
Product Development: Yellow Pumpkin Donuts And RPO (Red Palm Oil) For School-Age Children

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ABSTRACTS

Background: Nutritional problems are crucial things to be concerned about, especially for children. Children are still growing, so their nutritional intake needs to be considered. Vitamin A deficiency still often occurs in children, even though vitamin A has a significant role in the child's growth process. Food sources that contain good sources of pro-vitamin A but are never used properly are pumpkin and Red Palm Oil (RPO). This study aims to make a product in the form of donuts, the type of snack that is of interest to children, and increase the added value of pumpkin and RPO.

Methods: The research method used is Pure Experimental, which consists of several activities, starting with product trial, product manufacture, hedonic test, and product quality test. Data analysis was performed using Ms. Excel 2016.

Result: The results of the overall hedonic test of the product are 4.1, which means that the product is favored by the panelists. while results of the hedonic quality test show that the product has a golden yellow color, a pleasant aroma, a sweet taste, a slightly soft texture, and a weak after taste.

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1. Introduction

School-age children are an age group that is still in a period of growth and development, so they need special attention, especially the problem of nutritional intake. One of the problems that occurs in school-age children is Vitamin A Deficiency (VAD). The problem of vitamin A deficiency is still a nutritional problem in Indonesia. WHO states that vitamin A deficiency affects around 40% of the world's population, especially pregnant, lactating women and children. It is estimated that as many as 100-140 million children in the world still experience vitamin A deficiency at the subclinical level, although clinical deficiency has decreased. Vitamin A cannot be formed by the body so it must be obtained from daily food. Children's vitamin A status is not only caused by a lack of vitamin A intake, but also due to other factors (Marliyati et al., 2014).

Indonesia has many varieties of local food that have the potential to fulfill vitamin A intake for the body, one of which is pumpkin. Yellow pumpkin contains quite high beta-carotene, which is around 1800 IU or 2100 µg per 100 g of fresh fruit. The aroma and taste of pumpkin is very distinctive, and is a source of nutrients such as carbohydrates, protein, minerals, and carotene, carotene is pro-vitamin A. Vitamin A also has an important role in the maintenance of epithelial cells (Hariadi et al., 2021). The use of pumpkin among the people is still very simple where the presentation is still in the form of whole fruit. Yellow pumpkin can be processed, created and developed in various types of food and snacks.

Children's food consumption at school contributes energy and nutrients that are useful for children's growth and development. School-age children's eating habits are more influenced by their activities both at home and outside the home, children tend to delay their meal time because they are busy playing. This habit makes children prefer snacks compared to eating the main meal when they are hungry. Snacks have an important role in contributing energy intake and other nutrients for school-age children. Deficiency of vitamin A in school-age children can be overcome by developing products high in Vitamin A or Provitamin A in snacks.

Product development with the addition of pumpkin which is a local food added with Red Palm Oil (RPO) as a source of carotene which can prevent vitamin A deficiency in children, especially school-age children. According to Marliyati et al., (2010) the results of RPO analysis had a carotenoid content of 2511.13 ppm, so RPO is a type of vegetable oil that has good carotenoid content. In addition, there is a local ingredient that has a fairly high β-carotene content, namely pumpkin.

The form of snack food chosen to be developed is donuts. Donuts are one of the most popular bakery products, especially by children and are easy to make. The development of donut formulation products with the addition of pumpkin and RPO will improve the quality of donuts which are generally only high in calories. The purpose of this research is to develop local food-based products, namely pumpkin as snacks for school-age children who have a high level of provitamin A.

2. Methods

The research method is Pure Experimental with the implementation time being carried out in May 2017, the product trial was carried out on May 5 and 12 2017 at the Food Experiment Laboratory, Department of Community Nutrition, 2nd floor, Faculty of Human Ecology, Bogor Agricultural University. The hedonic quality test was held on May 19, 2017 at the Food Experiment Laboratory 2, Department of Community Nutrition, 3rd floor, Faculty of Human Ecology, Bogor Agricultural University. Data processing and analysis was carried out using the Ms. program. Excel 2016. Data from hedonic quality test results were descriptively analyzed using the average value and the percentage of panelist acceptance for the level of preference for the product.

The tools used for product development consist of basins, bowls, glasses, spoons, clean towels, food scales, pans, pans, knives, cutting boards, donut presses, rolling pins and plates. The materials used in the manufacture of products are presented in the following table:

Table 1. Product's Ingredients

Ingredients	Weight*
High protein flour	243 g
Egg	55.5 g
Yellow pumpkin	90 g
Margarine	22.5 g
Instan yeast	3 g
Salt	1.5 g
Sugar	60 g
Full cream milk	30 g
RPO	7.5 g
Oil	500 ml

*for one-time production of 9 donuts

3. Results and Discussion

Indonesia has many food sources of vitamin A, one of which is pumpkin (*Cucurbita moschata duschenes*). Yellow squash is a very potential source of local food because the nutritional content is quite complete and the price is affordable by the community. The main composition of pumpkin is carbohydrates and water, the nutritional content in pumpkin is listed in Table 2.

Table 2. Composition of pumpkin nutrients per 100 grams of material (fresh fruit flesh)

Component	Total
Energy (kkal)	51
Protein (g)	1.7
Fat (g)	0.5
Carbohydrat (g)	10
Calsium (mg)	40
Fosfor (mg)	180
Iron (mg)	0.7
Vitamin A (SI)	180
Vitamin B1 (mg)	0.1
Vitamin C (mg)	52
Water (g)	91.2
Edible Portion (%)	77.0

Source: Direktorat Jendral Kesehatan Masyarakat, 2017

Research (Wahyuni & Widjanarko, 2015) in his research obtained from the type of solvent n-hexane and extraction time of 25 minutes with a total carotenoid 575.22 ($\mu\text{g}/\text{gr}$). Beta carotene is a type of carotenoid and functions as provitamin A. Seeing the nutritional content that is quite good, pumpkin can be used as a mixture in various foods, but many children do not like pumpkin, so it is necessary to diversify food and modify recipes with Use food sources of vitamin A.

The type of vegetable oil that contains beta-carotene is Red Palm Oil (RPO), RPO has a reddish color where food with beta-carotene sources has characteristics like RPO (Valko et al., 2007). Utilization of RPO in food ingredients can be done by making it as a functional food. The use of RPO is starting to develop a lot and one of them can be used as an additional ingredient in making products in the form of snacks (Tony et al., 2012).

Determination of the formula based on the use of margarine in standard recipes, where the composition of margarine is combined with RPO with 3 kinds of formulations, namely F1 (75% margarine: 25% RPO), F2 (50% margarine: 50% RPO and F3 (25% margarine: 25% RPO)) The results of the trial of making Ningrum donuts with the three formulations above, recommended/selected Formula F1 as the best formula based on organoleptic assessment including taste, aroma, color, texture and after taste.

3.1. Product Organoleptic Test Results

The preference test for Ningrum Donuts was carried out by organoleptic tests conducted at the Organoleptic Laboratory of the Department of Community Nutrition, FEMA IPB. The purpose of this test was to determine the panelists' acceptance of Donat Ningrum. Organoleptic test was carried out using the hedonic test method and hedonic quality test. The organoleptic test was carried out by 11 male and female semi-trained panelists who were 2016 Masters in Nutrition Science Students. The panelists gave their preference ratings for color, aroma, taste, texture and overall acceptability. The test scale ranges from 1 to 5 (hedonic scale), namely: 1 (dislike very much), 2 (dislike), 3 (normal), 4 (like), 5 (very like).

3.2. Hedonic Test

The hedonic test was conducted to determine the response of the panelists to the general product quality characteristics, namely color, aroma, texture, and taste. Panelists were asked to express opinions about liking or disliking the product, besides that they also gave opinions about the level of liking or disliking (Soekarto, 1985). Panelists gave preference ratings to color, aroma, taste, texture and overall acceptability. The test scale ranges from 1 to 5 (hedonic scale), namely: 1 (dislike very much), 2 (dislike), 3 (normal), 4 (like), 5 (very like).

Table 3. Assessment of hedonic test and hedonic quality

Numeric	Assesment					
	Hedonic test*	Color	Aroma	Taste	Texture	After Taste
1	Dislike very much	Pale yellow	Rancid	Not Sweet	Not Soft	Very weak
2	Dislike	A bit yellow	A bit rancid	Not sweet enough	Less Soft	Weak
3	Normal	Yellow	Normal	Normal	Normal	Nothing
4	Like	A bit golden yellow	Quite Fragrant	A bit sweet	Less Soft	Not strong
5	Very like	Reddish yellow	Fragrant	Sweet	Soft	Strong

Description : *) Includes aspects of color, aroma, taste, texture

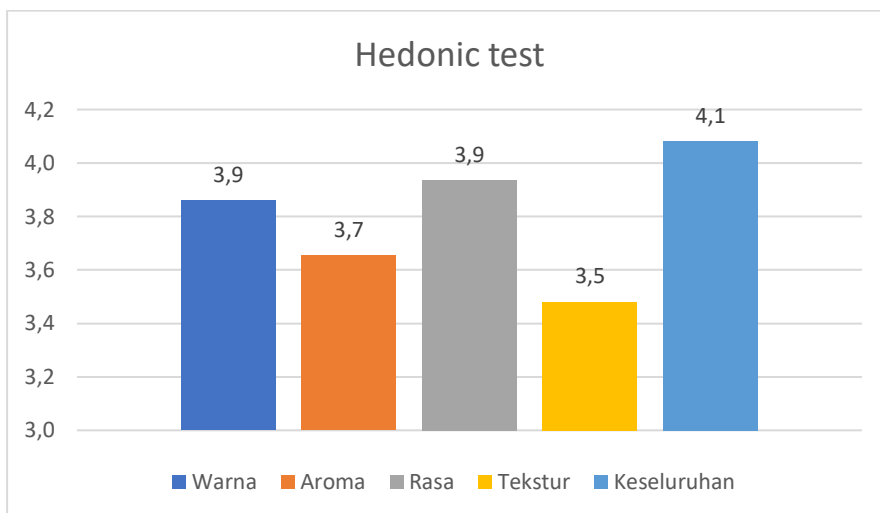


Figure 1. The results of the Ningrum Donat hedonic test

3.3. Hedonic Quality Test

The hedonic quality test is a more specific hedonic test for a certain type of quality. While the purpose of the hedonic quality test is to determine the response to more specific product properties. In the hedonic quality test, products are assessed based on good and bad impressions (Soekarto, 1985). Organoleptic test data were analyzed descriptively based on the panelist's preference percentage and mode score. The panelist's preference percentage is calculated by adding up the panelist's preference percentage.

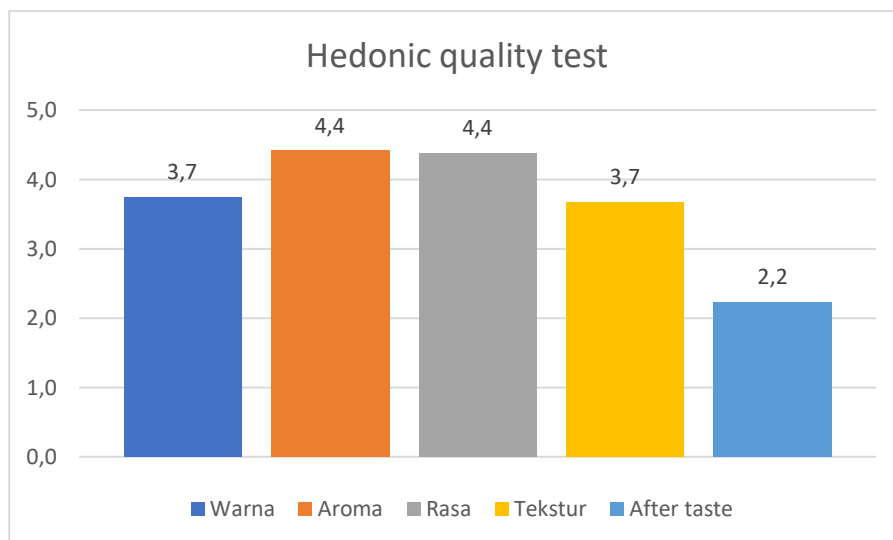


Figure 2. Results of the Ningrum Donat hedonic quality test

The sense used in judging color is the sense of sight. The color of the Ningrum donut is yellow inside and golden yellow on the outside. After the dough is fried, the outer skin becomes golden yellow. The yellow color is produced from the presence of pumpkin and Red Palm Oil which are sources of vitamin A and beta carotene. The panelists' average preference for donut color was 3.9. The reason for liking the color of the Ningrum donuts is because they are attractive and different from the existing donuts. The yellow color looks bright and appetizing to consume it. The hedonic quality is described as pale yellow to reddish yellow. Ningrum donuts have a yellow hedonic quality color, with a scale of 3.7.

Another criterion for selecting food products is aroma. The sense that plays a role in assessing this attribute is the nose. The aroma of food products will determine the delicacy of food products. A pleasant distinctive aroma can make food more likable. If a food product smells good, many people want to consume it. Based on the data from the hedonic test results, it is known that the Donat Ningrum aroma preference score is 3.7. That is, the panelists felt that these donuts had an evocative aroma and made people more appetizing to eat them. The hedonic quality is translated from rancid to fragrant. Ningrum donuts have a scale of 4.4 which means they have a slightly fragrant aroma.

An important component is also during the product acceptance test, namely taste. Taste is an attribute of judgment that involves the sense of taste. Even though a product has an attractive aroma, if it tastes bad it will make the product difficult for consumers to accept. Based on the results of the hedonic test, it shows that the level of preference for Ningrum donuts is on a scale of 3.9. The addition of pumpkin and RPO did not spoil the taste of the donuts. Choosing the right pumpkin contributes to the sweet taste of the donuts. The hedonic quality is translated from sweet to sweet. The taste of the hedonic quality of this product is slightly sweet, the taste is just right.

Based on the data from the hedonic test results, panelists have a texture preference level on a scale of 3.5. When compared with other assessment attributes, texture has a low level of preference. Some panelists said that the texture of the donuts was a bit thick. In the hedonic quality assessment, it is translated into soft to soft. The hedonic quality assessment shows a scale of 3.7. The texture of the hedonic quality of this product is usually not thick and not soft. The texture of the donuts is influenced by the content of gluten protein, gluten protein is a type of protein that can make the texture of the donuts better. The formula used adds pumpkin puree to increase levels of Vitamin A and beta carotene.

After taste is the taste left in the mouth (Higgins & Hayes, 2019). After taste of this product is the taste of RPO left in the mouth after the panelists have tasted it. The hedonic quality is translated from very weak to strong and on a scale of 2.2. After taste the hedonic quality of this product is weak. This shows that the RPO formulation does not change the taste. Proper RPO storage and proper RPO composition will avoid rancid and bitter tastes.

Acceptability is the consumer's overall acceptance of food products. The actual acceptability assessment is a combined assessment or the accumulated results of the panelists based on the previous hedonic quality assessment. Based on all donut components, the average panelist gave an assessment on a scale of 4.1. This shows that the addition of pumpkin and RPO did not cause significant differences between color, aroma, taste so that the substitution was able to increase the acceptability of the donuts by the panelists.

4. Conclusion

Ningrum donuts are a product made using pumpkin and fortified with red palm oil to increase pro-Vitamin A. Ningrum donuts are given as a snack or supplementary food (PMT) to school children aged 7-12 years. The level of preference on the organoleptic test shows that Ningrum donuts have good acceptability in all aspects including aspects of color, aroma, taste and texture. Calculation of the nutritional content of Ningrum Donuts shows that the product is used as an alternative to PMT-AS aged 7-12 years by contributing 76.97% of energy and 90% of protein.

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