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MARKET RESEARCH PRODUCTS FORTIFIED WITH IRON BY ADDING COMPONENTS BIOVEGETALE

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ABSTRACT. At the start of the third millennium is a fact of concern in the development of nutritional diseases globally. Reasons for this are manifold, but the primary cause of the disturbance resides nutritional of contributions. Shortcomings in micro nutrients represents a public health problem with important economic and the physiological consequences. Key deficiencies identified worldwide is the deficiencies in iodine, iron and the A vitamin, but also different deficiencies, such as calcium, zinc, B12 vitamin, riboflavin and the folic acid which coexistence in virtually every region of the Earth. The most common nutritional deficiencies iron deficiency ranges, affecting the 2.12 billion of humanity, including over fifty million from industrialized countries, where consumption of the iron rich hemic is vital. According to some more recent studies, this number is evaluated at 3.5 billion, of which 42% are in the developed countries. It is thus attested that indicate a significant increase of the iron deficiency, certain the duration the last decade, the program is not aimed reduction of the malnutrition in the developing countries.
The aim of this study is to the characterization of products fortified with the iron in Romanian market and to survey a few characteristics of these products to eventually concluded real possibilities of to the phenomenon of various products fortified with the Iron by the addition of bio vegetable ingredients.
Key words: market research, fortified products, the Iron ingredients bio vegetable

INTRODUCTION

Iron deficiency, especially in severe cases, can cause lead poisoning organism, because this element accumulates in the body can replace the conditions of insufficient intake, heme iron of the component (Lynch, 2002). As a consequence, hemoglobin gradually loses its ability to carry oxygen to tissues. Uptake and recovery of iron from food depends largely health and body. Thus, a number of key diseases can reduce iron absorption, helping to install a deficiency of iron in the body: iron sub absorptive organic pathologies, pathologies hematolitice, chronic renal insufficiency, urinary infections, hemorrhoids, polyps, colic or rectal cancer, various infections home Parasitology (ankylostome), HIV / AIDS and various forms of bleeding. One of the causes of iron deficiency anemia lies in acid–base balance disorder of the digestive tract as a result of misuse of antacids or anti–inflammatory drugs, e.g. aspirin (Chung *et al*., 2009). A diet deficient in ascorbic acid (C vitamin) in folate (Ramakrishnan *et al*., 2002), A vitamin and protein also contributes to reducing the rate of recovery of iron ingested by the body.

In 2002 WHO declared iron deficiency as the most important health hazards, preventable. In particularly, in cases where traditional food needs not recommend people to a significant degree of iron fortification of food consumer (Yamamoto *et al*., 2010). Among the various strategies developed to reduce the public health problem developing iron–fortified foods lead role (Shin *et al*., 2008). However, even if our efforts in this direction are numerous, the results achieved are far from conclusive. Reasons for failure are multiple. First, iron is an extremely sensitive to conditions of preparation and food storage: oxidation, pH changes, presence of other micronutrients that can significantly alter bioavailability (Wang *et al*., 2010). Therefore, iron fortification of foods requires development of food–vehicles with well–defined structure, which was to protect iron absorption from the gastrointestinal tract (King *et al*., 2005).

One natural product that has a remarkable content of iron in a human body is as valuable to the chicken nutrients that can be eaten as is or may be considered a bio elements can enrich other common foods. In itself, nutrients are a natural food with high nutritional benefits, as a cheap source and quality of protein compounds and other nutrients and minerals like folic acid, choline, iron, selenium and A, B, D, E and K vitamins (Stralsio *et al*., 2003).

Vegetables are also a valuable source of antioxidant carotenoids, lutein and zeaxanthin. The value of each component of the nutrients use of compounds that bear special attention has acquired lately (Shin *et al*., 2008). Many companies use the whole nutrients, only a few individual components of the nutrients processing.

The extraction of the pure components as those in the yolk and even bark, enormous technological advantages, the cost of biomedical and pharmaceutical products market (Gálik *et al*., 2011).

First, lipids, trace elements and yolk protein and calcium and collagen in nutrient shell powder, nutrients membranes that are very attractive compounds in terms of multiple uses in food, pharmaceutical and cosmetics. Food fortification with iron requires overcoming technical barriers to two, which reduces the progress of activities undertaken in this direction (Kłobukowski *et al*., 2006).

Initial technical barrier is to find a compound of iron, which will be of sufficiently high bioavailability, but that does not produce sensory changes of fortified products (Beinner *et al*., 2003). While water–soluble iron compounds are suitable for this purpose, however they are not used in many cases, problems of sensory order (O'Gorman *et al*., 2011).

The second technical barrier is shown by the inhibitory effect of diet compounds, primarily by phytate, polyphenolic compounds and calcium. It is recommended that the bioavailability of iron from these foods to be improved through innovative technology, based on ingredients which, while not produce sensory changes (Ha *et al*., 2010).

The bioavailability of "fortifiant" depends essentially on the nature of the food matrix and the presence of iron absorption promoters. The amount of iron absorbed (measured in vivo) depends also on the nature of iron compounds, the amount fortifiant administered, and the matrix element.

One of the greatest challenges for pharmaceutical industry and the manufacture of products food is fortified with the Iron to the infants for the period in which the process of diversifying the food that is from the age of 4–6 months (Frestedt *et al*., 2008). The different iron content in infant formulas fortified addressed, found in pharmacy and supermarkets are as follows:

At present exist on Romanian market a range of products to the content in milk were added cereal, fruit and is fortified with the iron to offset anemia which may occur after an improper diet for this age.

Table 1. Bioavailability of different iron compounds (%) in various food–matrix

Food–matrix	Ferrous sulphate	Ferrous fumarate	Ferrous biglycinate	NaFeEDTA
Wheat flour (70% extraction)	5.3	–	10.8	14.9
Based food plant matter	4.7	5.0	8.4	10.5
Fortified cereals	9.0	–	9.9	–
Milk	3.8	–	5.2	–
Water	4.0–8.0	–	8.3–10.7	–

Table 2. Value energy content of the food samples analysed

Food for infants with the additional content	Other ingredients, vitamins and / or minerals present	Content in mg Fe/100g product
8 types of grain	Ca, A Vit, C Vit, Bifidus	5.5
5 types of grain	Ca, A Vit, C Vit, Bifidus	6.0
Rice and 3 types of fruit	Ca, A Vit, C Vit, Bifidus	5.5
8 grains and honey	Ca, A Vit, C Vit, Bifidus	6.0
8 cereal and yogurt	Ca, A Vit, C Vit, Bifidus	6.0
Wheat and 5 different fruit	Ca, A Vit, C Vit, Bifidus	7.5
7 types of cereals	C vitamin	3.0
Cereals and biscuits	Nutrients powder	4.0
7 types of cereals and apple	C vitamin	4.7

MATERIALS AND METHODS

Were taken to study iron–fortified products by adding bio vegetable components, most commonly found in this market: samples fortified with nutrients yolk.

These were reported generally similar to values obtained for simple bread.

Protein Determination using the Kjeldahl Method

For many years, the protein content of foods has been determined on the basis of total nitrogen content, while the Kjeldahl (or similar) method has been almost universally applied to determine nitrogen content (AOAC, 2000). Nitrogen content is then multiplied by a factor to arrive at protein content. This approach is based on two assumptions: that dietary carbohydrates and fats do not contain nitrogen, and that nearly all of the nitrogen in the diet is present as amino acids in proteins. On the basis of early determinations, the average nitrogen (N) content of proteins was found to be about 16 percent, which led to use of the calculation N x 6.25 (1/0.16 = 6.25) to convert nitrogen content into protein content. This use of a single factor, 6.25, is confounded by two considerations. First, not all nitrogen in foods is found in proteins: it is also contained in variable quantities of other compounds, such as free amino acids, nucleotides, creatine and choline, where it is referred to as non–protein nitrogen (NPN). Only a small part of NPN is available for the synthesis of (non–essential) amino acids. Second, the nitrogen content of specific amino acids (as a percentage of weight) varies according to the molecular weight of the amino acid and the number of nitrogen atoms it contains (from one to four, depending on the amino acid in question). Based on these facts, and the different amino acid compositions of various proteins, the nitrogen content of proteins actually varies from about 13 to 19 percent. This would equate to nitrogen conversion factors ranging from 5.26 (1/0.19) to 7.69 (1/0.13) (AOAC, 2000).

Analytical methods for fats in food

There is perhaps more agreement on standardized methods of analysis for fat than for protein and carbohydrate.

Most fat in the diet is in the form of triglyceride (three fatty acids esterified to a glycerol molecule backbone).

There are also non–glyceride components such as sterols, e.g. cholesterol. While there is considerable interest in the roles that these non–glyceride components may play in metabolism, they are not important sources of energy in the diet. There are accepted AOAC gravimetric methods for crude fat, which includes phospholipids and wax esters, as well as minor amounts of non–fatty material (AOAC, 2000). Total fat can be expressed as triglyceride equivalents determined as the sum of individual fatty acids and expressed as triglycerides. This method is satisfactory for the determination of fat in a wide variety of foods (AOAC, 2000).

Analytical methods for carbohydrates in foods

Total carbohydrate content of foods has, for many years, been calculated by difference, rather than analysed directly. Under this approach, the other constituents in the food (protein, fat, water, alcohol, ash) are determined individually, summed and subtracted from the total weight of the food. This is referred to as total carbohydrate by difference and is calculated by the following formula:

100 – (weight in grams [protein + fat + water + ash + alcohol] in 100 g of food) (AOAC, 2000).

Calculation of the energy content of foods – energy conversion factors

Determining the energy content of foods depends on the following: the components of food that provide energy (protein, fat, carbohydrate, alcohol, polyols, organic acids and novel compounds) should be determined by appropriate analytical methods; the quantity of each individual component must be converted to food energy using a generally accepted factor that expresses the amount of available energy per unit of weight; and the food energies of all components must be added together to represent the nutritional energy value of the food for humans. The energy conversion factors and the models currently used assume that each component of a food has an energy factor that is fixed and that does not vary according to the proportions of other components in the food or diet (AOAC, 1999a).

Methods for chemical elements in food

The chemical elements by atomic absorption spectrometry (AAS) after dry ashing, the atoms of a particular chemical element (the analyte) coming from samples and standards (EN 14082, 2003). Atomic absorption spectroscopy (AAS) is a spectroanalytical procedure for the qualitative and quantitative determination of chemical elements employing the absorption of optical radiation (light) by free atoms in the gaseous state. In analytical chemistry the technique is used for determining the concentration of a particular element (the analyte) in a sample to be analysed.

RESULTS AND DISCUSSIONS

Determining the energy content of foods (in kJ/g) depends on a number of factors. Food supplies energy for all animals—without it we could not live.

The quantity of energy stored in food is of great interest to humans.

The energy your body needs for running, talking, and thinking comes from the foods you eat. The results determine the energy values and food samples analysed:

Table 2. Value energy content of the food samples analysed

Name of sample	Value energy content Cal/100g	Food value / 100g the product		
		Proteins	Fats	Carbohydrates
8 types of grain	208	2.30	2.20	29.7
5 types of grain	219	3.80	2.35	23.1
Rice and 3 types of fruit	227	8.60	3.31	58.0
8 grains and honey	215	7.20	3.76	47.0
8 cereal and yogurt	208	2.40	1.93	34.1
Wheat and 5 different fruit	211	3.70	2.40	33.1
7 types of cereals	217	6.90	2.14	43.0
Cereals and biscuits	211	8.90	2.72	42.0
7 types of cereals and apple	213	3.80	2.23	38.7

The energy value of the waste components depends on its calorific value, which is influenced by the moisture content and hydrogen content of the wastes. A higher value was calculated to test the nutrients yolk was used and this derives from its high protein and fat in this product. Values obtained by determination of total protein in the samples analysed. The energy value of the waste components depends on its calorific value, which is influenced by the moisture content and hydrogen content of the wastes

Tabelul 4. Determination of trace elements in samples calcined in advance.

Name of sample	Value energy content Cal/100g	Food value / 100g the product		
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The metal concentrations were determined on dry weight as ppm.

Our work focused on examination of ash content, contents of macro-elements (Na, K, Ca and Mg). The major cause of macro-elements deficiencies is a lack of adequate intake of bio available minerals and vitamins from the staple diets. Biochemical processes influencing the bio availability (or the fraction of a nutrient our body's metabolism absorbs) are inherently complex. That is why the choice of the compound to be used as a fortificant is critical. This depends in part on its solubility in the gastric juice, besides its impact on sensorial characteristics of the food itself. Ultimately, both of these parameters can affect the outcome of a nutritional intervention strategy and therefore, it is necessary to understand the factors involved (Abdelaziz et al., 2011).

With regard to nutritional value of products researched content protides, lipids and carbohydrates differ from one product to another and it depends on its content in the substance of the eleven types of product. This is due to different protein intake of the chemical composition of the ingredients used to enrich traditional iron products.

Note that a trace element is concentrated in core products. The most abundant were found Mn. Highest concentration of Fe has the dough with the some samples. Cr and Co were not detected by the samples. Of macro-elements evidenced the highest amount were found Na and K mainly in the samples. The finished products of the high intake comes from salt and flour and used in the formulation of manufacturing.

Table 5. Determination of metals in samples previously calcined

No	Samples	The metal content				
		Na	K	Ca	Mg	Fe
1.	8 types of grain	1.142	0.744	32.120	0.194	27.575
2.	5 types of grain	1.512	6.125	61.115	8.174	15.26
3.	Rice and 3 types of fruit	1.152	7.122	61.119	0.431	22.405
4.	8 grains and honey	1.362	6.274	63.126	4.104	62.505
5.	8 cereal and yogurt	1.011	1.642	32.137	3.612	21.770
7.	Wheat and 5 different fruit	3.886	15.193	39.151	2.147	22.205
9.	7 types of cereals	2.329	50.126	86.211	4.123	201.72
10.	Cereals and biscuits	4.811	15.598	37.175	3.124	25.617
11.	7 types of cereals and apple	4.411	11.985	38.161	2.423	22.772
The metal concentrations were determined on dry weight as μg/g.						

Their distribution in the crust and core products is quite uniform. The present study stops along the review of products fortified with iron in the Romanian market and to study the following characteristics of these products. Nutritional value is on the content of protein, carbohydrates, lipids, minerals and vitamins such as iron–fortified products and their absorption coefficient. The amount of energy released by various nutrients is considering their expression in calories or joules. In terms of protein value, ensure human 1–1/3 bread of the total plant protein. Biological value of proteins is relatively low due bakery inappropriate balance of essential amino acids; these proteins are deficient in lysine, tryptophan and methionine. The value of mineral content of bread is on calcium, phosphorus and iron. Energy value as bread and bakery products and other foods, the body has the ability to provide a certain amount of energy, which means carbohydrates, fat and protein materials are the main components that determine the calorific value of bread. Calorific value is influenced by moisture product. Regarding the degree of assimilation, it was established that he increases as flour is used in manufacturing a high extraction of smaller and better quality.

CONCLUSIONS

As with final conclusion we can consider that as cereal–based products has a special place in the diet of the population is obvious that will be of particular interest to both those aimed at strengthening iron adults and infants. Particularly nutrient enrichment of these products offers a number of strategic advantages. Distribution of these products on the market is well regulated; there is no need for changes in consumer habits. Daily doses of iron administered in such products can meet the needs of the body determined, which excludes any possibility of an accidental overdose. Ultimately, introducing the fortifying iron in the natural compounds such as those samples studied, may result in valuable nutritional specialties such fighting in preventing and treating iron deficiency so prevalent in current population. The success of a fortification programme can be measured through its public health impact and its sustainability.

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