed as a low-fat food product.

Keywords

pudding; heart disease; yellow pumpkin; soy milk; low fat

***Corresponding Author**: Lara Ayu Lestari (E-mail: laraayu014@gmail.com)

Introduction

Epidemiological and nutritional transitions affect the increasing prevalence of cardiovascular diseases in Indonesia (Maharani et al. 2019). Coronary heart disease (CHD) contributes to one-third of all deaths in Indonesia (WHO 2015; Abbafati 2019). The highest prevalence of CHD is in the 65-74 year-old elderly population (4.6%)—this condition will lower their quality of life (Ministry of Health 2018). Malnutrition is one of the most important prognostic factors in elderly patients with CHD (Arshad et al. 2022). Common symptoms that contribute to malnutrition in the elderly are abdominal distension, dysphagia, diarrhea, nausea, vomiting, lethargy, and decreased appetite (Keller et al. 2015).

Snacks, given between main meals, can be an alternative way to increase nutritional intake in elderly patients with CHD (Krok-Schoen et al. 2019; Mena et al. 2020). Dietary snack modifications focus on food texture (Residents & Diets 2022) and specific fulfillment of macronutrients such as protein and fat (Stewart 2015; Wleklik 2018). Rice is a staple food source of energy in Indonesia that can be modified in texture according to the patient's ability to chew and swallow (Suttireung et al. 2019; Moin et al. 2017). Firin Sutlac (grilled rice pudding) is a modified Turkish dessert made from rice, milk, sugar, cornstarch, and egg yolk (Alisarli et al. 2004).

Furthermore, adding to the constraint of elderly nutritional intake, lactose intolerance in the elderly contributes to low cow's milk consumption in Indonesia (Moin et al. 2017). Soy milk is a plant-based protein source with protein quality similar to cow's milk and eggs (Taylor 2014). Yellow pumpkin is one of the affordable local foods. The characteristics of yellow pumpkins can improve sensory perception related to color, taste, and sight. Yellow pumpkins are easy to digest as well because of their soft texture (Gugala et al. 2020; Corre & Bemfeito 2020). Based on animal studies, it is reported that administration of the highest dose of yellow pumpkin may decrease lipid profile, an indicator of oxidative stress in mice on a high-fat diet (Ghahremanlo et al. 2017).

This study aims to develop a special dietary food product Firin Sutlac Pumpkin Pudding for the elderly with heart disease. The specific objectives of the research include analyzing hedonic tests and hedonic quality, estimating the composition of nutrients based on Tabel Komposisi Pangan Indonesia (TKPI), calculating the contribution of pudding nutrients to the general population based on Angka Kecukupan Gizi (AKG), analyzing the feasibility of nutrient claims, and analysis of production costs and prices.

Method

Design, place and time

The study is a laboratory experiment-based experiment carried out in October 2022, in the Department of Community Nutrition laboratory, IPB University, Dramaga, Bogor. Pudding making process was carried out in the Food Experiment laboratory, and the Organoleptic Test was carried out in the Sensory Test Laboratory.

Materials and tools

The materials used consist of the main and supporting ingredients. The main ingredients used in the process of making Firin Sutlac pudding are soy milk, yellow pumpkin puree, and rice. The supporting ingredients used are white sugar and cornstarch. The soy milk is obtained from Sukahati Dramaga branch, Bogor. Yellow pumpkin is obtained from Ciampea market, Bogor. The tools used in making Firin Sutlac Pumpkin pudding are blenders, electric ovens, and aluminum foil cups.

Research Stages

This research started from preliminary research of designing pudding products Firin Sutlac Pumpkin formula which will be presented to the panelists. Pudding formula

Firin Sutlac Pumpkin is presented in Table 1.

The process of making the pudding started from cutting and removing the seeds of the yellow pumpkin. It was then boiled for 10 minutes and blended. The rice was cooked. Soy milk and granulated sugar were added to the mixture. Mixture was stirred for 3 minutes along with yellow pumpkin puree and cornstarch. The mixture was then cooked over 800C-850C, and stirred for 10-15 minutes until the mixture is consistent (Naseer et al. 2022). The next stage was to pour the mixture into an aluminum foil mold, while preheating the oven to 1750C until the mixture is consistent (Naseer et al. 2022). The next stage was to pour the mixture into an aluminum foil mold, while preheating the oven to 1750C until the top part is browned for 20 minutes (Ali 2015). The last stage is storing the mixture at a temperature of 2-40C for 2 hours (Naseer et al. 2022).

The determination of the selected formula was carried out through a series of organoleptic tests. The tests carried out on the sample were organoleptic tests, hedonic preference tests, and hedonic quality tests. The panelists involved in the testing process were 25 semi-trained panelists (students of IPB University). This hedonic test was carried out using a 9-point scale (1= dislike extremely; 2= dislike very much; 3= dislike moderately; 4= dislike slightly; 5= neither like or dislike; 6= like slightly; 7= like moderately; 8= like very much; 9= like extremely). The classification of hedonic quality tests is based on color (brightness), aroma (musty odor), taste (sweetness), and texture (softness).

The next stage is to calculate the estimated nutrient composition based on the Tabel Komposisi Pangan Indonesia (TKPI), the contribution of pudding nutrients to the Angka Kecukupan Gizi (AKG) of the general group, and to determine the feasibility of including nutrient claims using the Angka Label gizi (ALG) and to perform an analysis of production costs and prices.

Data processing and analysis

The data from the study was tabulated using Microsoft Excel 2019 for Windows and then analyzed using IBM SPSS 26.0 for Windows. Results of organoleptic characteristics with ordinal data scale were analyzed using the Kruskal Wallis and Mann-Whitney test. Results of p-value <0,05 show a significant difference.

Result and Discussion

Organoleptic Characteristics of Firin Sutlac Pumpkin Pudding

The organoleptic test is an analysis method involving the panelists' five senses as a tool to determine the quality and description of a food product which includes color, aroma, taste, texture, and temperature. The hedonic test is presented in Figure 1. The middle line represents the median, the rectangle represents the quartile (25%-75%), and the line segment represents the maximum and minimum values.

Figure 1 Results of the Kruskal Wallis test shows that the aroma and taste attributes are significantly different between samples. Furthermore, the Mann-Whitney tests showed that the aroma and taste attri-

Table 1. Formula for firin pudding sutlac pumpkin

Material (%)	Sample		
	S1 (40:60)	S2 (50:50)	S3 (60:40)
Soy Milk (ml)	111	111	111
Yellow Pumpkin (g)	11	14	17
Rice (g)	17	14	11
Sugars (g)	4	4	4
Cornstarch (g)	2	2	2

*Information: Formula Fn (x;y)= Comparison of yellow pumpkin weight (x) and rice weight (y)

butes of samples S1 and S3 were markedly different from those of S2. Sample S1 was deemed to have an aroma and taste that was not significantly different from S3.

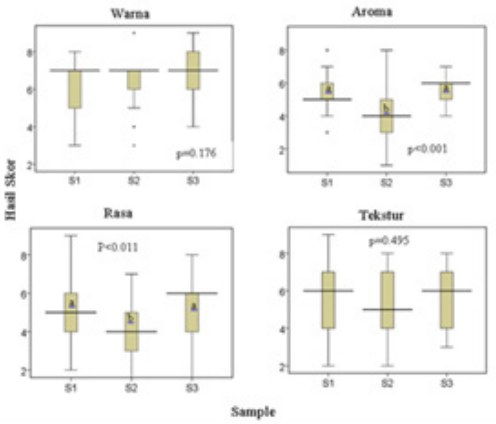

Figure 1. Hedonic test (S1-Sample 1, S2-Sample 2, S3-Sample 3), Kruskal Wallis test p<0.05, The value followed by different letters in one line is significant different Mann-Whitney test (p<0.005)

The aroma of Firin Sutlac Pumpkin pudding is influenced by the percentage of yellow pumpkin because it can disguise soy odor. This is in line with the research of Liestyaningsih et al. (2018) The higher the percentage of yellow pumpkin used, the less the typical soy odor will be. The soy odor is derived from lipoxygenase enzyme in soybeans that catalyzes the hydroperoxidation of polyunsaturated fatty acids such as linoleate and linoleic acid, thereby reactivating the molecules that cause odor in soybeans and their processing (Purwanto et al. 2018). Reducing the odor can be done by soaking and heating (Monica et al. 2020).

The use of yellow pumpkin affects the panelists' preference for flavor attribute. Soybeans provide a savory taste coupled with yellow pumpkins' natural sweetness. The sweetness is due to the naturally occurring sugar content (37%) of yellow pumpkins. (Nor et al. 2013). This aligns with a study by Ali (2015) regarding the Development of Yellow Pumpkin Base Body Cake Products to Increase Natural Sweetness.

Figure 2 Results of the Kruskal Wallis test shows that the color and aroma attributes are significant different between samples. Further tests by Mann-Whitney showed that the color attribute of samples S1 and S2 were significantly different from S3 and the aroma attributes of S1 and S3 were significantly different from S2.

Color is the first criterion for consumer acceptance of food. The color in Firin Sutlac Pumpkin pudding is influenced by the percentage of yellow pumpkin due to its ca-

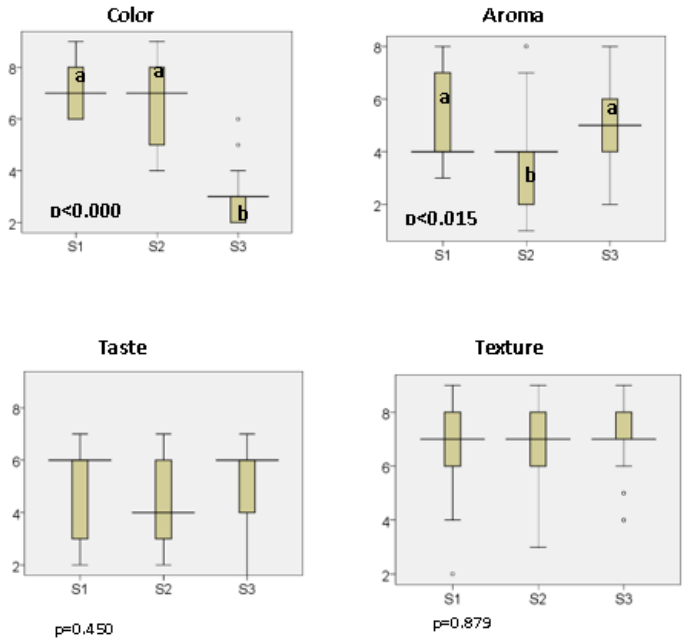

Figure 2. Hedonic Quality Test

rotenoid content as a natural pigment that gives it its yellow color (Pereire et al. 2020).). Firin Sutlac Pumpkin Pudding with the addition of a minimum of 40% and a maximum of 60% yellow pumpkin puree gives a light yellow and lighter yellow color respectively. Mehditabar (2019) proved that the addition of yellow pumpkin puree to ice cream gave a significantly different result ($p<0.05$) on the increase in color intensity and taste. The formation of carotenoid pigments with the addition of 15%-20% yellow pumpkin flour in the manufacture of flatbread and dry noodles gives a bright yellow color. In an excessive amount, it can produce a dark brownish color (Aljahani 2022; Fibentia et al. 2014; Alhanannasir et al. 2021).

The addition of yellow pumpkin puree did not cause significant difference ($p>0.05$) in texture. This is in line with the results of the research of Vital et al. (2018) stated that the texture of ice cream was not significantly different ($p>0.05$) with the addition of grape puree. The addition of yellow pumpkin flour to bread dough can reduce the volume and increase the toughness of the bread (Aljani 2022). The addition of fiber can modify the structure by changing the water absorption ability, water holding capacity, and gel formation ability (Mehditabar 2019).

Nutrient Composition and Nutritional Quality of Firin Sutlac Pumpkin Pudding

Nutrient analysis was carried out on all three formulations of Firin Sutlac Pumpkin Pudding presented in Table 2. The nutritional content per serving size of S1, S2, and S3 in Table 2 showed no significant difference in energy, protein, and fat. This happens due to the same amount of soy milk in each formula, which is 1000 ml. Soy milk is a source of protein and fat that contributes to energy.

The nutritional content per serving size S1, S2, and S3 in Table 2 is significantly different in carbohydrates and fiber. This is due to the difference in the composition of rice and yellow pumpkin. Based on TKPI, the fiber content of yellow pumpkin and rice per 100 g is respectively 2.7 g and 0.2 g. This shows that yellow pumpkin is the source of fiber in Firin Sutlac Pumpkin Pudding.

Determination of Selected Formula for Firin Sutlac Pumpkin Pudding

The determination of the selected formulation was carried out based on the organoleptic characteristics and nutrient composition of the sample. Based on the hedonic test, the acceptance value for the color, aroma, taste, and texture attributes in the S3 sample is relatively good. In line with high fiber content and low fat in S3. The highest percentage of component used in S3 is yellow pumpkin. Yellow pumpkin contains high amount of phytochemical substance beta carotene that is approximately 3100 µg/100 g (Batool et al, 2022). Carotenoids have antioxidant properties and may increase the proliferation of lymphocytes for immunological activity. Animal model studies using mice with atherosclerosis showed that a diet rich in 9-cis-beta-carotene can protect against heart disease by lowering non-HDL plasma cholesterol levels, inhibiting the growth of liver fibrosis and inflammation (Harari et al, 2008).

Nutritional Quality of Firin Sutlac Pumpkin

Table 2. Nutrient content of Firin Sutlac Pumpkin Pudding

Nutrients	Sample		
	S1 (40:60)	S2 (50:50)	S3 (60:40)
Energy (kcal/100 g)	106,24	102,66	99,08
Protein (g/100 g)	4,56	4,54	4,50
Fat (g/100 g)	2,83	2,89	2,89
Carbohydrates (g/100 g)	19,37	18,53	17,71
Fiber (g/100 g)	0,71	0,79	0,86

Table 3. Nutritional quality of Firin Sutlac Pumpkin pudding

Nutrients	Composition per	% AKG of elderly (65-80) years*		%ALG General group**	Nutrition Claims***
	Serving size (100 g)	Woman	Man		
Energy (kcal)	99,08	6,39	5,21	4,6	
Protein (g)	4,50	8,04	7,26	7,5	
Fat (g)	2,89	6,72	5,45	4,3	Low
Carbohydrates (g)	17,71	7,03	5,73	5,4	
Fiber (g)	0,86	3,89	3,17	2,9	

Information

*Based on the Indonesian Ministry of Health Regulation Number 28 in 2019

**Based on the BPOM Regulation Number 9 in 2019 concerning Nutrition Label Reference

***Based on BPOM Regulation Number 1 in 2022 concerning the Supervision of Claims on Processed Food Labels and Advertisements

Pudding

The results of the estimation of the nutritional composition of the Firin Sutlac Pumpkin pudding S3 sample resulted in a serving size value of 100 g or equivalent to two cups of pudding with a weight of 50 g each. The serving size aligns with BPOM regulation No 9 in 2015 regarding the supervision of processed food serving size that stated that milk-based desserts are limited to 100-200 g. Table 3 shows the percentage of nutrient contribution of the S3 sample referring to the AKG of the elderly aged 65-80 years and the ALG for the general group as a determinant of the feasibility in including nutritional claims on this product. The difference in target groups using AKG and ALG is due to the fact the main target is the elderly but there is no ALG for the elderly group.

Nutrition claims are all forms of description that show that a food possesses certain nutritional characteristics, including energy value and protein, fat, and carbohydrate content as well as vitamin and mineral content (BPOM, 2016). Based BPOM Regulation No. 13 in 2016 concerning claims on labels and advertisements of processed foods with a requirement of low-fat components of no more than 3 g per 100 g. Nutritional claims of firin sutlac pumpkin pudding meet the low-fat requirement at S1, S2, and S3, which is 2.8 g. Based on a study by Prentice (2017) with a randomized controlled trial (RCT) test, shows that a low-fat diet reduces the risk of coronary and cardiovascular heart disease in postmenopausal women aged 50-79 years.

Conclusion

Firin Sutlac Pumpkin Pudding was developed using a ratio of S1 60:40, S2 50:50, S3 40:60. Based on the results of organoleptic tests, and nutrient analysis, S3 was determined as the selected formula. Pudding S3 as the selected formula contains 99.08 kcal of energy, 4.5 g of protein, 2.89 g of fat, 17.17 g of carbohydrates, 0.89 g of fiber. Based on calculations, it was determined that the serving size of S3 pudding was 100 g or equivalent to two cups of pudding with a weight of 50 g each. This S3 pudding can also be considered eligible to be claimed as a low-fat food. It is suggested for future researchers to do proximate and beta carotene analysis. It is also suggested to perform a complete substitution of rice or yellow pumpkin to further elucidate the difference between the two.

References

Gibbons, L. (2010). *The global numbers and costs of additionally needed and unnecessary Caesarean sections performed per year: Overuse as a barrier to universal coverage*, World Health Report. 30. 1–31. doi: 10.1017/CBO9781107415324.004.

[BPOM] Badan Pengawas Obat dan Makanan. (2015). Pengawasan Takaran Saji Pangan Olahan. Jakarta (ID): BPOM RI

[BPOM] Badan Pengawas Obat dan Makanan. (2016). Pengawasan Klaim pada tabel dan iklan pangan olahan. Jakarta (ID): BPOM RI

[BPOM] Badan Pengawas Obat dan Makanan. (2020). Pencantuman Informasi Nilai Gizi untuk Pangan Olahan yang Diproduksi oleh Usaha Mikro dan Usaha Kecil. Jakarta (ID): BPOM RI

Abbafati C, Abbas KM, Abbasi-Kangevari M, Abd-Allah F, Abdelalim A, Abdollahi M, et al. (2020). Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet, 396(10258), 1204–22.

Abbafati C, Abbas KM, Abbasi-Kangevari M, Abd-Allah F, Abdelalim A, Abdollahi M, et al. (2020). Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet, 396(10258), 1204–22.

Alhanannasir, Murtoda AD, Muchsiri M, Rudi F, Agustini S. (2021). Aplikasi labu kuning sebagai substitusi zat warna kuning pada pembuatan kemplang. Indonesia Journal Of Industrial Research, 32(1), 19-26.

Ali W.S. (2015). Nutrition with Pumpkin (Cucrbita pepo) Cake as Lowering Cholesterol in Rats. Middle East J. Appl. Sci, 5, 10–18

Alisarli M, Sancak YCAN, Akkaya L, Elibol C. (2004). Investigation of Staphylococcus aureus isolation and thermonuclease activity and enterotoxin formation in some dairy desserts. Turkish J Vet Anim Sci, 27(6), 1457–62.

Aljahani AH. (2022). Wheat-yellow pumpkin composite flour: Physico-functional, rheological, antioxidant potential and quality properties of pan and flat bread. Saudi J Biol Sci, 29(5), 3432–9.

Arshad S, Khan S, Karim A, Gupta VA. (2022). The burden of malnutrition & frailty in patients with coronary artery disease: An under-recognized problem. JRSM Cardiovasc Dis. 11, 204800402211027.

Batool M, Ranjha MMAN, Roobab U, Manzoor MF, Farooq U, Nadeem HR, Nadeem M, Kanwal R, AbdElgawad H, Al Jaouni SK, Selim S, Ibrahim SA. (2022). Nutritional Value, Phytochemical Potential, and Therapeutic Benefits of Pumpkin (Cucurbita sp.). Plants (Basel), 24;11(11), 1394

Corre R, Bemfeito CM. (2020). Nutritional and functional potential of pumpkin (Cucurbita moschata) pulp and pequi (Caryocar brasiliense Camb .) peel flours, 57, 3920–5.

Fibentia N, Dahlia, Sari NI. (2014). Pemanfaatan labu kuning sebgaai pewarna alami pada mie kering ikan nila. JOM.

Ghahremanlo A, Hajipour R, Hemmati M, Moossavi M, Mohaqiq Z. (2017). The beneficial effects of pumpkin extract on atherogenic lipid, insulin resistence and oxidative stress status in high-fat diet-induced obese rats. Journal of complementary and integrative medicine.

Keller H, Allard J, Vesnaver E, Laporte M, Gramlich L, Bernier P, et al. (2015). Barriers to food intake in acute care hospitals: A report of the Canadian Malnutrition Task Force. J Hum Nutr Diet, 28(6), 546–57.

Kemenkes RI. (2018). Hasil Riset Kesehatan Dasar Tahun 2018. Kementrian Kesehat RI, 53(9), 1689–99.

Krok-Schoen JL, Jonnalagadda SS, Luo M, Kelly OJ, Taylor CA. (2019). Nutrient intakes from meals and snacks differ with age in middle-aged and older americans. Nutrients, 11(6), 1–12.

Liestyaningsih C, Maryanto S, Purbowati. (2018). Daya terima formulasi minuman berbahan kedelai dan labu kuning. Jurnal gizi dan kesehatan. 10(923), 51-61. doi: 10.35473/jgk.v10i23.42

Maharani A, Sujarwoto, Praveen D, Oceandy D, Tampubolon G, Patel A (2019) cardiovascular disease risk factor prevalence and estimated 10-year cardiovascular risk scores in Indonesia: The SMARThealth Extend study. PLoS ONE, 14(4), doi: e0215219. https://doi.org/10.1371/journal.pone.0215219

Mehditabar, H., Razavi, S. M. A., & Javidi, F. (2019). Influence of pumpkin puree and guar gum on the bioactive, rheological, thermal and sensory properties of ice cream. International Journal of Dairy Technology. doi: 10.1111/1471-0307.12658

Mena B, Ashman H, Dunshea FR, Hutchings S, Ha M, Warner RD. (2020). Adults in Australia and China. Foods, 9(4), 426–50.

Moin A, Ali TM, Hasnain A. (2017). Characterization and utilization of hydroxypropylated rice starches for improving textural and storage properties of rice puddings. Int J Biol Macromol

Monica C, Hintono A, Mulyani S. (2020). Karakteristik Permen Karamel Susu Kedelai dengan Penambahan Jahe. Journal Teknologi Pangan, 4(2), 110–6.

Naseer B, Naik HR, Hussain SZ, Qadri T. (2022). Development of low glycemic index instant Phirni (pudding) mix - its visco - thermal , morphological and rheological characterization. Sci Rep, 12, 10710

Nor NM, Carr A, Hardacre A, Brennan CS. (2013). The Development of Expanded Snack Product Made from Pumpkin Flour-Corn Grits: Effect of Extrusion Conditions and Formulations on Physical Characteristics and Microstructure. Foods, 14;2(2), 160-169. doi: 10.3390/foods2020160. PMID: 28239106; PMCID: PMC5302265.

Pereire AM, Krumreich FD, Ramos AH, Krolow ACR, Santo RB, Gularte MA. (2020). Physicochemical characterization, carotenoid content and protein digestibility of pumpkin access flours for food application. Food Sci. Technol (Campinas), 40 (suppl 2). https://doi.org/10.1590/fst.38819

Purwanto T, Nurohmi S, Rahadiyanti A, Naufalina Md. (2018). Analisis Daya Terima Yogurt Sari Kedelai (Soygurt) dengan Penambahan Jus Kurma (Phoenix Dactylifera). Darussalam Nutrition Journal, 2(1), 39–47.

Residents C. (2022). Diets CT. Exploring Meal Provision and Mealtime Challenges for Aged Methods Study.

Stewart MW, Traylor AC, Bratzke LC. (2015). Nutrition and Cognition in Older Adults With Heart Failure:A Systematic Review, 41(11), 50–9.

Suttireung P, Winuprasith T, Srichamnong W, Paemuang W, Phonyiam T, Trachootham D. (2019). Riceberry Rice Puddings: Rice-Based Low Glycemic Dysphagia Diets. Asia Pac J Clin Nutr, 28(3), 467–75.

Taylor P. (2014). Critical Reviews in Food Science and Nutrition Meat analogues : Health Promising Sustainable Meat Substitutes, 37–41.

Vital A C P, Santos N W, Matumoto-Pintro P T, da Silva Scapim M R and Madrona G S (2018) Ice cream supplemented with grape juice residue as a source of antioxidants. International Journal of Dairy Technology 71, 183–189.

Wleklik M, Uchmanowicz I, Andreae C. (2018). The Role of Nutritional Status in Elderly Patients with Heart Failure The Role Of Nutritional Status In Elderly Patients With Heart Failure, 22(5), 581-588.

World Health Organization. Global health observatory data, Indonesia country profile (2015) [updated January 2015; cited 2015 March 26]. Available from: http://www.who.int/gho/countries/idn/country_profiles/en/.