

Enriching Compositions for the Functional Products in Nutrition of School-Children

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Well-balanced nutrition is most important for health life of the young people who represent the future of any country.

Due to the accelerated growth, intensive physical and psychological development of school-children, stresses of maturity, and strains of educational process, nutrition of the young must meet the stringent requirements for such vital ingredients as vitamins, amino acids, mineral salts, bioflavonoids.

According to the data of medical studies [1], the ration of the Belarusian population is characterized by a great deficiency of vitamins A, B, E, C, and D and of minerals (calcium, magnesium, iodine, selenium) lowering the vital forces and increasing the sickness rate due to the inadequate nourishment. Two thirds of the school-children under 14 have chronic diseases.

With the scope of realization of the Republican Program «Child nutrition 2011-2015», the specialists of the Unitechprom of BSU, jointly with the concern Beltechnokhle, the Foodstuffs Research Center of the National Academy of Sciences of Belarus, have performed the research activities associated with the task «Investigation, development, approval and validation of enriching additives for bakery and confectionary flour products».

To develop the enriching additives, a model has been proposed for compensation of the deficient micronutrients in nourishment of school-children on the basis of the following principles:

1. Selection of the products systematically used for food with regard to the national traditions, availability, and preferences of school-children.
2. In Belarus these requirements are fully met by the bakery and confectionary goods.
3. The functional significance of the nutrients and compensation for the real micronutrient deficiency of teenagers.
4. In the process of work the activities were aimed at the design of enriching additives for normal functioning and development of locomotor apparatus, for the immune system strengthening. The enriching ingredients include compounds of calcium and magnesium; vitamins A, E, and D.
5. Provision of an adequate supply of the enriching components with due regard for the physiological consumption rate of school-children.
6. Selection of the components having a maximal biological availability and compatibility.

As a result, two enriching additives have been designed and tested, which include the compounds of Ca and Mg; vitamins A, E, D; and plant ingredients (apple powder, oats, buckwheat, cinnamon, inulin).

Calcium, being the principal structural element of a skeleton, is very important for its formation.

Magnesium is involved in the process of nervous agitation, of the water, carbon, phosphate metabolism.

Vitamin A is one of the most important antioxidants. It is required for protection against infections and for the immunity strengthening. Its deficiency results in retardation of growth, in the teeth deformation.

Vitamin E possesses the antioxidant properties, stabilizes cell membranes. Its deficiency leads to degenerative changes in skeletal muscles, in myocardium.

Vitamin D influences the mineral composition and bone forming. Its deficiency may result in rickets [2-6].

The developed enriching additives have been studied by physical and chemical methods; their antioxidant properties have been examined at the temperature 253 K. To characterize the antioxidant properties in general, a dimensionless quantity has been chosen. This quantity is denoted as the «efficiency» and determined by the ratio between the peroxide number of pure lipid and that with the use of an enriching additive. It has been found that the use of the additives improves stability of lipids to oxidation.

The package of the standard technical documentation for the production of the proposed enriching additives has been elaborated.

In conclusion it should be noted that organization of the research-grounded nourishment of school-children, adapted to their nutritional needs in the process of growth and influencing the development process of the young people, is very important both from the medicinal viewpoint and from the social aspects.