

# The Nutritional Value, Energy and Nutrient Contents and Claims of Marketed Multi-grain Breads

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**Abstract** Cereals, mainly bread from plain wheat flour, are the staple food in Jordan. Leavened Arabic bread is the traditional consumed form. Bread is also produced in other forms by the addition of ingredients not present in the traditional Arabic bread. These forms of bread are associated with some nutrient content claims. This study aimed to compare the proximate analysis and energy of 16 multi-grain breads, in addition to white bread, and their declared nutrient content claims. The mean contributions of carbohydrate, protein, fat, moisture, ash, and fiber were 50.01%, 13.61%, 2.00%, 24.49%, 2.65%, and 1.33% of the weight of the bread types, respectively. The lowest ash and fiber contents were that of the white bread. The mean energy density of the bread types was 275.76 kcal/100 g. The lowest 7 energy density breads have the highest moisture content. One type of bread (B16) had the highest moisture and protein and the lowest carbohydrate and energy density. It is concluded that the addition of other grains and additives increased the fiber, ash, and protein contents of other bread types.

**Keywords:** bread, Jordan, nutrient claim, carbohydrate, energy, multi-grain

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## 1. Introduction

Cereal grains are the main crops that have made the continuation of human life possible. Nowadays, cereal grains are the single most important source of energy for the majority of the world population [1]. Bread, the main cereal product, is one of the most important foodstuffs consumed in the contemporary world [2].

In the Mediterranean countries, cereals have been used in many ways, nevertheless, they are mainly used in refined forms. Wheat bread is one of the most commonly used cereal products [3]. Bread is the traditional food in the Arab Middle East countries [4]. In Jordan, wheat and rice are the staple foods. The leavened flat wheat bread (pita-type bread), is consumed daily with most meals [5].

Cereals provide important amounts of most nutrients. Bread is an important source of proteins, fibers, complex carbohydrates, vitamins, and minerals, in addition to antioxidants and phytochemicals [6,7]. However, processing wheat flour generally reduces the content of these nutrients and their content of bioprotective substances [8]. In Jordan, bread was reported to be the first of the top ten food sources of the micronutrients: iron (8.3 mg/day), zinc (2.7 mg/day) and selenium (86.7 µg/day) [9].

Bread form has changed from that of a dark, coarse and heavy loaf, baked in the ashes, to the refined and whitened enriched breads of the late twentieth century [10]. Unfortunately, the Jordanian population consumption of refined wheat flour bread was estimated to be about 326 g/capita/d, while the consumption of the whole-grain type was about 3 g/capita/d [11].

Today consumers are becoming increasingly aware of the relationship between diet and health. Bakery products, including bread, possess a considerable potential to deliver healthy functional properties. Many bakeries are working to distinguish their products and add value to them [12]. Many potential nutraceuticals have been proposed to increase the functionality of bread [13]. In the same context, Takruri and Alkurd [4] have studied a brand of healthy bread (Biobread) based on a mixture of whole wheat flour in addition to rye flour, soy powder, linseed powder, wheat bran, dried soaked wheat and seeds of fennel, anise, and caraway. They found that Biobread had a lower glycemic index in comparison with white bread.

Bread is a highly nutritious food eaten in many forms or types; its nutritional value varies depending on its type. Consequently, the proximate analysis indicates the nutritional value of the bread [14]. Traditional bread is made from a mixture of flour, salt, sugar, yeast, and water. To enhance bread nutritional value or other characteristics,

different ingredients like fat, milk, milk solids, egg, anti-oxidants, etc. may be added [15].

Nowadays, many types of bread are being marketed in Jordan. In addition to white bread, many so-called “health breads” are available which contain many added ingredients to white flour such as oat, bran, rye, barley, lupine, multigrain, and algae. The addition of such ingredients and others are attempting to create functional breads to attain additional health benefits [13]. These breads are mostly claimed as healthy breads that alleviate some health problems like obesity, diabetes, and GI disturbances.

In this study, 16 types of breads, in addition to the white bread, were studied regarding their energy content and proximate analyses.

The most widely consumed wheat flour in Jordan is known as Mowahad, with more than 90% of all wheat flour being of this type [16]. Mowahad wheat flour has an extraction rate of 73% to 78% and is mandatorily fortified now with 10 vitamins and minerals [17,18]. The type of bread produced from Mowahad wheat flour will be referred to as white bread in this study.

This study aimed to measure the nutrient contents and energy density of 16 types of bread and compare them with those of white bread. Another purpose of this study was to verify the health and nutrient claims of these breads according to their constituents.

## 2. Materials and Methods

### 2.1. Proximate Analysis

Proximate analysis was performed for the different types of freshly baked bread marketed in Jordan as healthy

multi-grain breads in addition to the white bread; the average values of triplicate analyses were obtained. Determinations were made using standard methods for moisture, crude ash, crude protein (Kjeldahl), and crude fat (Soxhlet) using AOAC methods [19]. Carbohydrates were calculated by difference and energy values were calculated using the Atwater factors 4, 4, and 9 for protein, carbohydrate, and fat, respectively.

### 2.2. Statistical Analysis

Statistical analysis was performed using the GLM procedure of the Statistical Analysis System [20]. Mean separation was performed using the LSD test at  $P < 0.05$ .

## 3. Results and Discussion

Bread is the main source of both macro- and micronutrients in our diet. The main macronutrient provided by bread is carbohydrate, but it also provides some protein and a little fat. Bread also is an important source of fiber. The white bread, the regularly consumed bread in Jordan, is the reference type with which other breads were compared in this study.

The bread name is used in the Jordanian bakeries to characterize its constituents and their health claims. Table 1 shows that the selected breads included 2 types of bread that contain oat (breads no. 1, 5: B1, B5), 1 type of rye bread (B13), 3 types of multi-grains (B7, B11, B13), 3 types of bran bread (B2, B12, B14), 4 types of brown bread (B2, B3, B4, B8), 1 type of barley bread (B15), 1 type of lupine bread (B10), 1 type of algae bread (B9), 2 types of healthy bread (B3, B6), 1 type of bread named after its producer (B16), and 1 type of white or regular bread (B17).

Table 1. The bread characteristics or descriptions as obtained from their names

Bread type	Bread characteristics
B1	Oat, sugar-free Wheat flour +wheat bran +oat
B2	Brown, bran Wheat flour + wheat bran
B3	Brown, healthy Whole wheat flour Claim: enhanced and healthy
B4	Brown, sugar-free Wheat flour +wheat bran; 160 kcal/100 g bread
B5	Oat, sugar-free Wheat flour + oat
B6	Healthy-bread Undeclared ingredients Claim: Healthy
B7	Multi-grain Flour of whole wheat + barley, millet, corn, soybean, etc.
B8	Brown Whole wheat flour
B9	Algae Whole wheat flour + algae powder+ barley flour + linseed
B10	Lupine Whole wheat flour + lupine flour + soy flour
B11	Multi-grain Whole wheat flour + different grains
B12	Bran Whole wheat flour + wheat bran
B13	Rye, multi-grain Whole wheat flour + rye + other grains
B14	Bran, toast Whole wheat flour + wheat bran
B15	Barley Whole wheat flour + barley flour
B16	High fiber, high protein, and low carbohydrate Claim: 36% fiber, 80% less carbohydrate Per 100 g: 34.2 g protein, 36.3 fiber, 2.9 carbohydrate
B17	White bread Mowahad flour (73-78% extraction)

### 3.1. Moisture Content

Table 2 shows the results of the proximate analysis of the 17 studied breads on a wet-matter basis. The average moisture content (%) of the breads was  $29.49 \pm 0.95$ ; ranging from  $16.56 \pm 0.20$  (B1) to  $41.01 \pm 0.27$  (B16), while for white bread (B17) it was  $26.98 \pm 0.12$ . The moisture content of white bread (B17) is significantly ( $p < 0.05$ ) lower than that of B11, B6, B8, B3, B9, B14, B10, B13, and B16 and higher than that of B1, B5, B15, B2, B12, and B7. There was no significant difference between B17 and B4 ( $p > 0.05$ ).

It is clear that moisture constitutes a high percentage of bread weight, therefore lowering its energy density.

Table 2 and Table 3 depict the reciprocal relationship between the energy density and moisture content of the different types of bread. The lowest 7 energy density breads (kcal/100 g) have the highest moisture content (%): (219.04, 40.01) for B16; (235.48, 37.54) for B10; (244.07, 35.02) for B14; (251.32, 34.28) for B9; (253.37, 34.08) for B3; (267.61, 37.78) for B13; and (257.98, 33.23) for B8. The energy density of the reference white bread (B17) was found to be 288.58 (kcal/100 g) with a moisture content of 26.98%. This indicates that the energy density of breads is mainly dependent on their moisture content.

Table 2. Proximate analysis of the 17 studied breads\*

Bread types	% fiber	% fat	% protein	% ash	%CHO	%moisture
B1 Oat, sugar-free	$0.80 \pm 0.02$ IHGF	$1.42 \pm 0.07$ ED	$9.22 \pm 0.24$ J	$1.99 \pm 0.02$ H	$70.02 \pm 0.15$ A	$16.56 \pm 0.20$ K
B2 Brown, bran	$1.06 \pm 0.01$ FE	$0.77 \pm 0.01$ IHGF	$7.74 \pm 0.12$ K	$3.01 \pm 0.07$ BC	$63.32 \pm 0.11$ B	$24.10 \pm 0.14$ H
B3 Brown, healthy	$0.96 \pm 0.02$ EFG	$0.27 \pm 0.02$ IJ	$10.58 \pm 0.28$ H	$1.95 \pm 0.05$ H	$52.17 \pm 0.54$ G	$34.08 \pm 0.30$ D
B4 Brown, sugar-free	$2.28 \pm 0.22$ B	$0.97 \pm 0.08$ EHGF	$12.63 \pm 0.14$ F	$3.01 \pm 0.01$ BC	$53.83 \pm 0.47$ F	$27.28 \pm 0.24$ FG
B5 Oat, sugar-free	$1.78 \pm 0.05$ D	$1.08 \pm 0.05$ EGF	$12.80 \pm 0.03$ F	$2.63 \pm 0.01$ E	$61.14 \pm 0.13$ C	$20.57 \pm 0.11$ J
B6 Healthy-bread	$1.97 \pm 0.03$ CD	$11.05 \pm 0.70$ A	$17.21 \pm 0.31$ C	$4.61 \pm 0.01$ A	$31.57 \pm 1.06$ L	$33.60 \pm 0.49$ DE
B7 Multi-grain	$0.62 \pm 0.04$ IJ	$3.16 \pm 0.22$ C	$12.82 \pm 0.31$ F	$2.18 \pm 0.03$ G	$56.32 \pm 0.64$ E	$24.89 \pm 0.31$ H
B8 Brown	$1.01 \pm 0.03$ EFG	$0.87 \pm 0.06$ EHGF	$11.32 \pm 0.11$ G	$2.44 \pm 0.01$ F	$51.15 \pm 0.37$ HG	$33.23 \pm 0.25$ E
B9 Algae	$1.15 \pm 0.03$ E	$0.82 \pm 0.06$ IHGF	$9.84 \pm 0.42$ IJ	$2.77 \pm 0.01$ D	$51.15 \pm 0.61$ HG	$34.28 \pm 0.29$ CD
B10 Lupine	$3.29 \pm 0.20$ A	$1.75 \pm 0.02$ D	$18.30 \pm 0.26$ B	$2.49 \pm 0.03$ F	$36.64 \pm 0.29$ K	$37.54 \pm 0.29$ B
B11 Multi-grain	$0.88 \pm 0.06$ FHG	$3.26 \pm 0.19$ C	$14.96 \pm 0.05$ D	$2.80 \pm 0.04$ D	$50.10 \pm 0.28$ HI	$28.01 \pm 0.14$ F
B12 Bran	$0.71 \pm 0.03$ IH	$0.28 \pm 0.02$ IJ	$12.58 \pm 0.02$ F	$2.67 \pm 0.01$ E	$59.15 \pm 0.10$ D	$24.61 \pm 0.04$ H
B13 Rye, multi-grain	$0.77 \pm 0.03$ IHGF	$6.16 \pm 0.20$ B	$14.25 \pm 0.03$ E	$2.92 \pm 0.01$ C	$38.78 \pm 0.71$ J	$37.78 \pm 0.14$ B
B14 Bran, toast	$0.89 \pm 0.02$ FHG	$0.00 \pm 0.00$ J	$11.92 \pm 0.09$ G	$3.07 \pm 0.04$ B	$49.10 \pm 0.83$ I	$35.02 \pm 0.74$ C
B15 Barley	$2.10 \pm 0.10$ CB	$1.19 \pm 0.03$ EDF	$11.43 \pm 0.14$ G	$2.65 \pm 0.03$ E	$60.76 \pm 0.39$ C	$21.86 \pm 0.14$ I
B16 High fiber, high protein, and low carbohydrate	$2.02 \pm 0.11$ CD	$0.60 \pm 0.02$ IHGF	$33.51 \pm 0.26$ A	$2.96 \pm 0.01$ C	$19.91 \pm 0.06$ M	$41.01 \pm 0.27$ A
B17 White bread	$0.42 \pm 0.02$ J	$0.42 \pm 0.03$ IHJ	$10.32 \pm 0.42$ IH	$0.99 \pm 0.01$ I	$60.87 \pm 0.46$ C	$26.98 \pm 0.12$ G
LSD value	0.2483	0.5569	0.6602	0.0878	1.453	0.8446
Mean $\pm$ SEM*	<b><math>1.33 \pm 0.11</math></b>	<b><math>2.00 \pm 0.38</math></b>	<b><math>13.61 \pm 0.80</math></b>	<b><math>2.65 \pm 0.10</math></b>	<b><math>50.01 \pm 1.98</math></b>	<b><math>29.49 \pm 0.95</math></b>

\*Analysis was done in triplicates; values are expressed as mean $\pm$ SEM (Standard Error of the Mean). Means in the same column with the same letter are not significantly different.

Table 3. Percentage (%) energy contribution of macronutrients and the energy density (kcal/100 g) of the breads \*

Bread types	% energy contribution of			Energy density kcal/100 g
	Fat	Protein	CHO	
B1 Oat, sugar-free	3.88	11.18	84.94	$329.70 \pm 1.14$ A
B2 Brown, bran	2.39	10.63	86.98	$291.18 \pm 0.82$ DE
B3 Brown, healthy	0.96	16.70	82.34	$253.37 \pm 1.41$ I
B4 Brown, sugar-free	3.18	18.40	78.42	$274.61 \pm 0.71$ F
B5 Oat, sugar-free	3.18	16.76	80.06	$305.49 \pm 0.33$ B
B6 Healthy-bread	33.76	23.37	42.87	$294.58 \pm 3.85$ D
B7 Multi-grain	9.32	16.81	73.86	$305.04 \pm 1.47$ B
B8 Brown	3.04	17.61	79.35	$257.98 \pm 1.14$ H
B9 Algae	2.94	15.66	81.40	$251.32 \pm 1.37$ I
B10 Lupine	5.44	25.28	69.20	$235.48 \pm 1.91$ K
B11 Multi-grain	10.13	20.66	77.799	$289.59 \pm 0.92$ E
B12 Bran	0.87	17.39	81.72	$289.47 \pm 0.22$ E
B13 Rye, multi-grain	20.72	21.30	57.98	$267.61 \pm 1.16$ G
B14 Bran, toast	0	19.53	80.47	$244.07 \pm 3.10$ J
B15 Barley	3.58	15.27	81.16	$299.51 \pm 0.84$ C
B16 High fiber, high protein, and low carbohydrate	2.46	61.18	36.35	$219.04 \pm 0.93$ L
B17 White bread	1.31	14.31	84.38	$288.58 \pm 0.38$ E
LSD value				4.5167
Mean $\pm$ SEM*	<b><math>6.30 \pm 2.09</math></b>	<b><math>20.12 \pm 2.73</math></b>	<b><math>74.08 \pm 3.56</math></b>	<b><math>275.76 \pm 7.19</math></b>

\*Analysis was done in triplicates; values are expressed as mean $\pm$ SEM (Standard Error of the Mean). Means in the same column with the same letter are not significantly different.

### 3.2. Ash Content

The average ash content (%) of the 17 studied breads was  $2.65 \pm 0.10$ , ranging from  $0.99 \pm 0.01$  (B17) to  $4.61 \pm 0.01$  (B6). The ash content of the white bread (B17) was significantly ( $p < 0.05$ ) lower than that of the other 16 bread types. In comparison to the white bread, it can be inferred that the different constituents or additives of the other bread types may have led to their higher ash contents. It is clear that ash has little contribution to the weight of the bread, and hence in lowering the energy density of breads. It should be indicated that white bread should contain a low salt content ( $\leq 1.5\%$  of bread on a dry matter basis) according to the national specifications [21,22]. However, other types of bread are not covered by this regulation in Jordan. Therefore, the low figure of ash content in white bread (B17) is expected.

### 3.3. Crude Fiber Content

The average fiber content (%) of the 17 studied breads was  $1.33 \pm 0.11$ , ranging from  $0.42 \pm 0.05$  (B17) to  $3.29 \pm 0.50$  (B10). The fiber content of the white bread (B17) was significantly ( $p < 0.05$ ) lower than the other bread types except that of B7 ( $0.62 \pm 0.04$ ). Like ash, fiber has little contribution to the weight of bread, and consequently to lower the energy density of breads. The white bread crude fiber content, like ash content, was the lowest among all the bread types; this is due to the inclusion of fiber sources in the other breads such as bran, other cereals, grains, and seeds. In comparison to the white bread, the other 15 breads had significantly ( $p < 0.05$ ) higher crude fiber contents as a result of addition of oat (in B1, B5), bran or fiber (in B2, B3, B4, B8, B12, B14, B16), rye (in B13), multi-grains (in B11, B13), barley (in B15), lupine (in B10), and algae (in B9). In perspective of the addition of these constituents to the breads, the manufacturers' nutrient content claims were correct. The addition of all these constituents may give many health benefits other than the higher fiber content.

### 3.4. Total Fat Content

The average fat content (%) of the 17 studied breads was  $2.00 \pm 0.38$ , ranging from 0.00 (B14) to  $11.05 \pm 0.70$  (B6), while for white bread it was  $0.42 \pm 0.03$ . The fat content of the white bread (B17) was significantly ( $p < 0.05$ ) lower than that of B5, B15, B1, B10, B7, B11, B13, and B6; while there was no significant difference ( $p > 0.05$ ) in comparison to the other bread types.

As indicated in Table 3, on average, fat in the 17 types of bread constituted  $6.30 \pm 2.09\%$  of their energy content, ranging from 0% (B14) to 33.76% (B6), while for white bread it was 1.31%. These results indicate that fat has little contribution to the energy content of breads. Fat contributed to the lowest energy percentage among the macronutrients of the tested breads.

### 3.5. Protein Content

The average protein content (%) of the 17 studied breads was  $13.61 \pm 0.80$ , ranging from  $7.74 \pm 0.12$  (B2) to  $33.51 \pm 0.26$  (B16), while for white bread it was  $10.32 \pm 0.42$ .

There was no significant difference ( $p > 0.05$ ) in the protein content between the white bread (B17) and that of B2, B1, B9, and B3; while B17 was significantly ( $p < 0.05$ ) lower than the other types of bread. On average, protein in the 17 types of bread contributed  $20.12 \pm 2.73\%$  of their energy content, ranging from 10.63% (B2) to 61.18% (B16), while for white bread it was 14.31%. Protein occupied the second contributor of energy among the macronutrients in breads.

### 3.6. Carbohydrate Content

Carbohydrate is the main macronutrient in bread and is present mainly in the form of starch. The average carbohydrate content (%) of the 17 studied breads was  $50.01 \pm 1.98$ ; it ranged from  $19.91 \pm 0.06$  (B16) to  $70.02 \pm 0.15$  (B1), while for white bread it was  $60.87 \pm 0.46$ . There was no significant difference ( $p > 0.05$ ) between the white bread (B17) and that of B15 and B5. White bread was significantly ( $p < 0.05$ ) lower than that of B2 and B1; while it was significantly ( $p < 0.05$ ) higher than that of the other bread types.

On average, carbohydrates in all of the bread types contributed  $74.08 \pm 3.56\%$  of their total energy content; ranging from 36.35% (B16) to 86.98% (B2), while for white bread the contribution was 84.38%. As expected, carbohydrate was the first energy contributor among the macronutrients in breads.

As obtained from the Household Expenditures and Income Survey of 2010 for Jordan, the per capita estimated energy intake was 3325 kcal/day, of which carbohydrates contributed 60.27% of the total energy intake (501 g carbohydrate/day). Of the food groups containing carbohydrates, grains contributed 1424 kcal (43% of the total energy intake). In Jordan, bread is the main food in the grain group that contributes most of the consumed energy and carbohydrates [23].

The macronutrient content claims of B16 were: 36% fiber, 2.95 carbohydrate, and 34.17 protein. The proximate analysis of this bread revealed different contents of fiber (2.02%) and carbohydrate (19.91%), while it was almost the same for protein (33.51%).

### 3.7. Energy Density

As shown in Table 3, the average energy density (kcal/100 g bread) of the 17 studied breads was  $275.76 \pm 7.19$ , ranging from  $219.04 \pm 0.93$  (B16) to  $329.70 \pm 1.14$  (B1); while the average energy density of white bread was  $288.58 \pm 0.38$ . The energy content of white bread is significantly ( $p < 0.05$ ) lower than that of B6, B15, B7, B5, and B1 and higher than that of B16, B10, B14, B9, B3, B8, B13, and B4. There was no significant difference ( $p > 0.05$ ) between B17 and that of B12, B11, and B2.

Carbohydrates contributed 36.35% of the total energy content of B16. The low contribution of B16 to energy percent does agree with the claim of the low carbohydrate content of the bread.

The energy content of foods, including bread, comes from their carbohydrate, protein, and fat contents. The higher the amounts of these macronutrients, the higher the energy content. The highest energy contribution of breads

was of carbohydrate followed by protein then fat. On the other hand, the higher the fiber and the moisture content, the lower was the energy content or energy density.

The declared claim of the energy density of B4, a brown and sugar-free bread, is 160 kcal/100 g. On the other hand, the energy density was calculated to be 274.61 kcal/100g, about 1.7 times the declared energy density. This result supports the idea that not all the declared claims are true.

### 3.8. Nutrient Content Claims

The oat, sugar-free bread (B1), had the highest carbohydrate and energy and the lowest moisture contents. A second oat, sugar-free bread (B5), is among the 3 highest carbohydrate and energy contents. The third brown, sugar-free bread (B4), has carbohydrate, moisture, and energy contents that are around the mean of the breads. The sugar-free breads (B1 and B5) energy densities were significantly higher than that of white bread (B17), while the sugar free bread (B4) energy density was lower than that of white bread. These results indicate that the "sugar-free" nutrient claim does not always mean a low carbohydrate and hence energy content.

The 3 brown breads, B2, B3, and B8, which are composed of whole wheat with/without wheat bran had lower carbohydrate content than the white bread. All of these breads had higher fiber and ash content than the white bread. Two of them, B3, and B8 had lower energy content than the white bread.

Two breads (B12 and B14) are bran breads. The addition of bran is expected to increase the crude fiber content and to lower the energy density of the breads (if the macronutrients content is similar); implying that this nutrient claim carries many health benefits. The crude fiber content of these 2 breads was significantly higher than that of the white bread. One of these 2 breads (B14) had a significant lower energy density than the white bread, while the other bread (B12) had an energy density similar to that of white bread. These results indicate that the addition of bran does not necessarily mean that the bread has low energy density; since the macronutrient content of breads is the main contributing factor of the energy content.

The 3 breads, B10, B13, and B15, included lupine, rye, and barley, respectively. All these breads had higher protein, ash, and fat contents than the white bread. Two of them, B10 and B13 had lower carbohydrate and energy than the white bread. This means that inclusion of grains in wheat bread may significantly change some of their nutrient contents.

A distinguished bread, B16, had the highest protein and moisture and the lowest carbohydrate and energy. The manufacturer of this bread claimed that this bread contains (per 100 g bread) 34.2 g of protein, 36.3 g of fiber, and 2.9 g of carbohydrate. The chemical analysis of this bread revealed close figures for protein (33.52%), but much higher carbohydrate content (19.91%) and much lower fiber content (2.02%). This bread gave the lowest energy density (219.04 kcal/100 g) among all the other breads. These results indicate that the declared ingredient claims are not all true.

The declared name of bread is used in Jordan as a means of advertisement and to show the potential health benefits. The addition of multi-grains, legumes, bran, algae, and being sugar-free, healthy, and "enhanced" are the nutrient claims presented in the studied breads. Thus, the declared name of the studied breads does not always reflect the proximate analysis values and the expected potential health benefits.

Despite that cereals provide significant quantities of most nutrients, processing may increase or decrease the levels of their bioactive components and also modify the bioavailability of these components [7]. Therefore, the health benefits and health claims do not depend only on the nutrient contents of breads.

It is concluded from the present study that there is a wide variation in nutrient and energy contents among the studied types of bread. Furthermore, the addition of other constituents to white flour may have a positive effect on health.

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### Conflict of Interest

The authors declare no competing interests.

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