

INFORMATION ON FOOD FORTIFICATION WITH BIOACTIVE COMPOUNDS IN OBSERVATION AND CONSUMER STUDIES

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Key words: food fortification, bioactive compounds, labeling, consumer knowledge.

Abstract

This study was aimed at evaluating the load of information displayed on packages of fortified food products and at assessing consumer knowledge on fortified foods and information about them provided via package.

The study demonstrated that on the Olsztyn market the most frequently fortified groups of food products were juices and non-alcoholic drinks as well as dairy and cereal products. Labels of the evaluated packages were comprehensive and in most cases correct. The nutritive value was provided on packages of all analyzed products. The products were fortified with permitted components including mainly vitamins and minerals. The consumer survey showed that the selected target group knew the concept of fortified food however in the analyzed group of respondents this knowledge was not reflected in the consumption of these food products. Women had richer knowledge on food fortification.

INFORMACJA O WZBOGACANIU ŻYWNOSCI SKŁADNIKAMI BIOAKTYWNYMI W BADANIACH OBSERWACYJNYCH I KONSUMENCKICH

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Słowa kluczowe: wzbogacanie żywności, znakowanie, wiedza konsumentka.

Abstrakt

Celem niniejszej pracy była ocena warstwy informacyjnej opakowań produktów wzbogaconych, a także poznanie opinii konsumentów na temat żywności wzbogaconej i informacji o niej przekazywanej przy pomocy opakowania.

Otrzymane wyniki wykazały, że najczęściej wzbogaconymi grupami produktów spożywczych na rynku olsztyńskim są soki i napoje bezalkoholowe, przetwory mleczne oraz produkty zbożowe. Etykiety ocenianych opakowań były czytelne i w większości przypadków poprawnie oznakowane. Wszystkie poddane analizie produkty posiadały podaną wartość odżywczą oraz do wzbogacania użyto dozwolonych składników. Głównymi składnikami wzbogacającymi używanymi podczas fortyfikacji były przede wszystkim witaminy i składniki mineralne. Z przeprowadzonych badań konsumenckich wynika, iż wybrana grupa docelowa zna pojęcie żywności wzbogaconej, jednak w badanej grupie respondentów nie przekłada się to na jej spożycie. Wyższy poziom wiedzy na temat wzbogacania żywności posiadały kobiety.

Introduction

The approach to nutritional issues has recently been subject to considerable changes. Proper nutrition affects health status and contributes to the prevention of many diseases. It is responsible for providing nutrients (including vitamins and minerals) and influences proper body functioning. For this reason, apart from the primary role of hunger satisfaction, consumers increasingly often expect food products to serve additional functions. They pay great attention to a high nutritive value and health-promoting properties of food. In order to meet these expectations producers extend their assortment with, e.g., fortified foods (ACHREMOWICZ, JAWORSKA 2009, CANNON 2006).

The fortification of food products with vitamins or minerals enables preventing nutrients deficiency in a man's diet. Products fortified with nutrients represent a segment of food with a health-promoting character, but available in many branches of the food industry. Breakfast cereals with the addition of vitamins, fruit juices with vitamin C or milk desserts with calcium are commonly available in retail. Apart from food products fortified with vitamins and minerals, consumers search for innovative additives with health-promoting effects, e.g. omega 3 and omega 6 fatty acids, dietary fiber, probiotics or components with stimulating effects. But, are they aware of what they buy? In this case a significant role is ascribed to a food producer and to product's package. Often, labels placed on product's package are the only carriers of information about it. Apart from obligatory elements they frequently contain additional information placed by producers in order to attract consumers' attention, e.g. nutritional and health claims which are formulas used to emphasize special properties of a given product. However, producers not always adhere to labeling guidelines. Sometimes "promises" made are not confirmed by scientific research and information provided on products' labels

is far from truth (DZIĘCIOŁ et al. 2007, GÓRSKA-WARSEWICZ 2006, KUDELKA 2011, KUNACHOWICZ et al. 2007, KUNACHOWICZ, RATKOVSKA 2009, SZAMREJ 2011).

In view of the above, the aim of this study has been to evaluate the load of information displayed on packages of fortified food products and to assess consumer knowledge on fortified foods and information about them provided via package.

Material and methods

The study was divided into two parts. In order to assess labels of selected groups of fortified products the marketing research technique of observation was used. These observations were done by two people trained to conduct observation research. An identification card of fortified foods label has been elaborated that consisted of 6 groups of questions related to: food product name, its composition, its nutritional value, nutritional claims, health claims, and promotional mottos/information (EU Register of nutrition and health claims www.ec.europa.eu/nuhclaims, Rozporządzenie Ministra Zdrowia. Dz.U.10.174.1184, Rozporządzeniu (WE) 1924/2006. Dz.U. L.404 z 2006 z późn. zm., Rozporządzeniu (WE) 1925/2006. Dz.U. L.404 z 2006 z późn. zm., Rozporządzenie Parlamentu Europejskiego i Rady 1169/2011. Dz.U. L.304 z 2011).

Each group contained open and closed type questions. Products analyzed in the study included fortified foods selected according to assortment groups available in retail on the Olsztyn market. In total, analyses were conducted for labels of 72 packages of fortified food products. The packages were divided into 3 groups: fortified juices and non-alcoholic drinks (n=30), fortified dairy products (n=25), and fortified cereal products (n=17). Data collected from identification cards were transferred to an Excel calculation sheet. Next, results were subjected to a quantitative analysis.

The survey on the perception of fortified food and information about it provided via package was conducted among 150 young consumers, aged 19-15, living in Olsztyn. Non-probability sampling, i.e. a convenience sampling, was applied. Survey questionnaire consisted of 10 questions referring to fortified foods and to information displayed on their packages, including 9 closed questions and 1 question with a 5-point frequency scale, where 1 denoted – “I do not buy at all” and 5 – “I buy very often”.

Results were processed using a Statistica 9.0 calculation sheet, based on basic statistical measures: mean values and percentage values.

Results and discussion

Evaluation of information conveyed via package in selected groups of fortified food products – observation study

A nation-wide survey shows that in Poland the most frequently fortified group of food products includes juices and non-alcoholic drinks that have the largest share in the market of fortified foods (KUNACHOWICZ, RATKOVSKA 2009). Our study confirmed this observation in respect of the Olsztyn market. The survey evaluated 113 products divided into the following groups: fruit juices and beverages, dairy products, cereal products, food concentrates, margarines and vegetable oils, confectionery as well as coffees and teas. The largest group consisted of fruit juices and beverages (26.55%), followed by dairy products (22.12%) and cereal products (15.04%). The smallest group of fortified food products included coffees and teas (4.42%).

Information displayed on packages of the fortified food products was evaluated in three groups of enriched products having the greatest contribution in the market, i.e. juices and non-alcoholic drinks (n=30), dairy products (n=25) and cereal products (n=17).

The first evaluated element was product's name. The survey demonstrated that in many cases the name of the product did not correspond to its type. Labels of 74% of products from the group of juices and non-alcoholic drinks displayed only some fancy name not related to product type and did not describe precisely the product to a potential consumer. Both fancy and informative (precise) name of the product was visible on barely 26% of labels of juices and non-alcoholic drinks, but on as many as 72% and 65% of labels of dairy and cereal products, respectively. This form of expressing product's name is not only consistent with binding regulations, but also allows the consumer to know the food product by conveying reliable information on its type and properties.

In 50% of juices and non-alcoholic drinks, 50% of cereal products and 65% of dairy food products the name was suggesting their specific properties. Such information was usually linked with product fortification with nutrients, for example „*Multivitamin classic juice with vitamins*”, „*Carbonated drink: 3 vitamins A, C, E*”, „*Milk with the addition of omega 3 polyunsaturated fatty acids*”, „*Sugar-free bread made with prebiotic and dietary fiber*”, or „*Cereal beads with chocolate flavor fortified with vitamin, iron and calcium*”.

Another evaluated information was the composition of a food product. All analyzed juices and non-alcoholic drinks were multi-component products and all were fortified. In 10% of the products no information was provided on the content of components indicated in product's name, which is inconsistent with

respective legal regulations. Labels of all products from this group were also lacking information on allergenic components. Similar situation occurred in the group of dairy products, of which all were multi-component. In the case of all products the name of which indicated a flavor additive, information on additive content was also displayed in product composition, and in 64% of the packages additional components were listed. The fortifying substances were displayed on 96% of packages of products from this group. Such information was missing in the label of 1 product only. In 24% of the packages, labels contained comprehensive information on allergenic components. All analyzed cereal products were multi-component and all had labels informing about fortification (in “Composition” part). Fortifying substances were added in forms described in the appendix of Regulation (EC) 1925/2006, of 20 December 2006 on the addition of vitamins and minerals and selected other substances to food products, for instance calcium in the form of calcium carbonate or magnesium in the form of magnesium carbonate. Some labels contained information only about the fortifying component (e.g. iron or magnesium) but did not specify its form. In the case of one product, its label (“Composition” part) did not confirm the information about flavor additive indicated in product’s name. Most of packages (88%) contained information about allergens, provided as the last element of product composition.

Another analyzed element was information about the nutritive value. All analyzed products had this information clearly displayed on packages. In packages of all analyzed juices and non-alcoholic drinks it was provided per 100 mL of product, and in 63% of packages it was additionally displayed per product portion. In the case of dairy products, in 92% of packages it was expressed per 100 g and in 20% of packages per 100 mL. In addition, over 50% of packages provided information on the nutritive value per product portion. In the case of all cereal products, their nutritive value was provided per 100g of the product, and in most of them additionally per product portion.

Pursuant to Regulation (EC) 1925/2006, packages of food products fortified with vitamins or minerals should contain information on their nutritive value considering group II of nutrients. In all three analyzed groups not all packages of products fortified with minerals or vitamins had this information provided on their labels.

Fruit juices and drinks were fortified exclusively with such vitamins as: C, B1, B2, B6, B12, A, E, folic acid, pantothenic acid, and niacin, and with minerals: magnesium (Figure 1). Vitamin C addition was visible in the list of fortifying components in all analyzed juices and non-alcoholic drinks. In compliance with requirements provisioned in the Regulation of the Minister of Health of 16 September 2010 on fortifying substances added to food products, the fortifying substance ought to cover at least 15% of recommended daily

allowances. The evaluated products met this criterion in 29 cases. Such information was missing at package of one product only. According to Polish regulations, the maximum quantity of a fortifying agent (apart from folates and vitamin C) should cover 50% of recommended daily allowances (RDA). Only one product failed to meet this requirement.

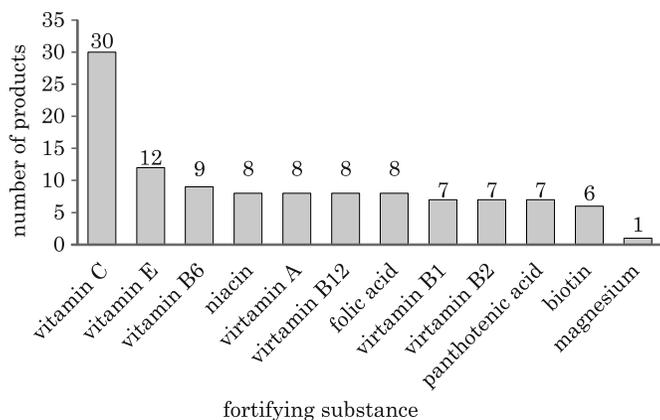


Fig. 1. Fortifying substances applied in the group of juices and non-alcoholic drinks (n=30)

Dairy products (Figure 2) – apart from vitamins and minerals – were fortified with dietary fiber, unsaturated fatty acids, probiotics as well as coenzyme Q 10 and ginseng. All of them contained fortifying agents listed in the Regulation (EC) 1925/2006, e.g. vitamins: D, E, A, B1, B2, and additional minerals: calcium and magnesium. Dairy products were most often fortified with vitamin D (9 products) and calcium (8 products). Frequently also mixed fortification

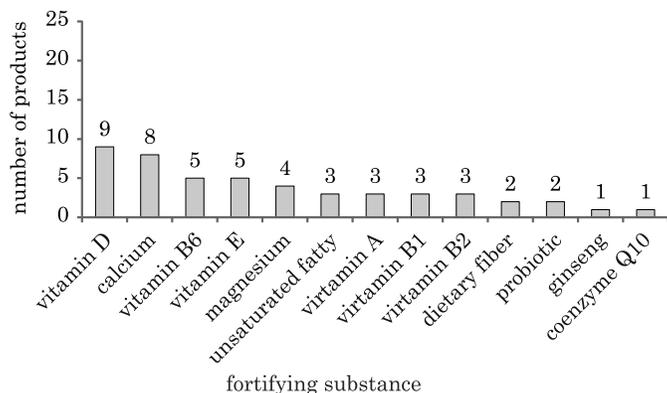


Fig. 2. Fortifying substances applied in the group of dairy products (n=25)

was applied, which included at least two different fortifying components. In accordance with legal regulations, in this group of products all added minerals and vitamins covered at least 15% and did not exceed 50% of RDA.

Likewise fruit juices and beverages, cereal products were fortified mainly with vitamins (B6, B1, B2, B12, C, A, E, D, niacin, biotin, folic acid and pantothenic acid) and minerals (iron, calcium, zinc and magnesium) (Figure 3). A prebiotic was also used in one product. All applied components were listed in the EC Regulation 1925/2006. Most frequently, these products were fortified with niacin, folic acid, vitamins B1 i B2 and iron. The most common form of fortification was a vitamin complex, a single fortifying agent was applied very seldom. Packages of three products had no information on meeting the recommended daily allowances, and in as many as 8 packages the declared doses were higher then the permissible levels. Some vitamins and minerals covered even up to 100% of RDA.

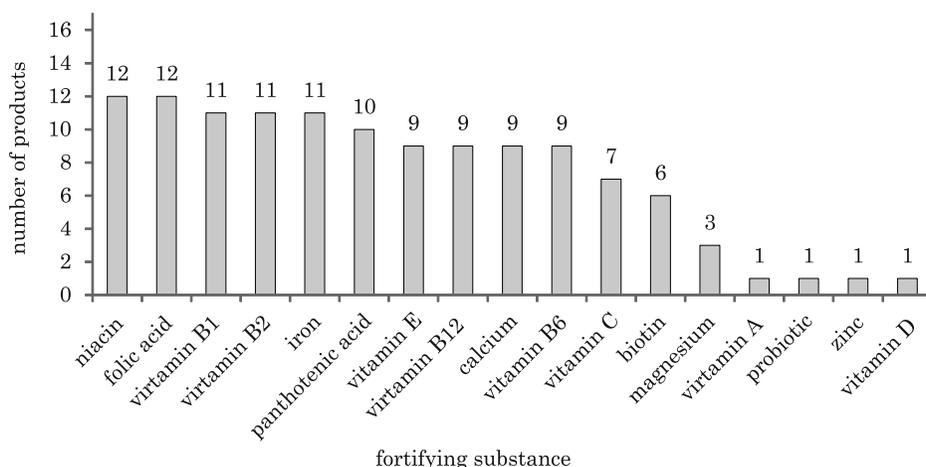


Fig. 3. Fortifying substances applied in the group of cereal products (n=17)

Pursuant to Regulation (EC) 1925/2006, packages of food products fortified with vitamins and minerals should contain information on the fortification only if they meet provisions of Regulation (EC) 1924/2006 which says that packages of food products with the addition of vitamins and minerals may contain nutritional or health claims. In the analyzed group of juices and non-alcoholic drinks, 53% of the packages contained nutritional and health claims supported by information on the nutritive value. The claims, if any, were linked with the applied fortifying components. The most frequently appearing declarations were: „rich in vitamin C”, or „a source of vitamin C”. Nutritional claims occurred also on 64% of packages of dairy products and

referred to their fortification, e.g.: „*a source of calcium*”, „*high content of omega 3 and omega 6*”, and „*a source of vitamin*”. In the group of cereal products, the nutritional claims were mainly related to dietary fiber, e.g. „*high content of dietary fiber*” or „*a source of dietary fiber*”.

Another analyzed informative element of the package was health claim. In the group of juices and non-alcoholic drinks, none of the products contained such claim. In the other two groups, such declarations appeared on packages of few products only (12% of dairy products and 1% of cereal products). The following declaration, *calcium and vitamin D are necessary for the proper growth and development of children*” – approved by the European Food Safety Authority (EFSA), as well as the following promises: „*omega 3 and omega 6 are necessary for the proper growth and development of children*” and „*actively enhances digestive processes*” appeared in the group of dairy products. In turn, the following claim: „*supports digestion, facilitates gut peristalsis*” appeared in the group of cereal products (EU Register of nutrition and health claims... www.ec.europa.eu/nuhclaims).

Apart from nutritional and health claims, producers place various promotional mottos on product packages, often implying non-specific benefits, namely statements that suggest the impact of a given component on health status. The non-specific benefits may be used on the package when they occur together with health claims consistent with binding regulations. In the group of juices and non-alcoholic drinks, slogans used on 4 packages were on the verge of nutritional claims and health claims, e.g., „*extra C*” or „*improves mental and physical capability*”. Promotional slogans, e.g. „*Everyday portion of health*” or „*bottle full of life*” were placed on packages of dairy products where they appeared more frequently (in 60% of packages) than on packages of juices and non-alcoholic beverages. In the group of cereal products, as in the group of juices and non-alcoholic drinks, the promotional slogans occurred rarely. Only packages of 3 products contained declaration with a character of nutritional or health claims, but not being the real claims, e.g., „*Healthy nutrition may be delicious*”. One of the packages contained the following recommendation: „*Good choice – I recommend it, Ewa Wachowicz*”.

Fortification of food in the opinion of consumers

Respondents participating in the survey were asked to indicate components with a fortifying character. Over half of them declared that they were paying attention to contents of nutrients. Further on, they were listing contents of minerals (25% of answers) and vitamins (23% of answers). The respondents were least interested in contents of plant sterols and stanols and contents of

unsaturated fatty acids. Every fourth respondent claimed not to pay any attention to food components. The study proved also that women were paying greater attention to contents of nutrients (62% of this group), dietary fiber (24% of all women) and salt (17% of this group). In turn, men were more often considering contents of vitamins (28% of this group) and minerals (34% of this group).

Respondents were also asked to indicate information which – in their opinion – implied the fortification of a food product. The survey showed that consumers related fortified foods mainly with products having the addition of dietary fiber (67% of answers), vitamins (61%) and with products containing minerals as well as omega 3 and omega 6 fatty acids (54%). Only a small percentage of respondents was declaring to know the concept of bioactive compounds, 21% of respondents were linking this concept with improved digestion, whereas 25% – with the addition of preserving agents. The analysis of results in terms of respondents gender showed that women knew better the idea of food fortification. A higher percentage of women than men related fortified foods with such terms as “with the addition of vitamins”, “with the addition of minerals”, “with the addition of dietary fiber”, “with the addition of omega 3 and 6 fatty acids” as well as “with bioactive components”. In addition, men were more frequently perceiving fortified foods as products with the addition of preserving agents (30% of answers) and as “light” products (8% of answers).

When asked about where they would search for information about food fortification the respondents indicated most of all the “Composition” of a food product (69%). Additional declarations of producers were indicated by 34% whereas nutritive value – by 22% of the respondents. The lowest number of respondents indicated product’s name (13%) as the source of information on product fortification. The target group was also asked if they pay attention to the coverage of daily recommended allowances by fortifying components declared by the producer. The study showed that 64% of the respondents (including 62% of women and 68% of men) paid no attention to this information.

Furthermore, survey results (Figure 4) showed that the respondents were most often identifying fortified foods with such products as fruit juices and nectars, dairy products (82% of answers), and breakfast cereals (77% of answers). In contrast, they had problems with indicating obligatorily-fortified food products. In accordance to Polish regulations, obligatory fortification applies to salt (fortification with iodine) and vegetable oils (with vitamins A and D). In this case, only half of the respondents indicated vegetable oils and only 11% indicated salt, and some of them were listing products that were not subjected to the fortification process, i.e. vegetables (8% of answers) and rice (9% of answers).

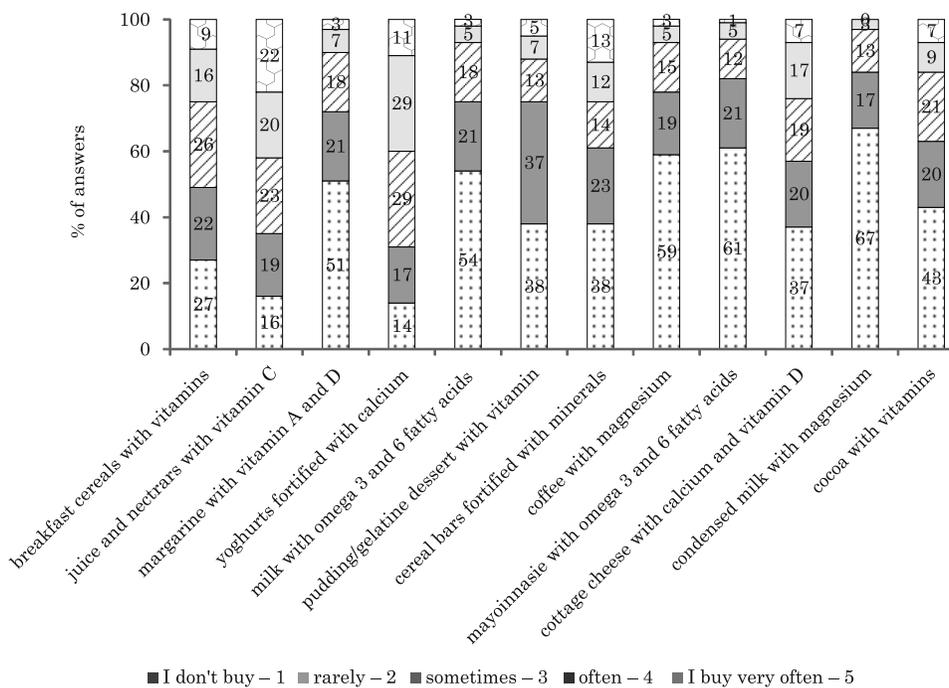


Fig 4. Frequency of purchase of fortified food products by respondents (% of answers)

The analysis of results (Figure 4) demonstrated that the selected target group was purchasing the fortified food products very rarely. In the case of 5 products (margarine with vitamin A and D, milk with omega 3 and 6 fatty acids, coffee with magnesium, mayonnaise with omega 3 and 6 fatty acids, and condensed milk with magnesium) over half of the respondents declared not to buy such products. Also other fortified products, like: puddings and gelatin desserts with vitamins, cereal bars with minerals, or cocoa with vitamins, were rarely selected by the respondents. Most often purchased fortified food products, as declared by the respondents, included: fruit juices and nectars (22% of answers) and dairy products (29% of answers).

The survey demonstrated (Figure 5) also that the main reason of purchasing fortified food products by respondents was the fact that they provide vitamins and minerals (64% of answers). Almost 40% of the respondents declared to buy these products owing to higher declared content of nutrients compared to conventional foods. Other important factors influencing the purchase of this type of food turned out to be: curiosity (27% of answers) and advertisement (22% of answers).

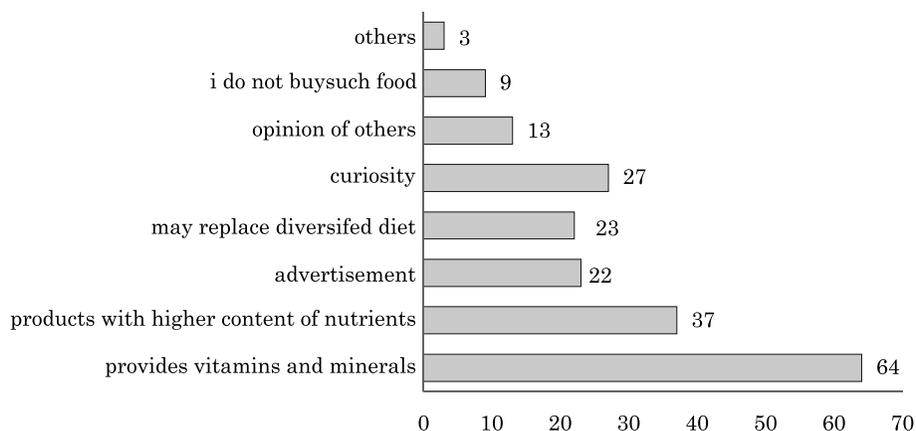


Fig. 5. Reasons influencing the purchase of fortified foods (% of answers)

Women significantly more often than men were declaring to buy fortified foods owing to their content of vitamins and minerals (72% of answers). In turn, men were more frequently claiming that “fortified foods may replace diversified diet” (28% of answers) and that they do not buy such food products at all (18%).

When asked about the reasons behind the production of fortified foods, half the respondents have stated that they are produced in order to make the market assortment more attractive. In this case, over 40% of the respondents indicated also: “to increase the nutritive value of food” and “to reduce deficiencies of nutrients in man’s diet”. Only 28% of the respondents “answered” “to restore the natural nutritive value of food products”.

Conclusions

The conducted survey proved that the analyzed groups of food products were most often fortified with vitamins and minerals. Fruit juices and beverages were mainly fortified with vitamin C, cereal products – with a vitamin complex and iron, and dairy products – with calcium and vitamin D. Other fortifying agents were applied rarely. The evaluated labels in most cases met the requirements provisioned in Polish and EU regulations. All analyzed food products had nutritive value indicated on their labels and were fortified with permitted components.

The names of the evaluated cereal and dairy products were in most cases clear and precise (informative). In contrast, the names of fruit juices and drinks were usually fancy. The nutritional and health claims appearing on

labels of the assessed food products of each group referred most of all to the properties of the added fortifying component.

Most of the surveyed respondents were able to correctly indicate concepts linked with fortified foods. Women more often than men were indicating the correct answers.

In turn, both female and male respondents had no knowledge on the products fortified obligatorily in Poland. Groups of fortified foods most frequently indicated by the respondents included: fruit juices and drinks, dairy products and breakfast cereals. The choice of fortified food products by respondents was mainly driven by their health-promoting properties. Men more often than women were declaring to buy such products owing to curiosity.

Translated by JOANNA MOLGA

Accepted for print 13.07.2015

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