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Development of Snack Bar (Snack Bar) In Rich In Calcium With Fortification Of Shell Flour Kijing (Anadonta Woodiana)

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Abstract. Shellfish flour has a proximate content including moisture content, ash content, fat content, protein content and calcium levels. Shellfish flour containing rich calcium can be added in the manufacture of food products such as Snack Bar to increase the nutritional value. The research includes making snack bar barbecue with several types of sweeteners such as honey, palm sugar and sorbitol. Based on the results of proximate and minerals test, it was found that snack bar preparations were made with ash content (2.25, 2.04, 1.88), total fat content (20,34,20,75,24,20) and kalisum (823,78; 506,21; 814,06) which is higher than the positive control. lower protein and phosphorus content than positive controls, and total carbohydrates that approach positive controls.

Keywords: Shellfish Flour, Snack-Bar, Sweetener, Proximate Test

I. INTRODUCTION

Graveyard taiwan (Anadonta woodiana) is a type of shell that lives in ponds, lakes or other freshwater. The results of Rahayu et al (2013), showed that solid waste of Taiwan tuna shell obtained from Darmaga Bogor can be processed into a form of starch preparations that are utilized to meet the calcium in the body. Taiwanese Shell Cane Flour produced has a proximate content and calcium content. The flour content of Taiwan taro shell can be seen in Table 1.

Table 1. Content of Taiwan Gauze Shell Flour

Content	Amount	(%)
Water	content	0.54
Ash	content	55.31
Protein	content	3.01
Fat	content	0.4
Calcium	(Ca)	29.8
Magnesium	(Mg)	0.12
Posfor	(P)	0.11

Source: Rahayu et al (2013)

Snack Bar is a snack-shaped food made from cereal or beans, has a high protein content commonly consumed on the sidelines of the meal. Snack Bar can meet consumer demand for nutrition, comfort, and taste that can meet hunger in a short time until the next main meal is eaten (Christian, 2011).

Honey is a natural sweet substance produced by bees with nectar raw materials. Honey presents energy in two stages, in the first stage of glucose in honey is absorbed rapidly by the body produce energy. In the second stage of the fructose, the slower absorbed the body maintains the availability of energy. The honey glycemic index is 50-60, meaning it belongs to the moderate category (Mendosa, 2008).

The palm sugar comes from nira (Iegen) from the enau tree (Arenga pinnata) which belongs to the Arecaceae family which is processed naturally. Palm sugar has a lower glycemic index value of 35 while the glycemic sugar index sugar of 70. Palm sugar that has been digested in the body will release energy for the body in a long time. Palm sugar is not directly dissolved in the body, but is absorbed slowly, therefore palm sugar can last long in the body. Palm sugar is safe for diabetics.

Sorbitol or D-Sorbitol or D-Glucitol or D-Sorbite is a polyol monosaccharide (1,2,3,4,5,6-Hexanehexol) with the chemical formula C6H14O6, has a cooling effect and has several advantages over other sugars, which is enough sweet but not tooth decay. Sorbitol is an alternative sweetener widely used in industry. The objective of using alikelatif sweetener is as food for diabetes mellitus because it does not cause excess blood sugar, fulfill low calorie requirement for obese patient, as drug coating, avoid tooth decay, and used to reduce production cost because the price is relatively cheaper (Cahyadi, 2006).

The research that will be done is the manufacture of processed food products functional in the form of Snack Bar fortified shell flour of Taiwanese gauze with various types of sweeteners then followed by proximate test of the snack bar that has been made.

The main raw material is Taiwan Kijing shell which is obtained from Darmaga, Bogor and can be processed by special process into shell flour of Taiwan Gauze which contains high enough calcium based on

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Rahayu et al (2013) research, so it becomes fortification material on the processed food functional such as Snack Bar .

Preparation of processed products Snack Bar is made into three formulas and presented with a weight of 25 g. The Snack Bar formula can be seen in table 2.

Tabel 2. Snack Bar Processed Product Formula

Material	Amount of Material (%)		
	Fo.I	Fo. II	Fo. III
Flour Shell of Taiwan Gauze	1	1	1
Raw rice cereal	17	17	17
Rice cereal	25	25	25
Peanuts	8	8	8
Raisins	12	12	12
Sukade	8	8	8
Peanut butter	12	12	12
Honey	9	-	-
Palm sugar	-	9	-
Sorbitol	-	-	9
Unsalted butter	8	8	8

II. RESEARCH METHODS

How to manufacture Snack Bar. All ingredients are prepared and weighed. Dry ingredients (Rough rice cereal, finely ground rice cereal, groundnuts, raisins, sukade) are mixed with wet ingredients (Taiwanese Gauze Shell Flour, peanut butter, honey / palm sugar / sorbitol and Unsalted butter) until all ingredients are evenly mixed, the ingredients are fed into in a baking sheet that has been covered with baking paper before, then pressed using a spatula until the material becomes solid, baked for 30 minutes in microwave 150ºC, after cold the dough can be cut into a Snack Bar weighing 25 g.

Proximate Analysis Method. Water Content Determination. Determination of the Air Snack Bar is performed using a moisture balance tool, using 5 g of Snack Bar sample that has been destroyed. With time set for 10 minutes. After the process is complete, then the percentage of water content from the Snack Bar will be listed automatically (determination is done duplo). Water content is generally not more than 5%.

Determination of Ash Content. Incorporating approximately 2 g to 3 g of sample into the refined crucible and ductile silicates, flattening. Softened until charcoal runs out, chill, weigh, if this way charcoal can not be removed, add hot water, strain through ash-free filter paper. Permitted the remaining paper and filter paper in the same crucible. Put the powder into the crucible, steam, grease until fixed weight, weighed. Calculate the level of ash against the material that has been dried in the air. (DepKes RI, 2000).

Protein Test. Tests of protein content were done by Kjedhal method. weighed 0.5-1.0 g samples were then put into a 100 mL Kjeldahl flask. A mixture of 2 g selenium catalyst and 25 mL of concentrated H2SO4 were added to the sample. The mixture is then heated in an electric heater until it boils and the solution becomes clear-greenish (± 2 hours). This stage is done inside the fume hood. The mixture that has boiled and turned the color becomes clear greenish, then let cool put into a 100 mL measuring flask and diluted with aquadest to the limit. A total of 5 mL of mixture was introduced into the distiller, added 5 mL 30% NaOH and a few drops of the penoltalein indicator. The mixture is then distilled for 10-15 minutes or until the container changes color with the distillate container is 10 mL of 2% boric acid solution which has been given a few drops of indicator. The distillate mixture was then subjected to 0.01 N HCl solution (DepKes RI, 1992). The protein content of the sample can be calculated using the following formula:

$$\text{Protein Levels } (\%) = \frac{(V1 - V2)\ x\ N\ HCl\ x\ 14{,}008x\ fk}{Initial\ Weight\ Sample\ sampel} \text{ x } 100$$

Information :
- V_1 = volume HCl for sample titration (mL)
- V_2 = volume HCl for blank titration (mL)
- N = Normality of HCL solution
- W = sample weight (mg)
- 14,008 = weight of nitrogen atom
- 6,25 = protein factor

Fat Test. Fat content was tested using soxhlet method. 2 g of the smoothed sample is inserted into a cotton-covered paper sleeve, the paper sleeve plug containing the sample with cotton, dried in the oven at a temperature not exceeding 80oC for ± 1 hour, then inserted into the soxhlet extraction tube with fat gourds of boiling rock that have been dried and known to weigh. Extraction with hexane or other fat solvent for ± 6 hours. After that, remove the hexane and dried fat extract in the drying oven at 1500C for 30 minutes. Cooled and weighed (drying repeated until fixed weight) (DepKes RI, 1992). Calculated fat content with the following formula:

$$\text{Fat level } (\%) = \frac{W - W1}{W2} \text{ x } 100\%$$

Information :
- W = sample weight
- W_1 = fat weight before extraction
- W_2 = fat weight after extraction

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Carbohydrate Test. The determination of carbohydrate content by rough calculation is also called Carbohydrate by difference that is carbohydrate determination by using calculation and not analysis (DepKes RI, 1992).

% Carbohydrate = 100% - (water + ash + fat + protein)

Mineral Analysis. Conducted a wet process in advance to the samples that akna tested. One g sample was put into 150 ml erlenmeyer, added 5 ml of HNO3 into Erlenmeyer flask and left for 1 hour. Continue heated over hotplate for ± 4 hours, and cooled. Added 0.4 ml of concentrated H2SO4, then reheated. After the color change from brown to yellow, the samples were added 3 ml of HCIO4 and HNO3 mixture, reheated for ± 15 minutes. Subsequently the sample was added 2 ml of aquadest and 0.6 ml of concentrated HCL, then reheated until dissolved and cooled. After dissolving, the sample is then diluted to 100 ml in the flask. Ca, Na, Fe content is measured using AAS (Atomic Absorption Spectrophotometer type AA7000).Analisis Fosfor

Vanadat-Molibdat reagent. Phosphorus analysis was done by Molibdat-Vanadat method. The first Vanadat-Molybdate reagent was made as much as 20 g of ammonium molybdate dissolved in 400 ml of warm aquadest (500 C) and cooled. A total of 1.0 g of ammonium vanadate was dissolved in 300 ml of boiling aquadest, then cooled and added with 140 ml of concentrated nitric acid while stirring. The molybdate solution is introduced into the vanadate solution while stirring, the vanadate-molybdate solution is adjusted to 1 liter by aquadest.

Standard phosphorus solution. Dissolved in aquadest Sebayak 3 g of dried potassium dihydrogen phosphate and diluted to 1 liter volume. A total of 25 ml of the solution is introduced into a 250 mL plunger flask and diluted to the limit.

Standard Curve Creation. is incorporated into a 100 mL 100 mL bottle of standard phosphate solution of 0, 2.5, 5, 10, 20, 30, 40 and 50 mL, respectively. the solution is diluted to a volume of 50-60 mL with aquadest. Into each flask was added with 25 mL of vanadate-molybdate reagent and diluted to 100 mL volume with aquadest. The solution was allowed to stand for 10 minutes, then the absorbance of each solution was measured using a spectrophotometer at λ 400 nm. Sample Analysis was put into a 100 mL sample bottle of 10 mL aliquot samples from wet sponging Into the flask was added 40 mL of aquadest and 25 mL of vanadate-molybdate reagent. The solution is diluted with aquadest to the limit. The solution was allowed to stand for 10 minutes, then measured its absorbance by spectrophotometer at a wave length of 400 nm (Aprianto, et al., 1989).

III. RESULTS AND DISCUSSION

Test	formula 1 (honey)	formula 2 (palm sugar)	formula 3 (sorbitol)	Positive control	Negative control
a. color	Brownish yellow	Brownish yellow	Bright yellow	Brownish yellow	Yellowish white
b. proximate test (%)					
- Water content	6,92	5,78	5,35	5.60	5.35
- Ash content	2,25	2,04	1,88	2,11	0,91
- Protein content	7,86	6,75	7,84	12,25	8,38
- Fat content	20,34	20,75	24,20	12,50	18,68
- Carbohydrate content	60,29	60,84	55,02	62,29	62,59
c. mineral test (%)					
- Calcium content	823,78	506,21	814,06	722,85	119,31
- Fe content	0	0	0	0	0
- Fosfor content	1089,71	1093, 90	1032,40	1657,92	1037,60

The resulting snack bar preparations give a slightly brownish yellow color for the preparations containing honey and palm sugar and are slightly less brightly colored on sorbitol-sweetened preparations. At the time of eating, still slightly felt grains of mashed gravy shells. Each formula has a peculiar smell of peanuts and peanut butter.

Water content. In the experimental formulas ranged from 5, 35 to 6.92%. Water content at snack bar on formula 3 is lower, that is 5.35%, influenced by the material used is sorbitol. In this study using sweetener honey, palm sugar and sorbitol, the honey itself has very much contain water content, and the palm sugar is hydroscopic. According to winarno, the water content in food safe for storage is less than 14%, so snack bars with low moisture content are safe to store. Water content 14-15% is enough to prevent the growth of baketri and mold.

Ash content. The lowest ash content was obtained from the formula 3. The low ash content in treatment 3 was due to the use of sorbitol sweeteners. While in the formula 1 and 2 each using a sweetener of honey and gul sugar in the material still contains a variety of mineral elements in it, so it has a high level of ash. Ash content indicates the amount of mineral content in the product and is closely related to the purity and hygiene of a material. In addition to sweeteners, barbecue shells are also a source of minerals, namely high kalisum, so it can affect the ash content of snack bar preparations.

Protein levels. As the main source of protein in snack bars this time is peanut and shell gravestone. Protein content in peanuts is strongly influenced by the duration of heating and temperature at the time of boiling. Boiling process can reduce the nutritional value because the food will be directly exposed to boiling water and will decrease the nutrients, especially the water-soluble vit. B complex and also protein. The more temperature and the longer the processing time, the higher the level of protein damage that occurs in the food. The shell's own shell also contains a protein content of 3.01% (rahayu, dkk., 2013)

Fat level. The main fat sources used in the manufacture of this snack bar are peanut, peanut butter

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and unsalted butter so it can provide fat content ranging from 20.34 to 24.20%. Honey and palm sugar are sweeteners high in carbohydrates but low in fat than sorbitol.

Carbohydrate. Carbohydrates have an important role in determining the characteristics of foodstuffs, such as flavor, color, texture and others. Carbohydrates are a major source of calories although the number of calories produced by 1 gram of carbohydrate is only 4 Kal (kcal) when compared to protein and fat. While in the body carbohydrates are useful to break down excessive body protein and help metabolize fats and proteins (Winarno 2008). Carbohydrate sources in snack bar preparations are derived from rice cereals and also sweeteners used. Carbohydrate levels at 1 tablespoon is 17, 3 g, while palm sugar in 100 g is 95 g, while sorbitol has lower carbohydrate levels.

Levels of kalisum is strongly influenced by the level of shell gravestone in it. The gravestone shell itself is composed by lime which is one of the high sources of calcium. The test results of Fe or iron content showed no heavy metal content in shellfish preparation.

The importance of the role of phosphorus in the body of the 2nd order after the kalisum in the total body content of the main functions of phosphorus is as a giver of energy and strength for the metabolism of fat and starch, as supporting dental health and gum, for synthesis dna, and kalisum absorption. The content of phosphorus in different formulas due to the effect of sweetener used, on palm sugar containing phosphorus of 35 mg, on honey contain 16 mg and at sorbitol lower.

IV. CONCLUSION

Conclusion

Shellfish flour can be made into a snack bar, using a variety of sweeteners. Based on the results of proximate test which includes water content test, ash content, total fat content, protein, and total carbohydrate, it can be concluded the best formula is formula 1 by using honey.

Suggestion

Consumer level test needs to be done to find out the most preferred snack bar product. The most preferred snack bar product then needs to be tested for its shelf life to determine the level of durability during storage.

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