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Functional Snack Food

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ABSTRACT

The direct-expanded functional snack food could be produced using a formula being composed of 70% corn grit, 10.5% soy protein isolate, 4% full-fat soy flour, 10% inactivated full-fat rice bran, seasoning with barbecue flavor, as well as vitamins and iodine added to be accepted by the consumer test (120 persons) at the 7- point level of medium-like (9-point hedonic scale). The products showed 2.88 expansion ratio, 0.16 g/cm^3 density, 73.96 newton hardness and 1.23 crispiness (Df). The chemical compositions showed that the barbecue flavor functional snack food contained 15.78% protein, 14.07% fat, 4.49% ash, 2.02% crude fiber and 5.86% dietary fiber. The nutritive values of this product calculated at 30 g/serving as Recommended Daily Intake (RDI) were 9.46% protein, 7.03% dietary fiber, 278.67% vitamin B_1, 188.82% vitamin B_2 and 31.4% iodine. The shelf-life stability was determined by packing the products in 2 types of packaging: thin and thick metalized polyethylene terephthalate (metalized PET), then stored at varied temperature (35°C and 55°C) for 8 weeks. The results showed that the high temperature (55°C) caused the physical properties, texture and taste-panel acceptance change more than the other. Thin metalized PET was the most suitable packaging to keep products within 8 weeks at 35°C. Moisture content (3.72 to 4.87%) and a_w (0.25 to 0.32) were slightly increased. Thiobarbituric acid increased (0.20 to 3.24 mg/1000g). Hardness was not significantly different ($P > 0.05$) (84.52 to 90.65 newton), whereas Df slightly decreased (1.24 to 1.13). The chemical compositions of 8-week snack stored at 35°C as dry basis showed no significantly different values for protein (16.06%) and crude fiber (1.51%) from the control samples but had some different values for fat (9.81%), ash (4.11%) carbohydrate (68.51%) and dietary fiber (8.35%). The taste panel accepted the product similar to normal in the range of acceptance (score 8-9).

Key words: snack food, functional food, soy protein, rice bran

INTRODUCTION

In general, snack foods were made from mainly cereal as base ingredients, which provided mostly energy from carbohydrates and fat. The protein content was about 3.3-8.3% depending on other ingredients added. The frequency of snack consumption of children aged 7-18 years old in Bangkok was found to be 51.3% consuming everyday (Sinthavalai, 1984). Kosayothin (1996) reported that the market size of snacks was greatly increased to 5,820 million baht and 40% of the market was shared by extruded (or direct-expanded) snack.

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This project was aimed to improve the nutritional value of the direct expanded snack to be the functional snack food for children. The main improvement was protein content from soy protein isolate and dietary fiber from full fat rice bran.

MATERIAL AND METHODS

Materials

Corn grit (30-50 mesh) was supplied by Thai Maize Products Ltd. Soy protein isolate (PROFAM 974) was obtained from Heinz Win Chance Ltd. Full fat soy flour was received from The Royal Project (Doi Kham). Full fat rice bran was supplied by CP Product Ltd. For longer keeping quality, rice bran was stabilized by extrusion cooking with twin-screw extruder at 130°C. Calcium carbonate (food grade) was supplied by Thai Food and Chemical Ltd. VITACEL® (wheat fiber) was purchased from Rama Production Co., Ltd. Sugar and soybean oil were purchased locally.

Extrusion process

The weighed raw materials were thoroughly mixed by a mixer (Telegram bear mixer) before transferred to a co-rotating twin screw extruder (ZE 25x33D, Hermann Berstorff Laboratory). The extruder was composed of 7 connecting barrels and a 25 mm. Thick die with the diameter of 3.00 mm. The length : diameter ratio was 870 : 25. The temperatures in the barrel No. 1-7 and 9 (at die) were 30, 35, 45, 95, 135, 155, 130 and 120°C, respectively. The mixed raw material were fed into the extruder at the rate of 385 ± 10 g/min. Moisture content of the feed was adjusted to 16 ± 0.5% (wet basis) by injecting an ambient temperature water. Screw speed was 300 rpm (Boonyasirikool and Charunuch, 1997). The adjustable die face cutter with one blade was operated at 300 rpm. The melting temperature was 156-158°C. The extrudate were dried at 80°C for 15 min in an electric oven. The dried products were allowed to cool to room temperature and immediately packed airtight in plastic bags and stored at room temperature.

Proximate composition determinations

Moisture, protein, fat, crude fiber, ash and dietary fiber of corn grit, soy protein isolate, full fat soy flour and full fat rice bran were determined in duplicate by AOAC (1990).

Physical properties determinations

Expansion ratio (ER) of the extrudates were examined by applying a micrometer to measure the diameter of a cylindrical shape sample. ER was defined as the ratio of a sample diameter to a diameter of the dies (Boonyasirikool and Charunuch, 1997).

Bulk density was modified from Boonyasirikool and Charunuch (1997) by filling a 100-mL graduated cylinder and determine the weight per volume (g/cm^3).

Texture analysis of the extrudates were characterized by using compressive measurements, which was carried out on a TA.XT2 texture analyzer with a compressing probe P_{100} (100 mm. dia. cylinder aluminum). The instrument settings were as follows: pre-test speed 5.0 mm/s; test speed 10.0 mm/s; post-test speed 10.0 mm/s;compression distance 50% of sample height. Five measurements were performed on each sample. The maximum compression was defined as the sample hardness. The fractal dimension value was defined as the sample crispiness (Stable Micro System, 1993).

Sensory evaluation

Samples from each formula were coated with oil and barbecue seasoning in the appropriate ratio (extrudate : vegetable oil : barbecue seasoning ; 81 : 8.5 : 10.5). The barbecue flavor snacks were evaluated by 24 panels of the graduate students in Food Science program, Kasetsart University. 9-point hedonic scale (1 = extremely dislike to 9 = extremely like) was used to determine color, odor, flavor, texture and total preference. The SAS software was applied for statistical analysis of

ANOVA and Duncan's multiple range test of difference between formula at 95% level of confidence.

Storage stability test

The 30-g barbecue flavor snack food was placed in 2 types of packaging; thin (PET12 / MCPP25) and thick (OPP20/PE18/MPET 12/ PE 23) metalized polyethylene terephthalate (metalized PET). Samples were stored at 35°C and 55°C for 8 weeks and removed to determine physico-chemical changes, textural characteristics and sensory evaluation.

Physico-chemical changes of samples were evaluated by moisture content (AOAC, 1990) and a_w (Thermoconstanter, model HUMIDAT-TH2, NOVASINA) measurements. Lipid oxidation was evaluated by thiobabituric acid (TBA) determinations (Yu and Sinnuhuber, 1957).

Textural characteristics were determined by using compressive measurements, which was carried out on a TA.XT2 texture analyzer. The maximum compression was defined as the sample hardness. The fractal dimension value was defined as the sample crispiness (Stable Micro System, 1993)

Sensory evaluation of the functional snack food was determined by 10-trained panels at weekly interval during a period of 8 weeks. Panels were asked to give their opinions about off-flavor, color, barbecue flavor and crispiness against control samples stored in a dark cabinet at -18°C (Reilly and Man, 1994).

Statistical analysis

Data were analyzed using SAS data analysis software release 6.12 TSO20 Licensed to Louisiana State University. Analysis of variance and Duncan's multiple range test at (P = 0.05) were used to determine differences between treatments.

RESULTS AND DISCUSSION

Chemical compositions of raw materials (corn grits, soy protein isolate, full fat soy flour and full fat rice bran) were determined (Table 1).

The proximate analysis of four raw materials showed that soy protein isolate contained the highest protein (85.08%) content which full fat rice bran was composed of high amount of dietary fiber (18.38%). Both ingredients were aimed to increase nutritional value of corn grits.

The production of direct expanded functional snack food was set to compare between the control formula(CS,normal formula) and the formulas which contained 10.5% soy protein isolate and varied amount of full fat rice bran of 7.5% (FS_1), 10.0% (FS_2) and 12.5% (FS_3). Soy flour was used to reduce vegetable oil content and also to improve homogeneity of fat particles in extrude mixtures. Wheat fiber (VITACEL®) was used to increase dietary fiber content. Calcium carbonate did not

Table 1 Chemical compositions of raw materials.

Raw materials	Content (%)[1]					
	Moisture	Protein[2]	Total fat	Crude fiber	Ash	Dietary fiber
Corn grits	13.08	6.30	0.44	1.67	0.51	3.58
Soy protein isolate	6.07	85.08	3.45	1.41	3.80	8.77
Full fat soy flour	5.57	45.80	23.17	2.12	5.51	20.37
Full fat rice bran	10.45	13.50	16.91	5.49	7.27	18.38

[1] Average of duplicated determination.
[2] N x 6.25

appear in FS_1, FS_2 and FS_3 formula because the results of using it in the lower oil content formula made product surface to crack. The formulas of all ingredients are shown in Table 2.

All four formulas were calculated from Table 1 and Table 2 for the estimation amount of protein and dietary fiber as shown in Table 3.

The results showed that all three formulas contained more protein and dietary fiber as the amount of full fat rice bran content in the formula increased. The% RDI (Recommended Dairy Intake) of the three formulas for protein was 9.08-10.02% RDI and dietary fiber was 6.85-7.74% RDI which was higher than the control formula.

The comparison of physical properties of all four formulas is shown in Table 4 for expansion ratio, bulk density, hardness and fractal dimension.

The results showed that the soy protein isolate and full fat rice bran which were added to control formula significantly affected the physical properties of the extruded products. The expansion ratio of extrudates decreased significantly ($P \leq 0.05$)

Table 2 Compositions of functional snack food formulas.

Ingredients	Contents (%)[1]			
	CS	FS_1	FS_2	FS_3
Corn grits	93.0	72.5	70.0	67.5
Soy protein isolate	-	10.5	10.5	10.5
Full fat soy flour	-	4.0	4.0	4.0
Full fat rice bran	-	7.5	10.0	12.5
VITACEL®	-	0.5	0.5	0.5
Sugar	3.0	3.0	3.0	3.0
Vitamin-mixed	1.0	1.0	1.0	1.0
Calcium carbonate	1.0	-	-	-
Soybean oil	2.0	1.0	1.0	1.0
Total	100.0	100.0	100.0	100.0

[1] Average of duplicated determination.

Table 3 Total amount of protein and dietary fiber of four formulas[1].

Ingredients	CS		FS_1		FS_2		FS_3	
	Protein (g)	Dietary fiber (g)	Protein (g)	Dietary fiber (g)	Protein (g)	Dietary fiber (g)	Protein (g)	Dietary fiber (g)
Corn grits	5.86	3.33	4.57	2.60	4.41	2.51	4.25	2.42
Soy protein isolate	-	-	8.93	0.92	8.93	0.92	8.93	0.92
Full fat soy flour	-	-	1.83	0.81	1.83	0.81	1.83	0.81
Full fat rice bran	-	-	1.01	1.38	1.35	1.84	1.69	2.30
Total	5.86	3.33	16.34	5.71	16.52	6.08	16.70	6.45
As % RDI	3.52	3.99	9.80	6.85	9.91	7.30	10.02	7.74

[1] Calculated values as wet basis of 100 g.

from 4.20 (CS) to 3.09 (FS_1), 2.88 (FS_2) and 2.68 (FS_3) as the content of the full fat rice bran increased. Bulk density and hardness increased significantly ($P \leq 0.05$) when the soy protein isolate and full fat rice bran added to the formulas compared with control formula (CS), whereas the fractal dimension of all four formulas (1.22-1.24) was not significantly different ($P>0.05$). It could be stated that the incorporation of soy protein isolate and full fat rice bran into the control formula led to decreasing of product expansion and increasing of hardness. Guy (1994) suggested that during the mixing stage in extrusion process, the proteineceous materials, such as cereal protein and soy protein would absorb water and reduced starch-swelling, causing reducing product expansion. The result showed the decreasing of product expansion and the increasing of harness due to the increasing amount of full fat rice bran in the formulas. Colonna *et al*. (1989) stated that fiber particles tend to rupture the cell wall in the extrudate, causing reducing in expansion. Guy (1994) reported that at levels of fibrous materials more than 2-3% would affected the expansion and texture of extruded product. Similarly to the work of Onwulata *et al*. (2000) which found that adding cereal fiber more than 10% might cause lower expansion and harder texture of the direct-extruded products.

Chemical compositions of the four formulas functional snack foods are shown in Table 5.

Chemical compositions of the extrudates were determined. Three formulas which composed of 10.5% soy protein isolate and three levels of full fat rice bran of 7.5% (FS_1), 10.0% (FS_2) and 12.5% (FS_3) gained significantly higher contents of protein (18.81-18.87%) than normal formula (7.55%). FS_3, which contained 10.5% soy protein isolate and 12.5% full fat rice bran was composed of the highest dietary fiber contents (6.49%).

Table 4 The physical properties of the products[1].

Formula	Expansion ratio	Bulk density (g/cm^3)	Hardness (Newton)	Fractal dimension (Df)
CS	4.20^a	0.082^c	61.49^b	1.22^a
FS_1	3.09^b	0.149^b	73.48^a	1.23^a
FS_2	2.88^c	0.161^{ab}	73.96^a	1.23^a
FS_3	2.68^d	0.185^a	74.66^a	1.24^a

[1] Average of duplicated determination.
[a,b,c,d] Means within the same column with different letters are significantly different ($P \leq 0.05$).

Table 5 Chemical compositions of the functional snack foods.

Formula	Moisture[1] %	Contents[1] (% as dry basis)				
		Protein	Fat	Crude fiber	Ash	Dietary fiber
CS	4.39^a	7.55^b	4.00^c	0.56^c	2.43^b	6.13
FS_1	4.04^{ab}	18.87^a	5.21^b	0.93^b	3.21^a	4.64
FS_2	3.83^{ab}	18.87^a	5.96^{ab}	1.53^a	3.08^{ab}	5.95
FS_3	3.45^b	18.81^a	6.09^a	1.74^a	3.05^{ab}	6.49

[1] Average of duplicated determination.
[a,b,c] Means within the same column with different letters are significantly different ($P \leq 0.05$).

Samples from each formula were coated with oil and barbecue seasoning in the appropriate ratio (extrudate : vegetable oil : barbecue seasoning ; 81 : 8.5 : 10.5) and determined for the chemical compositions (Table 6).

Three formulas of barbecue functional snack foods (FS_1, FS_2 and FS_3) contained higher amount of protein, fat, crude fiber and ash than normal formula (CS). The result showed that all 3 formulas, which soy protein isolate and full fat rice bran added contained more than 2 times of protein (16.05-16.12%) than that of the control formula (7.05%). The three formulas contained 2-3 times of protein if compared to the market corn based snack (4.73-8.45%) which reported by Tangkanakul et al., 2000.

Moreover, increasing of full fat rice bran content of 7.5% (FS_1), 10.0% (FS_1) and 12.5% (FS_3) increased dietary fiber contents, especially the FS_3 formula, which contained 10.5% soy protein isolate and 12.5% full fat rice bran consisted of the highest dietary fiber contents (5.19%).

The barbecue flavor products were evaluated with the taste panels, using 24 persons and 9-point hedonic scale. Results are shown in Table 7.

The taste panels gave the results that the FS_1 and FS_3 (the lowest and the highest content of full fat rice bran) were not significantly different for color, odor, flavor and texture. The FS_2 showed the highest acceptance by all means with 7.79 score (moderately like) total preference.

From the results of chemical composition and sensory evaluation, the FS_2 which contained 10.5% soy protein isolate and 10.0% full fat rice bran was chosen for storage study.

The nutrition values of the barbecue flavor functional snack food (FS_2) was determined (Table 8). Iodine was added in the mixture as KI before extrusion step. Vitamin B_1 and B_2 were filled in the barbecue seasoning before seasoning coated.

The nutritive values of this product calculated

Table 6 Chemical compositions of the barbecue flavor functional snack foods.

Formula	Moisture[1] %	Contents[1] (% as dry basis)				
		Protein	Fat	Crude fiber	Ash	Dietary fiber
CS	3.50^a	7.05^b	11.44^b	0.05^b	3.90^b	4.92
FS_1	2.66^{ab}	16.12^a	14.13^a	1.31^a	4.16^{ab}	3.70
FS_2	1.97^b	16.12^a	14.49^a	1.15^a	4.40^a	4.72
FS_3	1.89^b	16.05^a	14.51^a	1.33^a	4.11^{ab}	5.19

[1] Average of duplicated determination.
[a,b] Means within the same column with different letters are significantly different ($P \leq 0.05$).

Table 7 Sensory evaluation of the barbecue flavor functional snack foods.

Formula	Score[1]				
	Color	Odor	Flavor	Texture	Total preference
FS_1	6.71^b	6.79^{ab}	6.42^b	6.92^b	6.96^b
FS_2	7.21^a	7.04^a	7.25^a	7.88^a	7.79^a
FS_3	6.50^b	6.29^b	6.29^b	6.88^b	6.42^c

[1] The scores were 1 = extremely dislike to 9 = extremely like.
[a,b] Means within the same column with different letters are significantly different ($P \leq 0.05$).

Table 8 The nutritive values of the barbecue flavor functional snack foods (FS_2).

Compositions	Contents (%)	
	By weight (g/100g)	RDI[1]
Moisture	2.07	-
Protein	15.78	9.46
Fat	14.07	-
Carbohydrate	61.57	-
Crude fiber	2.02	-
Dietary fiber	5.86	7.03
Ash	4.49	-
Vitamin B_1	13.93*	278.67
Vitamin B_2	10.71*	188.82
Iodine	143.30*	31.40

* mg/100g

1 Recommended Daily Intake for more than 6-year-old Thai people. (Thai RDI)

at 30 g/serving as Recommended Daily Intake (RDI) were 9.46% protein, 7.03% dietary fiber, 278.67% vitamin B_1, 188.82% vitamin B_2 and 31.4% iodine.

The storage stability was measured by using 2 types of packaging; thin (PET12/MCPP25) and thick (OPP20/PE18/MPET 12/PE 23) metalized polyethylene terephthalate (metalized PET). The products were stored at 35°C and 55°C for 8 weeks. The results are shown in Fig 1-5.

The results showed that the products, which stored at the high temperature (55°C) in thick metalized PET package caused the physical properties, texture and taste-panel acceptance change more than that stored in the thin one. Thin metalized PET was the most suitable package to keep the products within 8 weeks at 35°C, the moisture content (3.72 to 4.87%) and a_w (0.25 to 0.32) slightly increased, the hardness was not significantly different ($P > 0.05$) (84.52 to 90.65

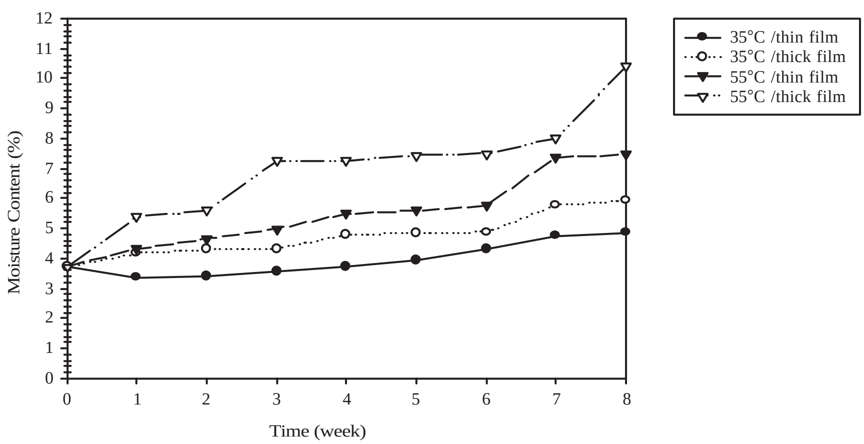

Figure 1 Moisture content of the functional snack food stored in thin and thick metalized PET at 35°C and 55°C.

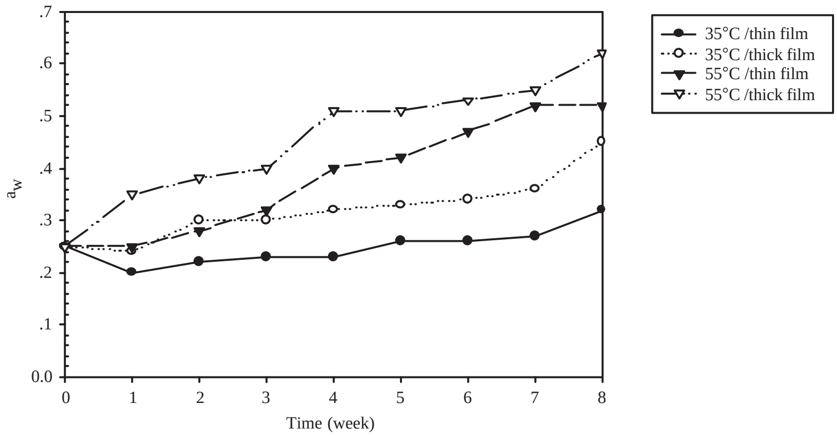

Figure 2 a_W of the functional snack food stored in thin and thick metalized PET at 35°C and 5°C.

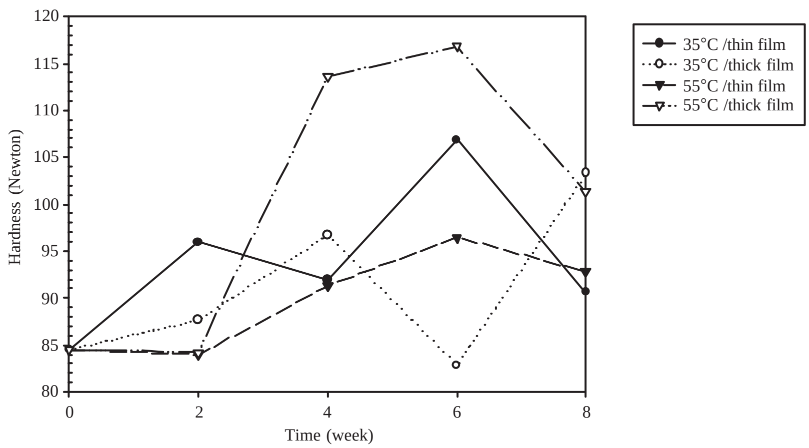

Figure 3 Hardness of the functional snack food stored in thin and thick metalized PET at 35°C and 55°C.

newton), Df slightly decreased (1.24 to 1.13) and the thiobarbituric acid increased (0.20 to 3.24 mg/ 1000g).

Chemical compositions of 8-week functional snack foods stored in thin and thick package at 35°C and 55°C compared to control sample (no storage) are shown in Table 9.

The functional snack foods were determined by 10-trained panels at weekly interval during a period of 8 weeks against control samples stored in a dark cabinet at -18°C. Sensory scores are shown in Table 10.

The sensory characteristic scores showed that the functional snack stored in thin metalized PET at 35°C was still accepted by the panels through 8 weeks of storage with 8.4 scores of off-flavor, 9.2 scores of color, 8.0 scores of barbecue flavor and 7.8 scores of crispiness.

The 120-panel with 4 age-groups was asked to give their opinions about appearance, color, odor, flavor, crispiness and total preference for 9-point hedonic scale. Informations are shown in Table 10.

Results indicated that the consumers accepted the functional snack food at the 7-point level of medium-like. People aged 21-30 and 31-40

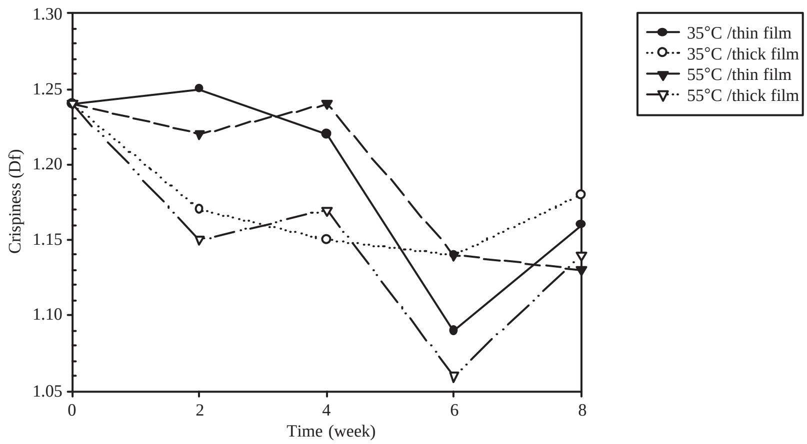

Figure 4 Crispiness (Df) of the functional snack food stored in thin and thick Metalized PET at 35°C and 55°C.

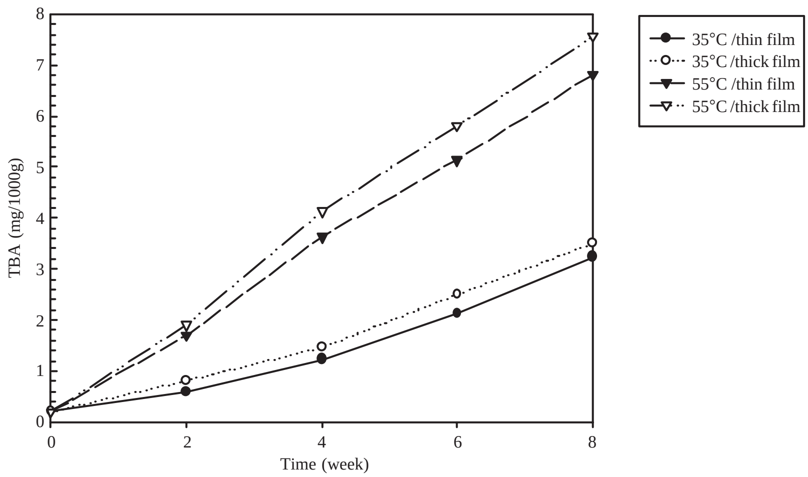

Figure 5 Thiobarbituric acid (TBA) of the functional snack food stored in thin and thick metalized PET at 35°C and 55°C.

years old showed higher acceptance than other age-groups.

CONCLUSION

The acceptable and nutritious functional snack food, which increased protein, dietary fiber, vitamin and mineral was produced by adding 10.5% soy protein isolate and 10.0% full fat rice bran into normal formula. The product contained 15.78% protein (9.46% RDI), 5.86% dietary fiber (7.03% RDI), vitamin B_1 13.93 g/100g (278.67% RDI), vitamin B_2 10.71 g/100g (188.82% RDI) and iodine 143.30 g/100g (31.40% RDI). The physical properties and sensory characteristics of the snack depended strongly on the content of soy protein isolate and full fat rice bran in the formulas. The flavor-coated products could store in thin metalized PET at 35°C for at least 8 weeks.

Table 9 Chemical compositions of 8-week functional snack foods stored in thin and thick package at 35°C and 55°C compared to control sample.

Condition		Moisture[1]	Contents [1](% dry basis)				
Temp.	Package	%	Protein	Fat	Crude fiber	Ash	Dietary fiber
Control		1.97[a]	16.12[a]	14.49[a]	1.15[a]	4.40[b]	4.72
35°C	Thin	4.87[b]	16.06[a]	9.81[b]	1.51[a]	4.11[c]	8.78
	Thick	5.48[c]	15.35[b]	10.30[b]	1.43[a]	4.73[a]	8.25
55°C	Thin	7.59[d]	15.88[a]	11.00[b]	1.42[a]	4.49[b]	8.95
	Thick	10.15[e]	16.09[a]	10.59[b]	1.37[a]	4.73[a]	9.70

[1] Average of duplicated determination.

Table 10 Sensory characteristics of functional snack foods stored in thin and thick package at 35°C and 55°C for 0-8 weeks compared to control samples.

Characteristic	Temp °C	Package	Time (week) 0	1	2	3	4	5	6	7	8
Off-flavor	35	Thin	10.0a	9.8a	9.8a	9.6a	9.4ab	9.4ab	8.8bc	8.6c	8.4c
		Thick	10.0a	9.6ab	9.4b	8.8c	8.8c	8.4cd	8.2cd	8.0d	7.8d
	55	Thin	10.0a	8.8b	7.6c	6.8d	6.6d	5.6e	5.6e	5.6e	5.4e
		Thick	10.0a	8.6b	8.0c	6.6d	6.0e	5.0f	4.4g	4.2g	4.0g
Color	35	Thin	10.0a	10.0a	10.0a	9.8ab	9.8ab	9.8ab	9.6abc	9.4bc	9.2c
		Thick	10.0a	9.8ab	9.8ab	9.6ab	9.4bc	9.0cd	9.0cd	8.8d	8.6d
	55	Thin	10.0a	8.4b	7.8c	7.6c	6.8d	6.8d	6.8d	6.8d	5.2e
		Thick	10.0a	8.8b	7.6c	7.4c	6.2d	5.8d	5.0e	4.4f	4.2f
Barbecue flavor	35	Thin	10.0a	9.8a	9.8a	9.6a	9.4ab	9.4ab	9.0b	8.4c	8.0c
		Thick	10.0a	9.4b	9.2bc	9.0bcd	9.0bcd	8.8cd	8.6d	8.4d	8.4d
	55	Thin	10.0a	8.4b	7.4c	7.2c	7.0cd	6.4d	6.4d	6.4d	5.0e
		Thick	10.0a	8.8b	7.6c	7.4c	6.2d	5.8d	5.0e	4.4f	4.2f
Crispiness	35	Thin	10.0a	10.0a	9.8a	9.8a	9.6a	9.6a	8.8b	8.4b	7.8c
		Thick	10.0a	9.4ab	9.2bc	9.0bcd	8.6cd	8.4d	8.4d	8.4d	7.6e
	55	Thin	10.0a	9.6a	8.6b	7.6c	7.0d	6.6de	6.4e	5.8f	5.0g
		Thick	10.0a	7.8b	6.6c	6.0d	5.8d	5.2e	5.0e	4.0f	4.0f

[a-g] Means within the same column with different letters are significantly different ($P \leq 0.05$).

Score 10 = equal to control;
9 = slight difference to control;
8 = more distinct difference but still acceptable;
7 = beginning to lose of acceptability;
6 = more distinct loss of acceptability;
5 = very distinct loss of acceptability;
4 or less = unacceptability.

Table 11 Average sensory scores of functional snack foods gained from 4 age-groups.

Age	Score[1]					
	Appearance	Color	Odor	Flavor	Crispiness	Total preference
10-20 year	5.53^{b}	6.27^{a}	6.13^{b}	6.90^{a}	7.37^{b}	6.97^{a}
21-30 year	6.30^{a}	6.43^{a}	7.07^{a}	6.77^{a}	7.63^{a}	7.03^{a}
31-40 year	6.33^{a}	6.23^{a}	6.03^{b}	6.17^{b}	7.17^{bc}	7.00^{a}
> 41 year	6.37^{a}	5.77^{a}	6.27^{b}	5.90^{b}	7.07^{c}	6.47^{b}

[1] The scores were 1 = extremely dislike to 9 = extremely like.
[a,b,c] Means within the same column with different letters are significantly different ($P \leq 0.05$).

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