

Effect of Peanut Addition (*Arachis hypogea*) On Organoleptic Properties, Nutritional Value, and Acceptability Snack Peanbars for Pregnant Women in the Working Area

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ABSTRACT

Background: *Snack bars, which are rectangular and contain all the nutrients humans need, can be a great option to meet the nutritional needs of pregnant women because pregnant women need a balanced and nutrient-rich intake to meet the needs of the fetus and mother. One of the most common health problems in developing countries is malnutrition among pregnant women. One of the efforts to be made is to improve the nutritional status of pregnant women by providing local food-based snacks, namely snack peanbars.*

Research Methods: *In this study, experiments were conducted using a completely randomized design (CRD), consisting of five treatment levels, by collecting data on organoleptic properties, data on nutrient values, and data on acceptability. Organoleptic quality was analyzed by hedonic test while the nutrient content (moisture content, ash content, protein content, fat content, and carbohydrate content) was tested in the laboratory*

Research Result: *The results showed that adding peanuts significantly affected aroma and texture ($p < 0.05$). The selected products are formulations Snack Peanbars t4 (42 g peanuts) with nutritional content per 100 grams with Energy 407.8 kcal, protein 8.90 grams, fat 12.40 grams, carbohydrates 65.15 grams, water content 13.07 grams, ash content 0.47 grams. While acceptance Snack Peanbars in pregnant women, namely 90% good acceptance and 10% poor acceptance.*

Conclusion: *The addition of 75% peanuts (42 g) had a significant effect on the texture and aroma parameters ($p < 0.05$), while the color and taste parameters had no significant impact ($p > 0.05$). Snack Peanbars per 100 g contain an energy of 407 kcal, protein 8.9 g, fat 12.4 g, and carbohydrates 65.15 g—acceptability results peanbars in pregnant women with good acceptance of 90% and less acceptance of 10%.*

BACKGROUND

Snack bars are rectangular-shaped foods that contain all the nutrients humans need, can be consumed directly, and have high nutritional value. (Indrawan. 2018). Snack bars can be an excellent choice to meet the dietary needs of pregnant women because they need a balanced and highly nutritious nutritional intake for themselves and their growing fetus (Rangel., 2017).

One of the most common health problems in developing countries is malnutrition in pregnant women. The nutrition of pregnant women is one of the focuses of attention of community nutrition activities because of its significant impact on the condition of the fetus they are carrying (Ministry of Health of the Republic of Indonesia, 2019).

Considering the nutritional problems of pregnant women in Indonesia, significant efforts are needed, namely by making alternative snacks for pregnant women that contain high levels of energy and protein based on local food.

Apart from that, some processed foods can be changed while maintaining the calories and nutritional content the body needs. This is also practical and can quickly reduce hunger by providing local food-based snacks, namely peanbars made from peanuts, because research has shown that peanuts contain several essential nutrients, including protein, healthy fats, fiber, vitamins, and minerals, which can benefit pregnant women.

Peanuts (*Arachis hypogea* L.) are a food source with high nutritional value. It has 40-5% fat, 27% protein, carbohydrates, and high levels of vitamins (A, B, C, D, E, and K) (Gultom & Raya, 2020).

Peanut production, according to the Regency/City of West Nusa Tenggara in 2020, namely in West Lombok Regency, was 735,418 tons, in Central Lombok Regency was 7,278,322 tons, in East Lombok Regency 838,587 tons, in Sumbawa Regency it was 315,262 tons, in Dompu Regency 508,422 tons, in Bima Regency 16,085,465 tons, in West Sumbawa Regency 188,115 tons, in North Lombok Regency 7,264,633 tons, and Bima City 397,112 tons. So, the total peanut production in NTB is 33,611,334 tons (West Nusa Tenggara Province Agriculture and Plantation Service, 2020).

The results of previous research by Fitria et al. (2022) showed that peanut and sweet potato flour snack bars had a better taste because there were more peanuts. In 50 grams, the snack bar has an energy content of 238.47 kcal, 7.5 g protein, 12.98 g fat, and 22.91 g carbohydrates.

The results of research previously carried out by (Novidiyanto & Wardani., (2016) on Snack bars with low-fat rice flour and peanuts obtained the results of the snack bar with the most preferred color, aroma, taste, and texture being (comparison of rice flour and peanuts). Low-fat soil 25:75).

Many previous researchers have researched peanuts, with results showing that the nutritional content contained in peanuts is quite good for the body. Peanuts are also a source of vegetable protein—high protein content and calcium and iron content. So peanuts are widely used to make various processed foods, including Peanbars snacks.

Based on the description above, researchers researched "The Addition of Peanuts on Organoleptic Properties, Nutritional Value, and Acceptability of Peanbars Snacks in Pregnant Women."

METHODS

Organoleptic tests were conducted at the Food Technology Science Laboratory, Nutrition Department, Health Polytechnic, Ministry of Health, Mataram. The proximate test was conducted at the Analytical Chemistry Laboratory at Mataram University. The acceptability test was conducted on second-trimester pregnant women in Gunungsari, West Lombok. This research was carried out in January – February 2023.

This research was carried out using experimental methods. The research design used a Completely Randomized Design (CRD) with one factor, namely the addition of peanuts consisting of 5 levels of treatment, namely t1: 60% addition of peanuts, t2: 65% addition of peanuts, t3: 70% addition of peanuts, t4: addition peanuts 75%, t5: addition of peanuts 80%. Repetition 3 times for each treatment level for 15 experimental units.

The variables of this research are the organoleptic properties of Peanbars snacks, the nutritional value of Peanbars snacks, and the acceptability of Peanbars snacks. The independent variable is the addition of peanuts, which consists of 5 levels of treatment, namely t1: 60%, t2: 65%, t3: 70%, t4: 75%, t5: 80%. Meanwhile, the dependent variable consists of organoleptic properties, including color, aroma, texture, taste, nutritional value content, water content, ash content, protein content, fat content, carbohydrate content, contribution, and acceptability.

RESULTS

Test Results of Organoleptic Properties of Peanbars Snacks

Organoleptic testing, also known as sensory testing or self-sensory testing, involves using human senses to measure the acceptability of a product. Organoleptic testing is essential for quality testing because it can show spoilage, quality deterioration, and other defects in the product. This study used the Hedonic rating scale to evaluate these organoleptic properties. Organoleptic tests use preferences for color, aroma, taste, and texture (Fath et al., 2020).

Hedonic Test

The results of this hedonic test were obtained from the results of an assessment using 25 somewhat trained panelists regarding Peanbars Snack products by considering the panelists' level of preference in terms of color, aroma, taste, and texture of the product using five hedonic scales including (1) really do not like, (2) do not like, (3) somewhat like, (4) like, (5) like very much.

Based on the results of descriptive statistical tests regarding color, aroma, taste, and texture, the average level of panelists' liking was obtained, as presented in Table 1.

Table 1. Average Panelist Assessment of the Peanbars Snack Hedonic Product Test

Formulas	Average assessment score			
	Color	Aroma	Flavor	Texture
t1	3,64	3,76	3,76	3,88
t2	3,12	3,24	3,20	3,52
t3	3,80	3,84	3,88	3,84
t4	3,52	3,44	3,72	3,52
t5	3,32	3,08	3,48	3,20

Based on the results of the hedonic test that was carried out, it was found that the color of the Peanbars snack was light brown, the texture was solid, the aroma of peanuts, and the taste was sweet and savory.

From these results, we continued with the analysis of variance (One Way Anova test) to determine the significance of each treatment and whether there was an influence between treatments t1, t2, t3, t4, and t5 in terms of color, aroma, taste, and texture. The results of the analysis can be seen in Table 2.

Table 2. Significance of Organoleptic Properties of Snack Bar Products

Parameter	P	Notation
Color	0,076	NS
Aroma	0,014	S
Flavor	0,177	NS
Texture	0,029	S

Information :

S = Significant : Really different

NS = Non-Significant: Not significantly different

Based on Table 2, it can be concluded that the p-value <0.05 for the aroma and texture parameters. This shows that adding peanuts to peanbars snacks has a natural effect. Meanwhile, the taste and color showed that adding peanuts to the organoleptic properties of peanbars snacks did not differ (p>0.05).

Peanbars Snack Color

The score for the effect of adding peanuts from the total weight of the ingredients on the aroma of peanbars snacks can be seen in Table 3

Table 3. Organoleptic Test Results on the Color of Peanbars Snacks

Treatment with the addition of Peanuts from the total weight	Average organoleptic test results for peanbars snack color	Notation
t1 (60%)	3,64	a
t2 (65%)	3,12	a
t3 (70%)	3,80	a
t4 (75%)	3,52	a
t5 (80%)	3,32	a

Note: Numbers followed by the same letter in the same column are not significantly different at α 5% based on the Tukey test.

Based on Table 3, it can be seen that adding peanuts to the aroma parameter of peanbars snacks with the t3 treatment level got the highest average value, namely 3.80. The average aroma test results at the t1, t2, t3, t4, and t5 treatment levels ranged from 3.12–3.80 and were included in the somewhat like category. After one-way ANOVA statistical analysis, it was found that color was one of the parameters that was not significant, so no additional analysis was carried out.

The aroma of Peanbars snacks

The score for the effect of adding peanuts from the total weight of the ingredients on the aroma of peanbars snacks can be seen in Table 4.

Table 4. Organoleptic Test Results on The Aroma of Peanbars Snacks

Treatment with the addition of Peanuts from the total weight	Average organoleptic test results for peanbars snack color	Notation
t1 (60%)	3,76	ab
t2 (65%)	3,24	ab
t3 (70%)	3,84	b
t4 (75%)	3,44	ab
t5 (80%)	3,08	a

Note: Numbers followed by the same letter in the same column are not significantly different at α 5% based on the Tukey test.

Based on Table 4, it can be seen that adding peanuts to the aroma parameter of peanbars snacks with the t3 treatment level got the highest average value, namely 3.84. The aroma test results at the t1, t2, t3, t4, and t5 treatment levels averaged 3.08-3.84, which indicates the somewhat liked category. After the one-way ANOVA statistical test was completed, it was found that aroma was one of the significant parameters. Therefore, the Tukey test was carried out, and it was found that the results of t1, t2, t3, t4 were not significantly different but were significantly different from t5.

Peanbars snack taste

The score for the effect of adding peanuts from the total weight of the ingredients on the aroma of peanbars snacks can be seen in Table 5.

Table 5. Organoleptic Test Results on the Aroma of Peanbars Snacks

Treatment with the addition of Peanuts from the total weight	Average organoleptic test results for peanbars snack color	Notation
t1 (60%)	3,76	a
t2 (65%)	3,20	a
t3 (70%)	3,88	a
t4 (75%)	3,72	a
t5 (80%)	3,48	a

Note: Numbers followed by the same letter in the same column are not significantly different at α 5% based on the Tukey test.

Based on Table 5, it can be seen that adding peanuts to the taste parameters of peanbars snacks with the t3 treatment level got the highest average value, namely 3.88. The taste test results at treatment levels t1, t2, t3, t4, and t5 averaged 3.20–3.88, which shows that they are in the somewhat like category. The one-way ANOVA statistical test was not carried out because taste was one of the parameters that was not significant.

Peanbars snack texture

The score for the effect of adding peanuts from the total weight of the ingredients on the aroma of peanbars snacks can be seen in Table 6.

Table 6. Organoleptic Test Results for Aroma Snack Peanbars

Treatment with the addition of Peanuts from the total weight	Average organoleptic test results for peanbars snack color	Notation
t1 (60%)	3,88	b
t2 (65%)	3,52	ab
t3 (70%)	3,84	ab
t4 (75%)	3,52	ab
t5 (80%)	3,20	a

Note: Numbers followed by the same letter in the same column are not significantly different at α 5% based on the Tukey test.

Based on Table 6, it can be seen that adding peanuts to the peanbars snack texture parameters with the t1 treatment level got the highest average value, namely 3.88. The average texture test results ranged between 3.20 and 3.88 at the t1, t2, t3, t4, and t5 levels included in the somewhat like category. After the one-way ANOVA statistical test, the results showed that texture was one of the significant parameters. Therefore, the Tukey test results show that t1, t2, t3, t4, and t5 are not significantly different.

Peanbars Snack Nutritional Content

The five peanbar snack product formulas (t1, t2, t3, t4, and t5), from the results of the analysis of organoleptic properties testing by considering the results of the hedonic test, peanbar snack products were selected with the t4 treatment, namely with the addition of peanuts 75% of the weight of green bean flour for analysis. Its nutritional content.

Based on the results of the nutritional content test using the proximate method, which consists of water content, ash content, protein, fat, and carbohydrates in peanbars snack products with the addition of 75% peanuts, more details are in Appendix 9. The results of the analysis of the snack's nutritional content were obtained from the proximate test. peanbars compared with SNI 01-4216-1996 in Table 7.

Table 7. Nutrient Content in Peanbars Snack Formula

Parameter	Unit	Test method	Average results	SNI
Water content	%	Gravimetri	13,07	-
Ash content	%	Gravimetri	0,47	-
Proteins	%	Kjaldehl	8,90	9-25
Fat	%	Soxhletasi	12,40	1,4-14
Carbohydrate	%	By difference	65,15	Min.7
Energy	Kkal/gram	-	407,8	Min 400

Table 7 shows that the selected snack bar has a water content of 13.07% w/w and an ash content of 0.47%. Apart from that, the macronutrient composition of the peanut snack is 407 kcal of energy, 8.9 g of protein, 12.4 g of fat, and 65.15 g of carbohydrates.

Peanbars Snack Acceptance Test Results in Pregnant Women

The food waste method taken from the 2013 Hospital Nutrition Service Guidelines (PGRS) is used in this acceptability test to determine whether pregnant women consume or accept peanbars snacks as a snack.

The panelists involved in this assessment are pregnant women over 19 years old, in the second trimester of pregnancy, and have no history of allergies to peanuts. The average data on the acceptability of Peanbars snacks is shown in Figure 1. The following:

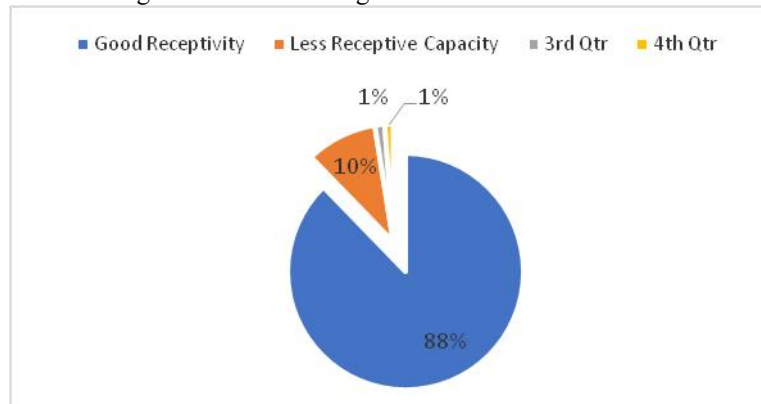


Figure 1 Receiver Power Circle

Based on Figure 1 above, of the 30 pregnant women in the second trimester who were panelists in testing the acceptance of Peanbars snack products, there were 27 pregnant women in the second trimester (90%) who received it well (food was consumed $\geq 80\%$ of the three pregnant women in the second trimester (10%) with less acceptance (food consumed $< 80\%$).

Each pregnant woman is given one portion containing one piece or 100 grams of Peanbars snack, which has an energy nutritional content of 407 kcal, 8.9 grams of protein, 12.4 grams of fat, and 65.15 grams of carbohydrates.

DISCUSSION

Organoleptic Properties of Peanbars Snacks

Organoleptic testing, also known as sensory testing or self-sensory testing, involves the use of human senses to measure the acceptability of a product. Organoleptic testing is essential for quality testing because it can show spoilage, quality deterioration, and other defects in the product. This study used the Hedonic rating scale to evaluate these organoleptic properties. Organoleptic tests use preferences for color, aroma, taste, and texture (Fath et al., 2020).

Color

The color of food products is used to increase people's appetite and attract consumers to buy the product, so color becomes an essential component. However, each person perceives product colors differently due to personal preferences (Dhanang et al., 2021).

From the results of the Anova statistical test, it was concluded that the probability of the color of peanbar snacks was 0.076 ($p > 0.05$), indicating that adding peanuts to peanbar snacks had no significant impact on the color.

It can be seen that the first and third treatments for color experienced an increase in scores, and in the second, fourth, and fifth treatments, the scores for peanbars snacks decreased. However, the color parameter had no effect because, in the five treatments of Peanbars snacks, the color produced was the dominant brown color. This is influenced by the oven where the Maillard reaction occurs.

The color of the peanbar snacks produced in this study was light brown. The more peanuts you add, the darker the color of the peanbars snacks. This is because, during the oven, a Maillard reaction occurs. The Maillard reaction in peanbars snacks occurs during cooking at temperatures above 115°C (Novidiyanto, 2016).

Aroma

Aroma is essential to determine how healthy customers receive an ingredient; aroma usually determines how delicious a food ingredient is. Generally, someone can judge whether a food ingredient is delicious or not from the smell it produces (Singgano et al., 2019).

Statistical data shows that the probability of peanbars snack taste is 0.014 ($p < 0.05$). This shows that the addition of peanuts to snack peanbars has a significant effect on the taste of snack peanbars. The organoleptic test results showed that the aroma of the Peanbars snack was quite pleasant. In the first and third treatments, the score for aroma experienced an increase because, in the first treatment, the aroma of the Peanbars snack produced was the typical aroma of peanuts.

In this study, the aroma produced by peanbars snacks was caused by the presence of volatile compounds found in roasted peanuts and played a role in producing the typical roasted aroma of roasted peanuts (Triachdiani & Murtini, 2021). Each peanut snack recipe produces a distinctive peanut aroma, which makes it more preferred by people. The panelists. This aroma is influenced by the roasting process, which aims to create an attractive taste and unique aroma in the snack bar (Nathasya et al., 2020).

Flavor

A food will become very popular if it has a taste that consumers like. Taste is a sensation produced by combining ingredients and proportions in a food product that the sense of taste can feel. As with other parameters, the taste assessment is also subjective because each panelist has different taste preferences (Dhanang et al., 2021).

The addition of peanuts to peanbars snacks did not significantly impact the taste, according to the results of statistical tests, which showed a taste probability of 0.177 ($p > 0.05$). The organoleptic test results showed that the taste of peanbars snacks was somewhat favorable at treatment levels t1, t2, t3, t4, and t5.

This research resulted in the taste of peanut bars, which was dominated by a sweet taste influenced by the use of peanuts in the dough. This aligns with research (Fitria, M. et al., 2022). The taste produced in Peanbars snacks is influenced by peanuts, which come from starch, which is broken down into glucose, so the use of peanuts can make a sweet taste so the higher the addition of peanuts, the greater the sweet taste.

Texture

According to Shewfelt (2014) and Sari (2019), tactile sensations influence the texture of food products. Looking at the product can provide an idea of its texture, whether tangible, smooth, complex, or soft. Bitten, chewed, or swallowed by the sense of taste or by touching with the fingers, you can see the texture (Dhanang et al., 2021).

Statistical data shows that the probability of texture in snack peanbars is 0.029 ($p < 0.05$), which implies that adding peanuts to snack peanbars has an essential impact on the texture of snack peanbars. According to the organoleptic test results, the texture of peanbar snacks was in the somewhat favorable category in treatments t1, t2, t3, t4, and t5.

The texture produced in snack peanbars in this study is by the characteristics of snack bars, which are semi-wet and not too dry. In contrast to research conducted by (Novidiyanto, 2016), the texture of the resulting snack bar was slightly crunchy, which was caused by the amount of peanuts added and the processing method.

Nutritional content of Peanbars snacks

Water content

Water content analysis is carried out to determine how much water is in a food and is expressed in percent. This can be done using an oven method known as thermogravimetry (Juita, 2019). A water content test will be carried out based on the results of the preference test for the best treatment level for the selected peanbar snacks. The results show that the water content of snack peanbars is 13.07%, which meets the semi-wet food requirements of 10-50%.

The water content of snack bars is less than 14% and has the advantage of long-lasting shelf life because food ingredients that are safe to store are less than 14%, so snack bars with low water content are sufficient to prevent the growth of bacteria and fungi (Damayanti & Nurjannah, 2021).

Ash Content

Ash content is a mixture of inorganic components in a food ingredient (Alhadi et al., 2021). The proximate analysis of peanbars snacks showed an ash content of 0.47%. There is no SNI for ash content for snack bars, so it cannot be ascertained what the ideal ash content is for food bar products. However, the ash content of 1.15% in snack bars is considered higher than the maximum limit for SNI cookies, namely 1.04%, or following existing standards.

Ash content indicates the mineral content in food. Minerals are inorganic substances in materials that are not burned during the combustion process in a kiln. When the combustion occurs, organic substances burn while inorganic substances do not, so the remains are called ash. Ash consists of minerals remaining after a furnace burns organic materials at high temperatures. (Singgano et al., 2019).

Protein Content

Protein is a type of macronutrient found in food. Calculations of protein, fat, and carbohydrates can be used to determine the energy value of food because protein is essential for the body as an energy source, builder, and regulator.

The protein content of snack peanbars is 8.90%, which does not reach the standard protein content in SNI snack peanbars, which is 9-25 g. The low protein content in snack bars is caused by the roasting process, which can reduce the protein content due to the protein denaturation process at high temperatures. Efforts to increase the protein content in snack bars to comply with established standards can be made by increasing the amount of peanuts and green bean flour used in the snack bar formulation (Fitria et al., 2022).

Fat level

One of the lipid groups, fat, functions as a source of energy for the body. Fat also helps dissolve fat-soluble vitamins such as A, D, E, and K, giving food a savory and crunchy taste (Ekafitri & Isworo, 2014). Almtsier (2009) states that an Atwater factor is a conversion number where 1 gram of fat produces 9 kcal of energy and uses fat composition to calculate the energy value of food (Juita, 2019).

The fat content in the snack bar was analyzed using the Soxhlet method because the chemicals used for this analysis were dissolved in the extraction process using an organic solvent, namely petroleum ether. The selected snack bar has a fat content of 12.40 grams. The fat content in these snack bars is 12.40, reaching the SNI snack bar requirements, namely 1.4 -14 g. To meet SNI standards, the ingredients used in snack bars are peanuts, egg yolks, and margarine.

Carbohydrate

Carbohydrates consist of carbon, hydrogen, and oxygen atoms. Carbohydrates function to determine the characteristics of food ingredients, such as taste, color, and texture. The Atwater factor, a conversion number where 4 kcal of energy is produced in 1 gram of carbohydrate, is used to calculate the energy value of food (Juita, 2019). The carbohydrate content in snack bars is calculated using the by-difference method, subtracting the percentage of water, ash, protein, and fat from 100% to determine the carbohydrate percentage. The carbohydrate content in the snack bar measured was 65.15 g, and after being converted by the Atwater factor, the calorie content of carbohydrates was 260.6 kcal.

The carbohydrate content of the snack bar is 65.15, higher than the SNI requirements for snack bars, namely 40 g. As a higher carbohydrate source, mung bean flour helps snack bars achieve the desired SNI snack bar standards (Kurniawa et al., 2020).

Energy

Consuming carbohydrates, protein, and fat is the primary energy source for snack bars. The amount of carbohydrates, protein, and fat in a snack bar influences the energy produced; the more carbohydrates, protein, and fat in the snack bar, the more energy is produced (Alhadi et al., 2021). The estimated number of

calories in a snack bar is calculated by adding the number of calories from protein, fat, and carbohydrate content. This results in a snack bar energy of 407.8 kcal.

The energy content of peanbar snacks is 407.8 kcal and meets the SNI snack bar requirements, namely a minimum of 400 kcal. Ingredients such as green bean flour and tapioca flour are used as energy sources to meet SNI standards.

The way each mixed ingredient is used in the snack bar may be different, which causes differences in the nutritional value of the formula with the analysis results. The treatment in question is all the processes that occur during food processing, such as washing, boiling, heating, and the tools used. This process is still essential to keep food ingredients nutritious and safe for consumption (Juita, 2019).

Acceptability of Peanbars Snacks

The acceptability test was carried out to determine the panelists' consumption or acceptability of snack bars. Acceptability can be seen from food waste by calculating the difference between the weight of the food served and the weight of the food used, then dividing it by the weight of the food served and showing it as a percentage. Receptivity is said to be good if $\geq 80\%$ is spent, and receptivity is said to be poor if $< 80\%$ is spent.

The research showed that of the 30 respondents, the percentage categorized as suitable for the product reached 90% (27 people), and the percentage categorized as poor was 10% (3 people). On average, panelists who did not finish said that the product tasted too sweet and that they did not like eating snack bars. Meanwhile, respondents who had good acceptance said that the product tasted just right, was not too sweet, and had a soft texture, so it was easy to chew. Seeing the response of 27 respondents regarding good acceptability had a positive impact as an opportunity as an alternative snack for pregnant women.

Each pregnant woman is given one portion containing one piece or 100 grams of Peanbars snack, which has an energy nutritional content of 407 kcal, 8.9 grams of protein, 12.4 grams of fat, and 65.15 grams of carbohydrates and meets 15% of the child's needs as alternative snacks for pregnant women.

CONCLUSIONS

Based on the analysis of organoleptic test data, testing the nutritional content and acceptability of Peanbars snacks, the following conclusions were drawn: Peanbars snacks with peanuts have a natural effect on texture and aroma ($p < 0.05$), but there is no natural effect on color and taste. ($p < 0.05$). Peanbars snacks contain 407 kcal of energy, 8.9 grams of protein, 12.4 grams of fat, and 65.15 grams of carbohydrates. They have an excellent acceptability of 90% and a poor acceptability of 10%.

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