

PUMPKIN CELLULOSE IS A PROSPECTIVE ADDITIVE FOR PROVIDING BREAD WITH HEALTHY PROPERTIES

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During the last decade, in Ukraine, as in the whole world, the level of food security and the factors which form causes concern. In this aspect, one of the main issues is raised – the need to provide the population with qualitative food products. The health of the population, life expectancy and active longevity directly depend on the quality and effectiveness of the impact of food products on the human body. Therefore, food security is one of the most important types of national security [1].

From this point of view, attention should be focused on the use of products with health-improving and preventive properties, which are a way to avoid many diseases, in particular diseases of the gastrointestinal tract, especially among the young working population. That is why healthy nutrition is a priority of the food industry in the world. It may compensate the deficiency of essential nutrients in the body, which occurs under the influence of adverse environmental factors [2].

One of the main branches of food industry is bakery industry. However, bakery products, in particular based on wheat flour, have a rather low nutritional value, in particular due to the low content of dietary fibers [3]. One of the ways to effectively supplement the diet with an insufficient amount of dietary fiber, vitamins, and minerals is to enrich mass consumption products with these nutrients, and bread in particular, as evidenced by domestic and international experience. For this purpose, it is necessary to use non-traditional raw materials in bread recipes, which can change not only the organoleptic properties of bread, but also enrich it with necessary essential nutrients, in particular dietary fibers, increasing its functional properties. According to WHO recommendations, the daily rate of dietary fiber is 25-30 g. It is possible to increase the content of this nutrient by adding raw materials rich in dietary fiber, in particular pumpkin cellulose, to the bread recipe.

This raw material has increased sorption and dietary properties, fibers remove slags, toxins, breakdown products of proteins, fats, radionuclides, as well as excess cholesterol from the body, normalize intestinal microflora, preventing the development of dysbacteriosis. It has also anthelmintic, antiparasitic, antimycotic effects [4].

A comparison of the content of dietary fibers in pumpkin cellulose and wheat flour of the highest grade shows their significantly higher content (Table 1). Pumpkin cellulose has 9.1 times more dietary fiber.

Table 1. Dietary fiber content in pumpkin cellulose and high-grade wheat flour

Content, g/100 g of raw material	High-grade wheat flour	Pumpkin cellulose
Fiber	3.5	32.0

Determination of dietary fiber content in bread was carried out under the condition of replacing part of wheat flour with pumpkin fiber: 5%, 7%, 10% and 15% (Fig. 1). The control sample was the sample without added raw materials.

It was established that content of fiber in bread raised significantly. In the sample with 5% of replacement this indicator increased by 40.7%, with 7% of replacement – by 57.0%, with 10% of replacement – by 82.5% and with 15% of replacement – by 122.3%.

An important indicator is the integral rate - the percentage of providing the human body with nutrients due to the consumption of a certain amount of the product. The percentage of providing dietary fiber was calculated when replacing part of the wheat flour with pumpkin cellulose in the recipe due to the consumption of 100 g of bread and 277 g – the recommended daily rate of bread consumption in Ukraine (Table 2).

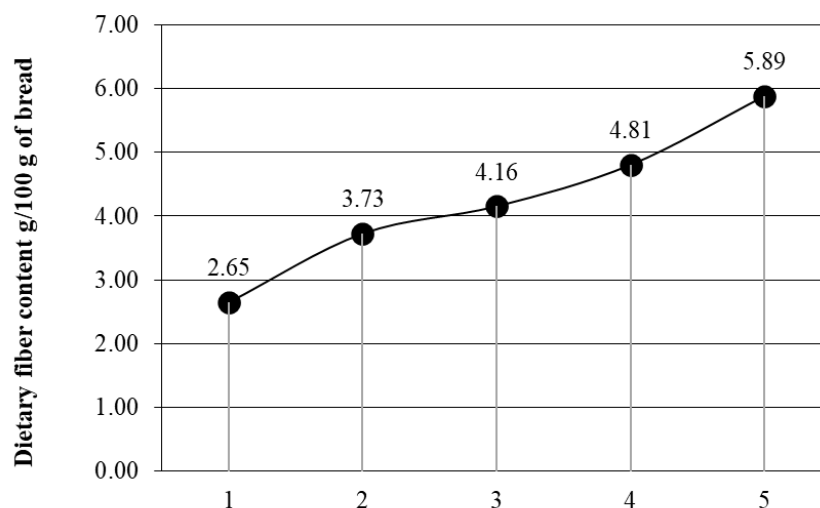


Fig.1. Dietary fiber content g/100 g of bread in case of replacing part of wheat flour with pumpkin cellulose:

1 – control sample; 2 – sample with 5% pumpkin cellulose to replace wheat flour; 3 – sample with 7% pumpkin cellulose to replace wheat flour; 4 – sample with 10% pumpkin cellulose to replace wheat flour; 5 – sample with 15% pumpkin cellulose to replace wheat flour

Table 2. Ensuring the daily need for dietary fiber

Control sample	Pumpkin cellulose to replace wheat flour, %			
	5	7	10	15
Ensuring the daily need for nutrients due to the consumption of 100 g of bread, %				
10.61	14.92	16.65	19.24	23.56
Ensuring the daily need for nutrients due to the consumption of 277 g of bread, %				
29.38	41.34	46.12	53.30	65.26

Therefore, pumpkin cellulose is a promising raw material for inclusion in the recipe of bakery products based on wheat flour due to the high content of dietary fibers and the possibility of providing the body with a significant amount of this nutrient. In addition, such products are able to normalize the course of physiological processes in the body in modern adverse environmental conditions, neuro-emotional and physical overloads.

References:

1. Сімахіна Г. О., Науменко Н. В., Башта А. О. Основи валеології. Оздоровчі аспекти харчування. Київ: «Сталь», 2020. 316 с.
2. Шевченко О. Ю., Сімахіна Г. О., Шевченко А. О. (2020). Оздоровче харчування в контексті продовольчої безпеки в Україні. Наукові праці НУХТ. 26(6), 36-43. <https://doi.org/10.24263/2225-2924-2020-26-6-6>.
3. Sehn G. A. R., Ortolan F., Nabeshima E., Steel C. Whole grain wheat flour: Definitions, production, nutritional, technological and microbiological aspects for application in bakery and pasta products. Flour: Production, Varieties and Nutrition / In María Dolores Torres Pérez, Santiago de Compostela, 2018. 346 p.
4. Drobot V., Shevchenko A. (2021). Influence of pumpkin processing products on structural and mechanical properties of dough and bread quality. Наукові праці НУХТ. 27(3). 172-180. <https://doi.org/10.24263/2225-2924-2021-27-3-20>.