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NUTRITIONAL VALUE OF PATTIES FORTIFIED WITH SOME NATURAL SOURCES RICH IN IRON

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ABSTRACT

The current investigation aimed to study the possibility of preparation some kinds of patties high in their content of iron using food sources rich in iron. In this matter cooked minced beef muscles as animal sources, cooked spinach as plant sources. These ingredients were used as stuff of patties. Defatted soybean flour and black rice flours were used at level of 5% to prepare some non stuffed patties rich in iron. Chemical composition and iron content of raw materials and the prepared patties were determined. Sensory evaluation of prepared patties was also carried out.

In relation to protein quality, the amino acids composition of prepared patties was determined, chemical score, computed protein efficiency ratio (PER) and Biological value (B.V.) were calculated.

The obtained results show that the pattystuffed with minced cooked beef was superior in its content of iron and protein than the other patties. Sensory evaluation proved that all prepared patties had a good acceptability especially the patties with stuffs. Higher amount of indispensable amino acids, were found in all patties which fortified with defatted soybean flour and the pattystuffed with mix of cooked minced beef and cooked spinach. In this relation, the patties stuffed with minced beef were found to contain the highest amount. In addition, the patties stuffed with cooked minced beef had the higher amino acid scores, computed protein efficiency ratio (C-PER) and biological value (B.V.) compared to the other types of patties.

INTRODUCTION

Iron deficiency is a global diet-related health problem, and the Worled Health Organization (WHO) has reported that iron deficiency manifests as anemia in up to 2 billion people (Severance and Hamza, 2009 and Li *et al*., 2013). Iron is one of the most abundant transition metals present on Earth and has important physiological functions in the body, such as oxygen transport, energy metabolism and DNA synthesis (Aisen et al., 1999; West and Oates, 2008).

Gerrior and Bente (2001) found that iron levels in the food supply increased from 15.3 mg per person per day in 1970 to 23.6 mg per person per day in 1999. Grains and breakfast cereals provided 35 percent of iron in the food supply in 1970 and 53 percent in 1999. Meat, poultry, fish and meat alternates provided 32 percent of iron in the food supply in 1970 and 23 percent in 1999. Enriched grains and fortified ready to eat breakfast cereals contributed to the incase in grains and cereals as a source of iron.

In Egypt, anemia prevalence among preschool children is 40% (UNICEF, 1991 and Abd Rabou, 1994). The information published in Egypt by National Nutrition Surveys (1978-1980) revealed that iron deficiency anemia in Egypt is principal due to malnutrition especially insufficient available iron where, 14% of pregnant women and women who breast fed

also 52% of children used to get less than 75% of recommended daily allowances (RDA) of iron. So, food fortified with iron is generally considered the most effective way to increase iron intake and can be achieved by fortifying widely consumed foodstuffs which provide iron to all segments of the population.

Iron, zinc and calcium can interact with each other in a way that inhibits their respective absorption. On the other hand, mineral fortification has been used to improve simultaneous iron and zinc absorption from food supplements (Mendoza *et al.,* 2004).

Reduced iron and several iron salts had been used as iron fortification. However, there are many problems concerning the choice of the iron salt suitable to achieve this purpose in the food products. Moreover, about 8% patients on iron therapy have side effects, ranging from nausea and vomiting to diarrhea and severe stomach cramps. It is sometimes suggested that other iron salts may be less toxic than ferrous sulfate (Ree and Monsen, 1973 and Bothwell *et al.,* 1979). Recently, Lund *et al.* (1999) found that oral ferrous sulfate supplements increase in the free radical-generating capacity of feces from healthy volunteers. In contrast, there are insufficient studies about the potential use of the natural sources of dietary iron in fortification of backed products.

The type of cereal grain has little influence on iron bioavailability of infant cereals. On the other hand, modification in the milling and processing methods for cereal gains that reduce their content of phytic acid is likely to improve iron availability significantly (Cook *et al.*, 1997).

Small amount of meat ($\geq$ 50 g) significantly increase non heme-iron absorption from a phytate-rich meal low in vitamin C (Bach *et al.,* 2003).

The Peruvian government is currently providing preschool children (3-36 months of age) with a precooked food supplement prepared from a mix of cereals, defatted soybean flour, and dried milk fortified with vitamins and minerals added in amounts equal to 100% of the recommended dietary allowances for vitamin A, vitamin C, iron, zinc and iodine, 60% of the recommended dietary allowances for thiamin, niacin, folic acid, riboflavin, vitamin B-6 vitamin B-12 and magnesium (Gibson *et al.,* 1998).

According, this work was carried out to prepare some patty fortified with natural sources rich in iron such as cooked miced beef muscles, cooked spinach, defatted soybean flour and black rice flour. These fortified patty were, chemically, organoleptically and protein quality.

MATERIALS AND METHODS

Materials:

Wheat flour (72% extraction) was obtained from the Middle Delta Flour Mills Company. Defatted soybean flour obtained from soy products factory of Food Technology Research Institute, Agricultural Research Center, Giza, Egypt. Black rice obtained from the Rice Research and Training Center (RRTC), Sakha, Kafr El-Sheikh Governorate, Egypt.

Other ingredients used in making patties included minced beef muscles, eggs, shortening, sunflower oil, dry milk, compressed yeast, sugar, salt and spinach were purchased from local market at Tanta, Egypt.

Methods:

Technological methods:

Preparation of different stuff blends:

Preparation of stuff blends used to fill the patties were done by adding and mixing of all ingredients (500 g minced beef muscles or 1 kilogram fresh and washed spinach + 200 gm minced onion + 5.0 gm sunflower oil + 5.0 gm salt and species), then cooked on direct heat until the mixture appears to be moisture free and fully cooked.

Patties making:

Patties were prepared using the method of Arora (1983). The ingredients and different blends used for making dough are shown in Table (A).

Table (A):Ingredients and blends used for making patties (gm on wet basis).

Blends for non stuffed patties / Ingredients	1	2	3
Wheat flour 72% extraction	100	95	95
Defatted soybean flour	-	5	-
Black rice flour	-	-	5
Shortening and sunflower oil	17	17	17
Egg	20	20	20
Dry milk	5	5	5
Compressed yeast	6	6	6
Sugar	13	13	13
Salt	2	2	2
Water	25	25	25

The ingredients of each blend were good mixed together and left at room temperature to ferment, then small pieces of required weight (100 gm) to use without stuffing and (70 gm) for patties which will be stuffed with the prepared stuff blends were cut off from the prepared dough. These pieces were rounded and fermented for 15 min. Then the pieces weight 70 gm were stuffed with the different stuff blends as shown in Table (B).

Table (B): Types of patties stuffed with different prepared stuff blends (gm. wet basis).

Types of stuff patties / Ingredients	4	5	6
Dough from blend No. 1	70 gm	70 gm	70 gm
Cooked minced beef mix	30 gm	-	15 gm
Cooked spinach mix	-	30 gm	15 gm

The prepared patties were left to rest for 15 min, then baked in electrical oven for 20 to 25 min. at 220-240^{o}C, then cooled to room temperature.

The backed patties were packaged in polyethylene bags and divided into two parts as follows:

The first part, was used to evaluate the organoleptic properties of the patties. The second part, was stored in freezer at -18 $\pm$2^{o}C, for chemical analysis.

Sensory evaluation:

The organoleptic properties of the prepared patties were evaluated by ten panelists for various quality (texture, color, taste, odor and overall acceptability). The evaluation were made using scores from 1 to 10, where excellent (10-9), very good (8-6), fair (5-4) and not acceptable (3-2) according to the method described by Renzo (1975).

Chemical analysis:

Proximate chemical composition including moisture, crude protein, ether extract, crude fiber and ash of the raw materials and prepared patties were determined according to A.O.A.C. Procedures (1990). Carbohydrates content was calculated by difference. Minerals were determined using atomic absorption spectrophotometer Perben Elmer Model 2180 as described by A.O.A.C. (1990). All samples were analyzed in triplicates.

Nutritional evaluation:

Amino acids determination: samples of studied patties were subjected to acid hydrolysis using 6 N HCl and few drop of mercaptoethanol. The hydrolyzate was recovered by removing the acid by evaporating in a rotary evaporator. Amino acids were estimated in the hydrolyzate using amino acid analyzer (Beckman amino acid analyzer, Model 119 CL) as described by Sadasivam and Manickam (1992) method. Tryptophan was determined colourimetrically after subjecting sample to alkaline hydrolysis as outlined by Miller (1967). Chemical score of indispensable amino acids was calculated using the equations of Pellet and Young (1980). Computation procedure for protein efficiency ratio (C-PER) of different studied patties was calculated as described by Alsmeyer *et al.* (1974) using following equation:

C-PER= -1.816 +0.435 (Methionine) + 0.780 (leucine) + 0.211 (histidine) - 0.944 (tyrosine). Biological values were calculated using the following equation reported by Farag *et al.* (1996):

Biological value (B.V.) = 49.9 + 10.53 C-PER, Where C-Per = computed protein efficiency ratio.

Statistical analysis:

The data were statistically analyzed using the analysis of variance and the means were further tested using the least significant difference test as outlined by Steel and Torrie (1980).

RESULTS AND DISCUSSION

Chemical composition of raw materials:

Chemical composition of raw materials presented in Table (1) show that, beef muscles had the highest protein content (78.62%) followed by

defatted soy flour (47.93%). These results are coinciding with those reported by Park *et al.* (1996), Kassab (1999), Hamza (1999) and Khalil (2003). Beef muscle had the highest fat content (14.45%) compared with the other raw materials. The highest carbohydrates content was found in black rice (89.61) compared with defatted soybean flour which had the lowest content (42.91%). The results also showed that spinach had the highest fiber content (16.51%). The results in the same table showed that spinach had highest contents of ash and iron against wheat flour. The highest iron content was found in black rice followed by spinach, beef muscle then defatted soybean. Their values were 43.8, 26.74, 18.0 and 8.93%, respectively, while wheat flour (72% extraction) had the lowest content of iron. The aforementioned results coincide with those obtained by Nour *et al.* (1983), Farrell (1990), Millgi *et al.* (2000), Abd El-Rahim *et al.* (2001), El-Badawi *et al.* (2003) and Dennis and Ross (2013).

Table (1): Chemical composition of raw materials used for prepared of studied patties (gm/100 g on dry weight basis.

Raw materials	Moisture	Crude protein	Crude fat	Ash	Carbohydrates*	Crude fiber	Iron mg/100 gm
Wheat flour	11.22	10.16	1.23	0.72	87.89	0.78	1.82
Defatted soybean flour	8.34	47.93	2.91	6.25	42.91	4.77	8.93
Black rice flour	12.31	8.51	0.71	0.76	89.61	0.41	43.8
Beef muscle	71.22	78.62	14.45	4.93	-	-	18.0
Spinach	91.55	31.38	3.75	20.24	44.63	16.51	26.74

*** Calculated by difference**

Chemical composition of different prepared patties:

Data presented in Table (2) show the chemical composition of the prepared patties. The results indicate that slight increase in protein, crude fat, ash, fiber and iron content of patties contained 5% soybean flour (No. 2) compared with patties (No. 1) which contained 100% wheat flour. These results may be due to composition of defatted soy flour which contained 47.93% crude protein, 2.91% fat, 6.25% ash, 4.77% fiber and 8.93 mg iron/100 gm as reported in Table (1) and coinciding with the results obtained by Abd El-Lateef (2002) and Khalil and Hussein (2002).

Comparing the chemical composition of non stuffed patties (No. 1, No. 2 and No. 3) with the stuffed patties (No. 4, No. 5 and No. 6) the results in Table (2) showed that patties stuffed with cooked beef (No. 4) and patties stuffed with blend of cooked beef and cooked spinach (No. 6) were superior in protein and fat than the others. These results are in agreement with those obtain by Cross *et al.* (1980), who found that, fat content of beef patties was 17.2-16.4%, but Spadaro and Keeton (1996), reported that beef patties contained 24.50% fat, 15.91% protein while, El-Demiry (2005) found that patties stuffed with minced beef contained 21.40% protein, 16.60% fat, 3.75% ash, 2.64% fiber and 55.61% carbohydrates. On the other hand, patties stuffed with cooked spinach had the highest value of moisture, ash and iron. These results are in the same trend with those found by El-Said (2001), who

indicted that spinach patty contained 9.95% fat, 12.37% protein, 2.58% ash and 2.06 mg/100 gm iron. From the same Table (2), it is obvious that, patty contained 5% black rice (No. 3) had the highest content of carbohydrates and the lowest content of protein, fat and ash among all the types of patties and the highest iron between the non stuffed patties, this may be attributed to its low protein 8.51%, fat 0.71% and ash 0.76% as shown in Table (1).

Table (2): Chemical composition of the prepared patties (gm/100 gm on dry weight basis).

Samples	Moisture	Crude protein	Crude fat	Ash	Carbohydrates*	Crude fiber	Iron mg/ 100 gm	Kcal/ 100 gm
A: Non stuffed patties:								
No. 1	24.88	10.71	12.03	1.63	75.63	1.51	3.26	453.63
No. 2	25.79	12.60	12.54	2.71	72.15	2.28	4.51	451.86
No. 3	24.51	10.19	11.65	1.66	75.39	1.11	5.21	447.17
B: Stuffed patties:								
No. 4	34.32	20.35	16.20	4.82	58.63	1.64	9.52	461.72
No. 5	42.26	11.98	12.88	5.61	69.52	2.97	10.48	441.92
No. 6	39.60	14.25	13.31	4.43	68.01	2.08	8.27	448.83

*** Calculated by difference.**

Patties No. 1: Prepared from 100% wheat flour (W.F.)
Patties No. 2: Prepared from 95% W.F. and 5% defatted soybean flour (D.S.F.).
Patties No. 3: Prepared from 95% W.F. and 5% black rice flour.
Patties No. 4: Patties stuffed with cooked minced beef.
Patties No. 5: Patties stuffed with cooked spinach.
Patties No. 6: Patties stuffed with 50% cook minced beef + 50% cook spinach.

Concerning the iron content of all types of patties, the results presented in Table (2) show that the highest iron content was found in patties stuffed with spinach (10.48 mg/100 gm) followed by patties stuffed with cooked beef (9.52 mg/100 gm), while the lowest iron content was found in patties from 100% wheat flour.

The calculated energy of the prepared patties ranged between 441.92 to 461.72 Kcal/100 gm.

Organoleptic evaluation of different fresh prepared patties:

Sensory evaluation of different fresh prepared patties is presented in Table (3). It could be noticed that, all stuffed patties had higher score than the non stuffed patties. Patties stuffed with cooked beef + cooked spinach (No. 6) had the superior over all acceptability than the other types of patty. In the same time no significant differences were observed in taste, flavor and overall acceptability between the stuffed patties. The control (No. 1 (100% wheat flour) was in the line with the stuffed patties.

Table (3): Organoleptic evaluation of different fresh prepared patties.

Types of patties	Organoleptic characteristics				
	Color	Taste	Flavor	Texture	Overall acceptability
No. 1	8.35	8.45 ab	8.30 ab	8.20	8.55 abc
No. 2	7.60	7.05 d	6.85 c	7.95	7.75 cd
No. 3	7.10	6.95 d	7.30 bc	8.10	7.50 d
No. 4	880	8.70 a	8.70 a	8.75	8.85 a
No. 5	8.40	8.20 abc	8.60 a	8.20	8.75 a
No. 6	8.80	8.50 a	8.85 a	8.45	8.95 a
	N.S	**	**	N.S	**
L.S.D. 0.05	-	0.95	0.75	-	0.77
L.S.D. 0.01	-	1.26	0.99	-	1.03

N.S.: No significant difference at 5% level.
****: Significant difference at 1% level.**
Each value is an average of ten determination.
In a column values followed by the same letter are not significantly different at the 5% level.
No. 1, No. 2, No. 3, ….. *etc.* were as given in Table (2).

Worth mentioning, as reported by El-Demiry (2005) fresh baked patties could be stored in a refrigerator at 4 ± 1^{o}C for 4 days, or frozed in freezer at -18 ±1^{o}C for six months. The best time for heating cold and frozen stored patties for consumption was 7 and 12 minutes respectively using a conventional oven at 220^{o}C to enhance their eating quality.

In conclusion the previous results of panel tests evaluation proved that all the types of patties had a good acceptability especially the stuffed patties with all different stuffings which were much more acceptable.

Protein qualities of patties:

1. Amino acids composition:

The amino acid requirements are the logical yard-sticks by which protein quality can be estimated and the relative quantities of the various amino acids, in particular the essential amino acids, in the food could be used as reliable estimators of actual protein quality (Alsmeyer *et al.,* 1974).

Amino acids composition of non stuffed patties and stuffed patties are presented in Table (4). The patties samples contained all detected indispensable amino acids. It could be observed that, the stuffed patties with cooked minced beef (No. 4) and the non stuffed patties prepared from 5% defatted soybean flour (No. 2) contained the highest amount of all indispensable amino acids compared with other samples.

However, addition of defatted soybean flour to the wheat flour used for preparing patties leads to increase in their contents of sulphur containing amino acids (methionine and cystine) and this would increase the nutritive value of the food produced as reported by Infant *et al.* (1979).

From the results in the same table, it could be concluded that the patties prepared from wheat flour contained the lowest amount of total and individual indispensable amino acids. All patties sample contained more

amount of dispensable amino acids (53.51-63.01%) than indispensable amino acids (27.27-36.92%).

The nutritive value of any protein depends primarily on its capacity to satisfy the needs for indispensable amino acids for human being. Thus, the amino acid requirements are the logical factors by which protein quality can be measured (Bhushan, 1991).

Table (4): Amino acids composition of patties samples (g/16 g N).

Indispensable amino acids	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	FAO/WHO pattern g/16 g N
Leucine	5.98	7.11	6.57	7.38	6.51	6.65	7.00
Isoleucine	2.88	3.67	3.49	4.10	3.43	3.45	4.00
Lysine	2.90	3.75	2.50	4.41	2.44	3.21	5.50
Methionine	1.42	1.87	1.52	1.92	1.50	1.62	
Cystine	1.47	1.76	1.70	1.91	1.70	1.69	
Methionine + cystine	2.89	3.63	3.22	3.83	3.20	3.31	3.50
Phenylaleanine	3.81	4.49	4.29	4.74	4.22	4.35	
Tyrosine	2.13	2.66	2.32	2.95	2.35	2.31	
Phenylalanine + tyrosine	5.94	7.15	6.61	7.69	6.57	6.66	6.00
Threonine	2.21	2.84	2.28	3.27	2.46	2.61	4.0
Valine	3.53	4.32	4.21	4.81	4.10	4.31	5.00
Tryptophan*	0.94	1.23	1.20	1.43	1.16	1.19	1.00
Total indispensable amino acids	27.27	33.70	30.08	36.92	29.87	31.4	
Dispensable amino acids							
Alanine	2.60	3.74	3.31	4.10	3.21	3.88	
Arginine	2.29	3.18	3.13	4.26	2.79	3.28	
Aspartic acid	4.15	5.5	5.33	6.4	5.11	5.82	
Glutamic acid	26.66	24.01	27.10	24.33	23.20	23.31	
Glycine	2.99	3.87	3.78	4.20	3.69	3.67	
Histidine	1.57	2.09	1.98	2.31	1.94	2.09	
Proline	9.38	11.6	11.37	11.71	11.67	11.91	
Serine	3.87	4.95	4.79	5.70	4.81	5.11	
Total dispensable amino acid	53.51	58.94	60.79	63.01	56.46	59.07	
Total amino acids	80.78	92.64	90.87	99.93	86.33	90.47	

***Tryptophan was determined colourmenrically FAO/WHO (1988)**
No. 1, No. 2, No. 3, ...*etc.* were as given in Table (2).

2. Amino acid scores (A.A.S.):

The amino acid scores can be considered as an imperfect indicator of protein quality, but it still is the best one based on amino acid composition (Pellett and Young, 1980).

The amino acid scores of the indispensable amino acid of non stuffed patties and stuffed patties are given in Table (5). The results revealed that, the stuffed patties with cooked minced beef (No. 4) had more amino acid scores of the indispensable amino acids than other patties. The lowest amino acids score were found in patties made from wheat flour only (No. 1). First limiting amino acid score was recorded for lysine. Addition of defatted soybean flour markedly increased the amino acids score of the patties.

3. The computed protein efficiency ratio (C-PER):

The computed protein efficiency ratio (C-PER) of different patties sample were lower than that of standard casein protein (PER = 2.50) as given in Table (6). The lower (C-PER) value was recorded in patties made

from wheat flour only No. 1 (1.79), while the highest one was recorded in stuffed patties with cooked minced beef No. 4 (2.48). Generally, fortification of flour with deffated soybean, black rice, minced beef and spinach increased the C-PER of the produced patties.

Table (5): *Chemical scoring of the indispensable amino acids of patties sample.

Indispensable amino acids	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	FAO/WHO pattern g/16 g N
Leucine	85.43	101.57	93.86	105.43	93.0	95.00	7.0
Isoleucine	72.0	91.75	87.25	102.50	85.75	86.50	4.0
Lysine*	52.73	68.18	45.45	80.18	44.36	58.36	5.5
Methionine + cystine	82.57	103.71	92.0	109.43	91.43	94.57	3.5
Phenylalanine + tyrosnine	99.0	119.17	110.17	128.17	109.50	111.0	6.0
Threonine	55.25	71.0	57.0	81.75	61.50	65.25	4.0
Valine	70.60	86.40	84.20	96.20	82.0	86.20	5.0
Tryptophan	94.0	123.0	120.0	143.0	116.0	119.0	1.0

***Chemical scoring was calculated as a percentage of FAO/WHO (1988) recommended amino acids.**
No. 1, No. 2, No. 3, …… *etc.* were as given in Table (2).

Table (6): Computed protein efficiency ratio (C-PER) and biological value (BV) of patties sample.

Patties sample	C-PER	B.V.
No. 1	1.79	68.71
No. 2	2.47	75.91
No. 3	2.20	73.07
No. 4	2.48	76.01
No. 5	2.11	72.12
No. 6	2.34	74.54
Casein*	2.50	76.23

C-PER: Computed protein efficiency ratio
B.V.: Biological value
***C-PER and B.V. of casein according to (FAO/WHO pattern, 1988).**
No. 1, No. 2, No. 3, *.....etc.* were as given in Table (2).

4. Biological value (B.V.):

The biological values of protein of different patties sample are shown in Table (6). Biological values are very useful parameter for evaluating the effect of processing on food protein quality (Abd Alla, 1981). The results revealed that, the stuffed patties with cooked minced beef had high biological value than other patties. Fortification of wheat flour to made patties increased the biological values of patties protein. These results may be related to the (C-PER) which was higher in stuffed patties with cooked minced beef than other patties.

CONCLUSION

As a conclusion, from the previous aforementioned results. It should be noted that, all prepared baked patties had high nutritive value. In such relation, the highest nutritive value was found in patties made from wheat flour fortified with minced beef and patties made from wheat flour fortified with 5% defatted soybean flour. Furthermore, stuffed patties with minced beef and spinach may enhance the eating quality and increased their iron contents.

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القيمة الغذائية للفطائر المدعمة ببعض المصادر الطبيعية الغنية بالحديد

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أجريت هذه الدراسة بهدف إمكانية إعداد بعض أنواع من الفطائر عالية المحتوى من الحديد باستخدام بعض مصادر الأغذية الغنية بالحديد وقد استخدم لهذا الغرض عضلات البقر المفروم المطهى كمصدر حيوانى ، السبانخ المطهية كمصدر نباتي في حشو الفطائر. وكذلك استخدم فول الصويا المنزوع الدهن بنسبة ٥% وكذلك ٥% من دقيق الأرز الأسود لإعداد بعض الفطائر الغير محشوة والغنية بالحديد.

تم تقدير التركيب الكيماوي ونسبة الحديد في المواد الخام وكذلك الفطائر المعدة ، كما تم إجراء الاختبارات الحسية للفطائر المعدة. وأخيرا تم تقييم الفطائر المعدة غذائيا بتقدير الأحماض الأمينية والرقم الكيماوي ومدى الاستفادة من البروتين والقيمة الحيوية.

وقد أظهرت النتائج أن الفطائر المحشوة باللحم المفروم والمطهى كانت عالية في محتواها من الحديد والبروتين عن الفطائر الأخرى.

وقد أثبتت الاختبارات الحسية أن جميع الفطائر المعدة كانت درجة تقبلها جيدة وخاصة الفطائر المحشوة حيث كانت أكثر تقبلا. أعلى نسبة من الأحماض الأمينية الأساسية سجلت مع كل الفطائر التي تم تدعيمها بدقيق فول الصويا والفطائر المحشوة بخليط متساوي من اللحم المفروم المطهى والسبانخ على مستوى كل الحشوات وكانت فطيرة اللحم المفروم المطهى أعلى في محتواها من الأحماض الأمينية الأساسية. كما وجد كذلك أن الفطيرة المحشوة بلحم البقر المفروم كانت أعلى في الرقم الكيميائى وفي نسبة كفاءة البروتين المحسوبة وكذلك القيمة الحيوية للبروتين بالمقارنة بباقي أنواع الفطائر.