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COMMON NUTS SUBSTITUE PREPARED OF SOYBEANS : 6-SOY NUT, SOY MILK AND FULL FAT SOY FLOUR IN SOME BAKED PRODUCTS

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Abstract

A number of 5 locally distributed baked products, namely feterah bel-zait (wheat flour-oil pie), Mary biscuits, basboosa, basima and baklawa were prepared using soy products (full-fat flour, soy nut and soy milk) to replace partially or totally the wheat flour, common nuts (peanut or hazel nut), or natural buffalo milk. The gross chemical composition, amino acids composition and organoleptic characteristics were evaluated. It was concluded that when selecting the proper formula for using soy products, cheaper baked products with higher nutritional value and good organoleptic properties could be obtained.

INTRODUCTION

The use of soy products in baked products is of importance. It was previously stated (Anon, 1962) that diets in some areas of the world are deficient in protein. These areas include all of Asia (except Japan), the northern part of south America, most of central America and all of Africa (except Southern tip). About two thirds of the world population live there . In Egypt locally cultivated varieties of soybean contain from 37.05 to 42.75% protein (El-Sanafiry, 1983). Analysis of food items revealed that protein of soy flour is rich in lysine lacking in wheat flour protein (Paul and Southgate, 1978; FAO 1982; Penningten and Church, 1983). Amino acid composition of soy protein is better than that of all known common nuts (Paul and Southgate, 1978; FAO, 1982). Soy milk protein showed actually less appreciated amino

acid composition when compared with natural milk protein . However, soy milk is very cheap in price. According to Heiner *et al.* (1964) up to 7% of U.S. babies are allergic to cow's milk.

This work was conducted to study the nutritional value of some wheat flour baked products as affected by incorporation of full- fat soy flour, soy nut and soy milk.

MATERIALS AND METHODS

Processing

Soy milk was prepared by cooking of 100g of soybeans in 500ml of water. At the moment of boiling , 1g sodium bicarbonate was added. Boiling continued for 5 minutes after which 500ml of cold water was added and cooking continued for 10 minutes. The resulting solution was filtrated through cheese cloth, pressed by hand , then 4g of sugar and 0.2 g of NaCl were added to each 100 ml of the solution to obatain soy milk. Baked wheat flour products were prepared using the common method according to Saba (1985) . Ingredients used were as follows:

1. Feterah Bel-Zait (wheat flour-oil pie)

Wheat flour (72% extraction)	205 g
Water	100 g
Sodium chloride	1 g
Cotton seed oil	60 g

2 . Mary biscuits

Wheat flour (72% extraction)	500 g	Ammonium carbonate	15g
Granulated sugar 160 g Vanilla	10 g		
Water	180 g	Finely Powdered sodium chloride	29 g
Cotton seed oil	70 g		

Samples of wheat flour - oil pie and Mary biscuits were prepared using 20% full-fat soy flour + 80% wheat flour.

3 . Basboosa

Basboosa cake:

Semolina	200 g	Sodium bicarbonate	10g
Liquid milk	200 g	Baking powder	10g
Granulated sugar	100 g	Powdered sodium chloride	2g
Melted samna	50 g	Roasted hazel nut	40g
Sweet syrup :			
Granulated sugar	380 g	Lime Juice	10g
Water	360 g	Vanila	10g

Beside the control, another sample was prepared with soy nuts (100% soy nuts instead of hazel nut), while full-fat soy flour replaced 20% of semolina. A third sample was prepared with 50% hazel nut+50% soy nut and 50% soy milk + 50% natural milk.

4 . Basima

Coconut flakes (grated coconut)	500 g	Liquid milk	10g
Sugar	500 g	Baking powder	5g
Melted samna	250g	Wheat flour 72% extraction	125 g

. Basima was also prepared using soy milk only (100% soy milk instead of buffalo milk) and 20% full-fat soy flour +80% wheat flour. A third sample was prepared using 50% soy milk + 50% natural milk.

5 . Baklawa:

Baklawa base :

Dough flakes (Gollash)	500 g
Samna	30 g
Coarse minced peanut mixed with vanilla	30 g
Peanut	29.7 g
Vanilla	0.3 g
Powdered cinnamon	2 g

Sweet syrup

Granulated sugar	190g
Water	90 g
Lime Juice	2 g
Vanilla	5 g

Beside the control , another sample was prepared with soy nut (100% soy nut) instead of peanut. A third sample was also prepared where soy nut replaced 50% only of roasted peanut.

Analytical method

Moisture, protein (N x 6.25; Kjeldahl method), fat (hexane solvent, Soxhlet apparatus) and ash were determined using the methods described in the A.O.A.C. (1980). The crude fibers were determined using the method described by Pearson (1971). Carbohydrates were calculated by difference . The energy values was calculated by multiplying protein and carbohydrates by 4.0 and fat by 9.0.

Amino acids composition was determined after HCl hydrolysis, using paper chromatography method as described by Block (1958). Tryptophan was determined colorimetrically after alkaline hydrolysis using 14% barium hydroxide solution according to the method indicated by Blauth *et al.* (1963).

Grams consumed of food articles (on wet weight basis) consumed to cover the G.D.R daily requirements for humans were calculated using the daily energy needs as given by N.R.C (1980): Children 1-3 years 1300 Kcal, children 4-9 years 1700 k Cal, children 7-10 years 2400 Kcal, male 11-14 years and adult males 23-50 years 2700 Kcal , female 11-14 years 2200 Kcal and adult females 23-50 years 2000 Kcal. Percent satisfaction of Protein daily needs for humans upon consumption of 150gm of food products (P.S. /150) were calculated. Similarly, G.D.R. values for protein were calculated using the daily requirements in grams as given by the N.R.C. (1980) : children 1-3 years 23, children 4-6 years 30, children 7-10 years 34, male 11-14 years 45, males 23-50 years 56, female 11-14 years 46 and females 23-50 years 44. P.S. /150 values for protein were also calculated.

Amino acid scores (A.S) were calculated using the reference protein given by FAO/WHO (1973) through dividing the concentration of tested protein in essential amino acid by its corresponding concentration of the FAO pattern. Values (gm/16 gm N) for reference protein are : isoleucine 4.0, leucine 7.0, lysine 5.5, threonine 4.0, tryptophan 1.0, valine 5.0, methionine + cystine 3.5 and phenylalanine + tyrosine 6.0. A.S. value less than 1.0 indicated deficiency in considered essential amino acid (EAA). The EAA which showed the highest deficiency was called first limiting amino acid (L.A.).

Essential amino acid index (E.A.A.I.) and biological vlaue (B.V.) were deter-

Table 1. Chemical composition of bakery products

Samples			Moisture %	Protein %	Fat %	Ash %	Fiber %	Carbohydr-ate %	Energy value Cal./100gm
Feterah Bel-Zail (Wheat flour-oil rice)	wheat flour 100%	WWB	12.41	9.46	23.22	1.31	0.15	53.45	460.62
		MFB	87.59	10.80	26.51	1.50	0.17	61.02	525.87
	wheat flour 80% + soy flour 20%	WWB	12.82	13.16	25.97	11.90	0.50	45.65	468.97
		MFB	87.18	15.10	29.79	2.18	0.57	52.36	537.95
Biscuits (Mary type)	wheat flour 100%	WWB	18.74	7.58	9.52	1.03	0.12	63.01	368.04
		MFB	81.26	9.33	11.72	1.27	0.15	77.53	452.92
	wheat flour 80% + soy flour 20%	WWB	19.95	10.45	11.74	1.49	0.398	55.98	371.38
		MFB	80.05	13.05	14.67	1.86	0.49	69.93	463.95
Basboosa	semolina 100% Buffalo milk 100% hazel nut 100%	WWB	17.72	3.57	9.02	0.78	0.43	98.48	369.38
		MFB	82.28	4..34	10.96	0.95	0.52	83.23	448.92
	semolina 100% + soy flour 20% Buffalo milk 100% hazel nut 100%	WWB	17.66	5.70	8.22	1.10	0.36	67.05	364.98
		MFB	82.34	6.92	9.98	1.23	0.44	81.43	443.22
	semolina 100% buffalo milk 50% hazel nut + soy nut 50%	WWB	17.93	4.04	7.65	0.89	0.35	69.14	361.57
		MFB	82.07	4.92	9.32	1.08	0.43	84.25	440.56
Basima	wheat flour 100% + buffalo milk 100%	WWB	11.22	3.92	34.35	0.90	1.97	47.64	515.39
		MFB	88.78	4.42	38.69	1.01	2.22	53.66	580.53
	wheat flour 80% +soy flour 20% + soy milk 100%	WWB	11.89	4.19	33.39	1.26	2.03	47.15	505.87
		MFB	88.02	4.76	37.94	1.05	2.31	53.56	574.74
	wheat flour 100% 50% buffalo milk+ 50%soy nut milk 50%	WWB	11.62	3.85	33.92	1.19	1.98	47.58	511.00
		MFB	88.338	4.36	38.38	0.36	2.24	53.83	578.15
Baklawa	Peanut 100%	WWB	10.95	7.60	6.76	0.40	0.32	74.01	387.28
		MFB	89.05	8.54	7.59	0.42	0.36	83.11	434.91
	soy nut 100%	WWB	11.74	8.06	5.47	0.48	0.44	73.87	376.95
		MFB	88.26	9.13	6.20	0.40	0.50	83.69	427.08
	peanut 50 % + soy nut 50%	WWB	11.33	7.83	6.1	0.45	0.38	73.95	382.11
		MFB	88.67	8.83	6.89	0.60	0.43	83.40	430.93
Wheat flour 72% extraction		WWB	11.50	9.90	1.20	0.68	0.70	76.80	357.60
		MFB	88.50	11.19	13.56	4.60	0.79	95.78	513.92
Soy flour		WWB	9.10	36.70	20.10	5.06	4.00	79.50	445.70
		MFB	90.90	40.37	22.11	5.06	4.40	32.45	490.27

WWB : wet weight basis MFB : Moisture free basis

* E; Gendi (1981).

Table 2. Evaluation of energy and protein in bakery products.

Samples		Factors	Energy						Protein						
		Sex	Child			Male	Female		Child			Male		Female	
		Age (Years)	1-3	6-4	7-10	11-14 & 23 - 50	11-14	23 - 50	1-3	6-4	7-10	11-14	23-50	11-14	23-50
		Daily needs	1300 Cal.	1700 Cal.	2400 Cal.	2700 Cal.	2200 Cal.	2000 Cal.	23 Cal.	30 Cal.	34 Cal.	45 Cal.	56 Cal.	46 Cal.	44 Cal.
Feterah Bel-Zail (Wheat flour-oil rice)	wheat flour 100%	G.D.R.	282	639	521	586	448	434	243	317	359	476	592	486	465
		P.S./150	53.15	40.64	58.79	25.59	31.41	34.55	61.70	47.30	41.74	31.53	25.34	60.85	32.25
	wheat flour 80% + soy flour 20%	G.D.R.	277	363	512	25.59	469	427	175	228	258	342	426	650	334
		P.S. / 150	54.11	41.38	29.31	576	31.98	35.17	85.83	65.80	58.06	43.87	35.25	42.91	44.86
Biscuits (Mary type)	wheat flour 100%	G.D.R.	353	652	652	26.00	598	543	303	396	449	594	739	607	581
		P.S. / 150	42.27	32.47	23.00	734	25.09	27.60	49.44	37.90	33.44	25.27	20.30	24.72	25.84
	whet flour 80% + soy flour 20%	G.D.R.	350	458	646	20.45	592	539	220	28.7	325	431	536	440	421
		P.S. / 150	42.85	32.77	23.21	727	25.32	27.85	68.15	52.25	46.10	34.83	27.99	34.08	35.63
Basbousa*	Semolina 100% Buffalo milk 100% hazel nut 100%	G.D.R.	352	460	650	20.63	596	542	644	840	952	1261	1569	1289	1233
		P.S. / 150	42.62	32.59	23.09	731	25.19	27.70	23.28	17.85	15.75	11.90	9.56	11.67	12.17
	Semolina 100% + soy flour 20% Buffalo milk 100% hazel nut 100%	G.D.R.	42.62	466	658	29.52	603	548	404	526	597	790	983	807	772
		P.S. / 150	356	32.20	22.81	740	24.89	27.37	37.17	28.50	25.15	19.00	15.27	18.59	19.43
	semolina 100% buffalo milk 50% hazel nut50% + soy nut 50%	G.D.R.	42.11	470	22.81	20.28	609	553	569	743	842	114	1386	1139	1089
		P.S. / 150	360	31.90	664	747	24.65	27.12	26.35	20.20	17.82	13.47	10.82	13.17	13.77

G.D.R: Grams of food Items (WWB) consumed to meet the daily needs of humans in energy value of protien
P.S./ 150: Percent satisfaction of daily needs of humans in energy value of protein upon consumption of 150 gm (WWB) of food items.
* FAO (1982)

Table 2 (cont.)

Samples		Factors	Energy						Protein						
		Sex	Child			Male	Female		Child			Male		Female	
		Age (Years)	1-3	6-4	7-10	11-14 & 23 - 50	11-14	23 - 50	1-3	6-4	7-10	11-14	23-50	11-14	23-50
		Daily needs	1300 Cal.	1700 Cal.	2400 Cal.	2700 Cal.	2200 Cal.	2000 Cal.	23 Cal.	30 Cal.	34 Cal.	45 Cal.	56 Cal.	46 Cal.	44 Cal.
Basima	wheal flaur 80% soy 20% + soy milk 100%	G.D.R.	257	44.64	31.62	543	435	395	549	716	812	1074	1337	1098	1050
		P.S./150	58.37	333	470	28.10	34.49	37.94	27.33	20.95	18.49	13.79	11.22	13.66	12.28
	whaeat flour 100% buffalo milk 50% + soy milk 50%	G.D.R.	254	45.09	31.94	527	431	391	597	779	883	1169	1455	1195	1143
		P.S. / 150	58.96	439	620	28.39	34.84	34.33	25.11	19.25	16.99	12.83	10.31	12.55	13.12
Baklawa	Peanut 100%	G.D.R.	336	34.17	24.21	679	568	516	303	395	447	592	737	605	579
		P.S. / 150	44.69	451	637	21.52	26.41	29.058	49.57	38.00	33.53	25.33	20.36	24.78	25.91
	Soy nut 100%	G.D.R.	345	33.26	628	716	584	531	285	372	422	558	695	571	546
		P.S. / 150	43.49	445	628	20.94	25.70	28.27	52.57	40.30	35.56	26.87	21.29	26.28	27.48
	Peanut 50% + soy nut 50%	G.D.R.	340	33.72	23.88	707	578	523	294	383	434	575	715	588	862
		P.S. / 150	44.09	475	671	23.23	26.05	28.66	51.07	39.15	34.54	26.10	20.97	25.53	26.69
Wheat flour 72`% Extracion		G.D.R.	364	31.55	23.88	755	615	559	232	303	343	455	566	565	444
		P.S. / 150	41.26		671	19.87	24.38	26.82	64.57	49.50	43.68	33.00	26.52	32.28	3375
Soy flour*		G.D.R.													
		P.S. / 150													

mined according to the method worked by Oser (1959) using the values of EAA (g/ 16 g N) found in samples for isoleucine, leucine, lysine, threonine, tryptophan, valine, methionine + cystine and phenylalalinie + tyrosine. Protein efficiency ratio (PER) of the tested food was calculated based on the amino acids concentrations (g / 16 g N) according to the following equations given by Alsmeyer *et al.* (1974).

PER1 = - 0.684 + 0.456 (Leucine) - 0.047 (Proline).

PER2 = - 0.468 + 0.454 (Leucine) - 0.105 (Tyrosine).

PER3 = - 0.816 + 0.435 (Methionine) + 0.78 (Leucine) +

0.211 (Histidine) - 0.944 (Tyrosine).

G.D.R. values for individual EAA were calculated using the daily requirements given by N. R. C. (1973) in grams which were for children 10-12 years, adult male 23-50 years and adult female 23-50 years as follows, respectively: isoleucine 1.26 , 0.84, 0.66; Leucine 1.89, 1.12, 0.88; lysine 1.98, 0.84, 0.66; threonine 1.26 , 0.56 , 0.44; tryptophan 0.18, 0.21, 0.165; valine 1.125, 0.980, 0.77; methionine + cystine (sulphur amino acids) 0.99, 0, 70, 0.55 ; phenylalanine + tyrosine (aromatic amino acids) 0.99, 1.12, 0.88. The highest G.D.R. value amongst individual EAA indicated restricting amino acid (R.A.). When the mentioned values are consumed, the daily needs of humans in all EAA including the R.A. will be simply covered. P.S./150 for R.A. was also calculated .

Organoleptic evaluation for taste, aroma, colour, consistency (texture) and overall acceptability was carried out by 10 Panelists according to Molander (1960) using the following judging scale : very good 8-9, good 6-7, fair 4-5, poor 2-3 and very poor 0-1. Results were analyzed statistically according to Sendecor and Cochram (1971).

RESULTS AND DISCUSSION

1 . Gross chemical composition

From the results in Table 1, it is evident that soy flour is highly rich in protein (36.7%) when cmpared with wheat flour (9.90%) . According to FAO (1982),

Table 3. Amino acid composition of some oriental sweets (gm/16 gm N).

Amino Acids	Feterah bel-zait (Wheat flour - oil pie)				Bescuits (Mary type)				Basboosa					
	Wheat flour. 100%		Wheat flour 80% + soy flour 20%		Wheat flour 100%		Wheat flour 80% + soy flour 20%		Semolina 80% Soy flour 20% buffalo milk 100% soy nut 100%		Semolina 100% buffalo milk 50% + soy milk 50% Hazel nut 50% + soy nut 50 %		Wheat flour 100% buffalo milk 100%	
	9/16 gN	A.S	9/16 gN	A.S	9/16 gN	A.S	9/16 gN	A.S	9/16 gN	A.S	9/16 gN	A.S	9/16 gN	A.S
Agrinine	3.69		5.90		3.67		5.90		4.96		6.39		5.66	
Histidine	2.09		2.31		2.10		2.32		2.07		2.35		2.18	
Isoleucine	4.08	1.02	4.47	1.12	4.09	1.02	4.47	1.12	4.65	1.16	4.74	1.19	4.66	1.17
Leucine	6.92	0.99	7.32	1.05	6.93	0.99	7.33	1.05	7.49	1.07	7.82	1.12	7.50	1.07
Lysine	2.55	0.45	4.35	0.79	2.57	0.47	4.36	0.79	3.77	0.69	5.50	1.00	4.30	0.78
Methionine	1.65		1.59		1.66		1.59		1.78		1.71		1.72	
Phenylalanine	4.98		5.11		4.97		5.09		4.73		5.04		4.95	
Threonine	2.92	0.73	3.46	0.87	1.27	0.73	3.48	0.87	3.40	0.85	4.01	1.00	3.51	0.88
Tryptophan	1.27	1.27	1.29	1.29	4.40	1.27	1.29	1.29	1.32	1.32	1.30	1.30	1.31	1.31
Valine	4.39	0.88	5.00	1.00	2.86	0.88	5.10	1.00	5.05	1.01	5.22	1.04	5.00	1.00
Tyrosine	2.85		2.70		2.32		2.70		3.44		2.94		3.04	
Cystine	2.31		8.19		11.41		2.05		1.90		1.82		1.88	
Proline	11.42		30.11		36.74		8.19		10.10		7.12		8.70	
Alanine+glutamic	36.75		11.43		7.30		30.10		31.35		26.70		30.28	
Glycine+aspartic	7.52		5.48		5.31		11.42		8.98		12.72		10.66	
serine	5.29		3.64		3.98		5.50		5.66		5.31		5.42	
Methionine+Cystine	3.96	1.13	7.81	1.04	7.83	1.14	3.64	1.04	3.68	1.05	3.53	1.01	3.60	1.03
Phenylalanine+tyrosine	7.83	1.31		1.30		1.31	7.79	1.30	8.17	1.36	7.98	1.33	7.99	1.33
E.A.A.I.	64.27		72.01		64.45		71.936		71.93		72.12		72.88	
B.V.	58.32		66.76		58.52		6.67		66.67		22.33		67.71	
PER_1	1.9348		2.2690		1.9398		2.2567		2.2567		2.5473		2.3271	
PER_2	2.744		2.5718		2.3779		2.713		2.5713		2.5713		2.178	
PER_3	2.0499		2.5239		2.0548		1.899		1.9899		2.7479		2.3724	

E.A.A.I. : Essential Amino Acid Index.
B.V. : Biological Value %
PER : Protein Efficiency Ratio.
A.S. : Amino Acid Score.
. Paul and Southgate (1978)

Table 3 (cont.)

	Basima						Baklawa									
	Wheat flour 100%		Wheat flour 20% soy flour 20% + soy milk 100%		Wheat flour. buffalo milk 50% soy milk 50%		Peanut 100%		soy nut 100%		Peanut 50% + Soy nut 50%		Wheat flour 72% Extraction		Soy flour.	
	9/16 gN	A.S	9/16 gN	A.S	9/16 gN	A.S	9/16 gN	A.S	9/16 gN	A.S	9/16 gN	A.S	9/16 gN	A.S	9/16 gN	A.S
Agrinine	7.68		8.57		8.57		4.70		4.70		4.70		3.68		6.38	
Histidine	2.15		2.19		2.19		2.11		2.16		2.14		1.84		1.64	
Isoleucine	5.09	1.27	5.04	1.26	5.04	1.26	4.07	1.02	4.26	1.07	4.17	1.04	3.30	0.83	5.07	1.27
Leucine	8.21	1.17	8.04	1.13	8.04	1.15	6.92	0.99	7.10	1.01	7.10	1.00	6.40	0.91	8.67	1.24
Lysine	4.98	0.91	5.10	0.97	5.10	0.93	2.73	0.50	3.37	0.61	3.06	0.56	2.031.	0.37	6.69	1.22
Methionine	2.15		2.00		2.00		1.57	0.74	1.65		1.60		71		1.25	
Phenylalanine	3.95		5.03		5.03		5.09	1.22	5.04		5.07		4.69		2.50	
Threonine	1.25	0.99	3.93	0.98	3.93	0.98	2.94	0.89	3.16	0.79	3.05	0.76	2.43	0.61	4.05	1.01
Tryptophan	5.34	1.25	1.22	1.21	1.22	1.22	1.22		1.27	1.27	1.25	1.25	0.72	0.72	1.33	1.33
Valine	3.43	1.07	5.27	1.06	5.27	1.05	4.44		4.61	0.92	4.53	0.91	4.34	0.87	5.52	1.10
Tyrosine	1.67		3.07		3.07		3.07		2.79		2.92		3.23		4.21	
Cystine	7.52		1.74		1.74		2.16		2.19		2.18		2.21		1.92	
Proline	26.59		6.87		6.87		10.42		33.94		10.15		11.63		5.31	
Alanine+glutamic	10.61		26.01		26.01		35.05		9.28		34.48		5.44		24.26	
Glycine+aspartic	4.96		11.60		5.02		8.93		5.26		9.11		4.22		16.69	
serine	3.82		5.02		3.74		5.21		3.84		5.24		3.92		518	
Methionine+Cystine	8.34	1.09	3.74	1.02	8.10	1.07	3.73	1.07	3.84	1.10	3.78	1.08	7.92	1.12	3.17	0.91
Phenylalanine+tyrosin		1.39	8.10	1.32		1.35	8.16	1.36	7.83	1.31	7.99	1.33		1.32	9.41	1.57
E.A.A.I.	78.21		76.74		77.24		64.47		67.94		66.30		54.77			
B.V.	86.45		71.92		72.46		58.54		62.33		60.54		47.97			
PER_1	2.6922		2.6633		2.6594		1.9818		2.0878		.03552		1.6878			
PER_2	2.8992		2.8253		2.8598		2.3513		2.4625		2.4079		2.0985			
PER_3	2.7388		3.0275		2.8892		1.8117		2.262		2.0429					

E.A.A.I. : Essential Amino Acid Index.
B.V. : Biological Value %
PER : Protein Efficiency Ratio.
A.S. : Amino Acid Score.
. Paul and Southgate (1978)

Table 4. Amino acid composition of bakery products (g/100 g sample).

Amino acids	Feteroh Bel-Zait (wheat flour - oil pie)		Biscuits (Mary type)		Basboosa			Basima			Baklawa			Wheat flour 72% extraction	Soy flour*
	wheat flour 100%	wheat flour 50% + soy flour 20%	wheat flour 100%	wheat flour 50% + soy flour 20%	semolina 100% Buffalo milk 100% hazel nut 100%	Semolina 80% + soy flour 20% buffalo milk 100% + soy nut 100%	semolina 100% soy buffalo milk 50% soy milk 50% + hazel nut 50%	wheat flour 100% + buffalo milk 100%	wheat flour 80% + soy flour 20% + soy milk 100%	wheat flour 100% buffalo milk 50% soy milk 50%	Peanut 100%	soy nut 100%	peanut 50%+ soy nut 50%		
Arginine	0.36	0.73	0.28	0.62	0.18	0.36	0.23	0.30	0.41	0.33	0.36	0.38	0.37	0.36	2.34
Histidine	0.20	0.30	0.16	0.24	0.07	0.13	0.09	0.08	0.10	0.08	0.16	0.17	0.17	0.18	0.71
Isoleucine	0.39	0.59	0.31	0.47	0.17	0.27	0.19	0.20	0.21	0.19	0.31	0.34	0.33	0.33	1.86
Leucine	0.67	0.96	0.53	0.77	0.27	0.45	0.30	0.32	0.33	0.31	0.53	0.57	0.55	0.63	3.18
Lysine	0.25	0.57	0.20	0.46	0.17	0.31	0.17	0.20	0.22	0.20	0.21	0.27	0.24	0.20	2.46
Methionine	0.16	0.21	0.13	0.17	0.06	0.10	0.07	0.08	0.08	0.08	0.12	0.13	0.13	0.17	0.46
Phenylalanine	0.48	0.67	0.38	0.53	0.17	0.29	0.20	0.19	0.19	0.19	039	0.41	0.40	0.46	1.91
Threonine	0.28	0.46	0.22	0.36	0.12	0.23	0.14	0.16	0.15	0.15	0.22	0.26	0.24	0.07	1.49
Tryptophan	0.12	0.17	0.10	0.14	0.05	0.07	0.05	0.05	0.05	0.05	0.09	1.10	0.10	0.43	2.03
Valine	0.42	0.66	0.33	0.52	0.18	0.30	0.20	0.21	0.20	0.20	0.34	0.37	0.36	0.32	2.03
Tyrosine	0.28	0.36	0.22	0.28	0.12	0.17	0.12	0.14	0.12	0.12	0.23	0.23	0.23	0.22	1.55
Cystine	0.22	0.27	0.18	0.21	0.07	0.10	0.08	0.07	0.07	0.07	0.16	0.18	0.17	1.15	1.95
Proline	0.10	1.08	0.89	3.15	0.36	0.41	0.35	0.31	0.27	0.27	0.79	0.80	0.80	3.19	8.90
Alanine+glutamic	3.54	3.96	2.79	1.19	1.12	1.52	1.22	1.04	1.00	1.00	2.66	2.74	2.70	0.54	0.13
Glycine+aspartic	0.73	1.50	0.57	0.58	0.32	0.73	0.43	0.42	0.45	0.5	0.68	0.75	0.71	0.42	1.90
serine	0.51	0.72	0.40	0.38	0.20	0.30	0.22	0.19	0.19	0.19	0.40	0.42	0.41	0.39	1.17
Methionine+Cystine	0.38	0.48	0.31	0.81	0.13	0.20	0.15	0.15	0.15	0.15	0.28	0.31	0.30	0.78	3.46
Phenylalanine+tyrosine	0.76	1.03	0.60		0.29	0.46	0.32	0.33	0.31	0.31	0.62	0.64	0.63		

* FAO (1982)

semolina had 8.7% protein, being very close in composition to wheat flour 72% extraction showing 13.8% moisture, 1.9% fat, 0.8% ash, 0.3 fibers , 74.8% carbohydrates and energy value of 351.11 Cal. Semolina (in Arabic "Semeed") is a milled product from durum wheat *Triticus durums* (El- Gendi, 1982) . Because of the higher protein in soy flour than in wheat flour (semolina) substiutution of the latter with the first at 20% level increased the protein content (Table 1) , and P.S./150 value, while the G.D.R. value decreased (Table 2). Therefore, this substitution, increased the nutritional value of the studied products. Also, substitution of peanut or hazel nut with soy nut will increase the protein content. For basima with 50% soy milk, protein content decreased when compared with the control sample (100% buffalo milk) because soy milk might have less protein content than buffalo milk (Pennington and Church, 1983). Nevertheless, such decrease was low and soy milk basboosa might be a cheaper product because of price difference of the two milks. The cheapest sample was basboosa with 20% soy flour and 100% soy milk, in addition to higher protein content.

2. Amino Acids Composition

Data of Tables 3, 4 and 5 show the amino acid composition and evaluations based on this composition for different wheat flour baked products. It could be noticed that in all products, treatments improved the quality of protein because either the number of deficient essential amino acids (EAA) decreased by adding soy products, or the amino acid scores increased if the number of deficient EAA did not decrease. The values of EAAI, B.V., PER, G.D.R. and P.S./150 based on R.A. also improved. In this connection some improvements were observed for basima having 20% soy flour and 100% soy milk . Basima having 50% soy milk was not of special importance, particularly when G.D.R. for R.A. and P.S./150 value based on R.A. were considered.

3. Organoleptic evaluation

Data presented in Table 6, indicated that none of the investigated samples prepared with soy products were rejected by panelists. On the other hand, experimental samples rated as good as the control samples.

Finaly, inclusion of full-fat soy flour, soy nut and soy milk could be recommended to obtain cheaper products with higher nutritional value with regard to protein content and quality when the proper formula is selected.

Table 5. Evaluation of amino acid composition of bakery products.

Amino Acids	Feterah Bel-Zait (Wheat flour oil pie						Biscuits (Mary type)						Basboosa								
	Wheat flour 100%			Wheat flour 80% + Soy flour 20%			Wheat flour 100%			Wheat flour 80% + soy flour 20%			semolina 100% Buffalo milk 100% Hazel nut 100%			Semolina 80% + soy flour 20% Buffalo milk 100% soy nut 100%			Semolina 100% Buffalo milk 50% + soy milk 50% + Hazel nut 50% Soy nut 50%		
	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman	Child	Man	Wom
Isoleucine	323	215	169	214	142	112	407	271	213	268	179	140	741	494	388	467	494	388	663	442	347
Leucine	282	167	131	197	117	92	357	211	166	246	146	114	700	415	326	420	415	326	630	373	293
Lysine	792	336	264	347	147	116	990	420	330	430	183	471	414	600	471	639	600	471	1165	494	388
Threonine	450	200	157	274	122	96	573	255	200	350	156	367	1050	467	367	540	467	367	900	400	314
Tryptophan	150	175	138	106	124	97	180	210	165	129	150	330	360	420	330	257	420	330	360	420	330
Valine	268	233	183	171	149	117	341	297	233	216	189	428	625	544	428	375	544	428	563	490	385
Methionine+Cystine	261	184	145	206	146	115	319	226	177	261	184	423	762	539	423	495	539	423	660	467	367
phenylalanine+Tyrosine	130	147	116	96	109	85	165	187	147	122	138	304	341	386	304	215	386	304	309	350	275
Restricting Amino Acid (R.A.)	Lysine			Lysine Valine			Lysine			Lysine Valine			Lysine			Methionine Lysine + Cystine			Lysine		
G.D.R. for R.A.	792	336	264	347	149	117	990	420	330	430	189	148	1414	600	471	639	350	275	1165	494	388
G.D.R. for Protein	476	592	465	342	426	334	594	739	581	431	536	421	1261	1569	1233	790	930	775	1114	1386	1089
P.S./150 based on R.A.	18.94	44.64	58.82	43.18	101.02	128.57	15.15	35.71	45.46	34.85	79.59	101.30	10.61	25.00	31.82	23.49	42.86	54.55	12.88	30.36	38.64
P.S./150 based on protein.	31.53	25.34	32.25	43.87	35.25	44.86	25.27	20.30	25.84	34.83	27.99	35.63	11.90	9.56	12.17	19.00	15.27	19.43	13.47	10.82	13.77
First Limiting Amino Acid (L.A., based on A.S.).	Lysine			Lysine			Lysine			Lysine			Lysine			Lysine			Lysine		

Child : 11-14 years.
Man : 23 -50 years.
Woman : 23 -50 years.

Table 3 (cont.).

Basima									Baklawa									Wheat flour 72% Extraction.			Soy flour.		
Wheat flour 100% + Buffalo milk 100%			Wheat flour 80% + Soy flour20% + Soy milk 100%			Wheat flour 100% Buffalo milk 50% + Soy milk 50%			Peanut 100%			Soy nut 100%			Peanut 50% + Soy nut 50%								
Child	Man	Woman	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman	Child	Man	Wom	Child	Man	Woman
630	420	330	600	400	314	663	442	347	407	271	213	371	247	194	382	255	200	382	255	200	68	45	36
591	350	275	573	339	267	610	361	284	357	211	166	332	197	154	344	204	160	300	178	140	59	35	28
990	560	330	900	509	300	990	560	330	943	400	314	733	311	244	825	350	275	990	420	330	81	34	27
788	350	275	788	350	275	840	373	293	573	255	200	485	215	169	525	233	183	525	233	183	85	38	30
360	420	660	360	420	330	360	420	330	200	233	183	180	210	165	180	210	165	257	300	236	37	34	34
536	467	367	511	446	350	563	490	385	331	288	227	304	265	208	213	272	214	262	228	179	55	48	38
660	467	367	660	467	367	660	467	367	354	250	196	319	226	177	330	233	183	254	180	141	85	60	47
300	339	267	291	329	259	319	361	284	160	181	142	155	175	138	157	178	140	127	144	113	29	32	25
Methionine Lysine + Cystine			Methionine Lysine + Cystine			Lysine Valine			Lysine			Lysine			Lysine			Lysine			Methionine + Cystine		
990	560	367	900	509	367	990	560	385	943	400	314	733	311	244	825	350	275	990	420	330	85	60	47
1148	1429	1123	1074	1337	1050	1169	1455	1143	592	737	579	558	695	246	575	715	562	455	566	444	123	153	120
15.15	35.71	40.91	16.67	39.29	40.91	15.15	35.71	38.96	15.91	37.50	47.73	20.46	48.21	61.36	18.18	42.86	45.55	15.15	35.71	45.46	177.27	250.71	319.09
13.07	10.50	13.36	13.97	11.22	14.28	12.83	10.31	13.12	25.33	20.36	25.91	26.87	21.59	27.48	26.10	20.97	26.69	33.00	26.52	33.75	122.33	98.30	125.11
Lysine			Lysine			Lysine			Lysine			Lysine			Lysine			Lysine			Lysine		

Table 6. Organoleptic evaluation of bakery products (average scores).

Treatment / Factor	Feterah Bel-Zait (Wheat flour - oil Pie)	
	Wheat flour 100%	wheat flour 80% + soy flour 20%
Aroma	9a	8a
Taste	9a	8a
Texture	9a	9a
Colour	9a	8a
Overall acceptability	9a	9a
	Biscuits (Mary type)	
	Wheat flour 100%	wheat flour 80% + soy flour 20%
Aroma	9a	8a
Taste	9a	9a
Texture	8a	9a
Colour	9a	9a
Overall acceptability	9a	9a
	Basbossa		
	semolina 100% buffalo milk 100% hazel nut 100%	Semolina 80% + soy flour 20% Buffalo milk 100% soy nut 100%	Semolina 100% Buffalo milk 50% + soy milk 50% + hazel nut 50% soy nut 50%
Aroma	9a	9a	9a
Taste	7a	8b	9ab
Texture	8a	8a	9b
Colour	8a	8a	8b
Overall acceptability	8a	8a	9b

Figures in similar letters indicate no significant difference.

Table 6 (cont.).

Treatment / Factor	Basima		
	wheat flour 100% + buffalo milk 100%	wheat flour 80% + soy flour 20% + soy milk 100%	Wheat flour 100%+ buffalo milk 50% + soy milk 50%
Aroma	9a	9a	9a
Taste	7a	9b	8ab
Texture	8a	8a	9b
Colour	8a	9b	8a
Overall acceptability	8a	9a	9a
	Baklawa		
	Peanut 100%	Soy nut 100%	Peanut 50% + soy nut 50%
Aroma	9a	9a	9a
Taste	9a	8a	9a
Texture	9a	9a	9a
Colour	9a	9a	9a
Overall acceptability	9a	9a	9a

Figures in similar letters indicate no significant difference.

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بديل للمكسرات الشائعة المجهزة من بذور الصويا :
٦ - مكسرات الصويا ، لبن الصويا ودقيق الصويا كامل الدسم في بعض منتجات الخبيز

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جهزت خمس منتجات خبيز منتشرة محليا وهي فطيرة بالزيت (فطيرة دقيق القمح بالزيت)، بسكويت ماري ، البسبوسة، البسيمة والبقلاوة مع استخدام منتجات الصويا (دقيق كامل الدسم، مكسرات الصويا ولبن الصويا) لتحل جزئيا أو كليا محل دقيق القمح والمكسرات الشائعة مثل الفول السوداني ، والبندق أو اللبن الجاموسي الطبيعي . وقد تم تقييم التركيب الكيماوي وتركيب الاحماض الأمينية والخواص الحسية. وقد امكن استنتاج انه باختيار التوليفات المناسبة لاستخدام منتجات الصويا يمكن الحصول علي منتجات خبيز ارخص في السعر وأعلي في القيمة الغذائية وذات خواص حسيه جيدة.