

LETTER TO EDITOR

Snack Bar Formulation Based on Mocaf and Corn Flours as A Snack for Athletes

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ARTICLE INFO

Keywords:

Snack bar
Mocaf flour
Corn flour
Athletes
Indonesia

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Received: April 1, 2023
Revised: July 2, 2023
Accepted: July 10, 2023

Please cite this article as: Rahmawati AY, Ismawanti Z. Snack Bar Formulation Based on Mocaf and Corn Flours as A Snack for Athletes. Int J Nutr Sci. 2023;8(3):193-195. doi: 10.30476/IJNS.2023.98750.1235.

Dear Editor

Maximum performance of an athlete can be obtained by nutritional intake, especially carbohydrates that can support the performance of them and prevent muscle fatigue (1). Giving snacks has the principle of food that contains high calories (1). Nutritional needs can be met from pre-match needs of athletes and added from snacks. Local food commodities that have the potential to be used as alternatives are cassava flour or Modified Cassava Flour (Mocaf) and corn flour. Mocaf flour has the advantage of being a source of complex carbohydrates (87.3%/100 g) with good starch digestibility and a low glycemic index (2). Corn flour can add energy, which has a nutritional content per 100 g of energy of 355 calories, 9.2 g of protein, 3.9 g of fat (3), and 73.3 g of carbohydrates, in addition there is the amino acid isoleucine (0.50 mg), leucine (1.2 mg) (4). So this study was conducted to analyze the nutritional content of snack bar formulations made from Mocaf and corn flours during three months starting in August October 2022. Formulation and organoleptic test of snack bars were carried out at the Food Technology Laboratory, Department of Nutrition, Health Polytechnic, Ministry of

Health, Semarang, Indonesia. Analysis of water content, ash density, fat content, protein content, carbohydrate content was carried out at the Center for Health Laboratory and Testing of Medical Devices in Central Java (Table 1). Assessment of the level of preference test scores were categorized on a scale of 1 to 5, i.e. 1=not at all liked, 2=disliked, 3=neutral, 4=liked, and 5=very favourable. Proximate analysis was conducted on ash content and water using the gravimetric method, protein content by Kjeldahl method, fat content via Soxhlet, carbohydrate content using difference method and fiber content utilizing AOAC method. Analysis of preference level was by Friedman different, Shapiro-Wilk normality and Mann Whitney tests with a 95% confidence level or $\alpha=5\%$. Table 2 presents panelists' preference level for the five formulations.

Panelists' acceptance of the snack bar can be accepted if the panelists give a value of 3 to 5. Overall, all formulas had an acceptance percentage of more than 50%. So F2 had the highest average percentage of acceptance with a ratio of corn to Mocaf flour (60:40). The results of the analysis of the energy and nutrient content of the selected snack

Table 1: Formula of snack bars.

Material	Material weight (g)				
	F1	F2	F3	F4	F5
Mocaf flour	30	40	50	60	70
Corn flour	70	60	50	40	30
Margarine	35	35	35	35	35
Sugar	45	45	45	45	45
Egg yolk	20	20	20	20	20
Almond	12	12	12	12	12
Sesame seeds	6	6	6	6	6
Raisins	10	10	10	10	10
Salt	0.4	0.4	0.4	0.4	0.4
Baking powder	0.2	0.2	0.2	0.2	0.2
Cinnamon powder	0.1	0.1	0.1	0.1	0.1
Vanilla	0.1	0.1	0.1	0.1	0.1
Chocolate paste	7	7	7	7	7

Table 2: Likelihood Test of Mocaf and corn flours based snack bar formulations.

Formulas	Parameters							
	Color		Taste		Smell		Texture	
	Mean±Std. Dev	<i>p</i>	Mean±Std. Dev	<i>p</i>	Mean±Std. Dev	<i>p</i>	Mean±Std. Dev	<i>p</i>
F1	3.70±0.95	0.03	3.9±0.76	0.00	3.87±0.77	0.46	3.97±0.76	0.00
F2	3.83±0.69		4.20±0.84		3.70±0.65		4.07±0.90	
F3	3.87±0.68		3.93±0.90		3.67±0.80		3.97±0.80	
F4	3.67±0.95		3.70±1.08		3.63±0.89		3.60±0.81	
F5	3.27±0.86		2.53±1.02		3.53±0.62		2.70±0.87	

Table 3: Analysis of the chemical properties of the selected snack bar formulas.

Formulas	F2	USDA
Total Energy (Kcal/100 g)	417.605	403
Protein (%)	5.18	Maks 9.38
Fat (%)	17.405	Maks 10.93
Carbohydrate (%)	60.06	66.72
Ash content (%)	1.94	Maks 1.72
Water content (%)	15.415	Maks 11.26

Table 4: Nutrient content per serving (40 g).

Formulas	Commercial snack bars	F2
Product weight (g)	24-30	40
Total energy (Kcal/40 g)	-	167.6
Protein (g)	3-4	2.072
Lemak, total (g)	5-6	6.962
Carbohydrate (g)	15-16	24.024

bars were presented in Table 3. Commercial snack bars ranged from 24 to 30 grams per stick, while this snack bar was around 20 grams per stick, so 1 portion served 2 sticks+40 grams. Table 4 reveals nutrient content per serving (40 gr).

Test results of the level of preference on the fifth snack bar formulation indicates that there is significant difference in the components of color, taste and texture, but there is no significant difference of

the aroma components (5). Snack bars with formula 2 with a ratio of Mocaf flour of 40% and corn flour of 60% constituted the best level of liking with the highest average value. Snack bar made from Mocaf and corn flours with formula 2 had the potential to be an alternative as snack for athletes, because it fulfilled criteria for sports foods both in terms of energy content, carbohydrates, proteins and fats (6). Energy content, carbohydrates, and fats have

met the criteria formula 2 snack bars as energy bars, however protein content is still lower than the criteria as an energy-dense snack nutrition. Product modifications need further investigation to meet the nutritional content that does not meet the criteria of the established standards. Besides that, further research is needed to test product effectiveness in athletes in fulfilling nutritional intake needs and their influence on athlete's performance during training or competition.

Acknowledgement

Thanks to the Director of the Poltekkes Kemenkes Semarang for funding this research.

Conflict of Interest

None.

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