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HERODIETIC POTENTIAL OF FISH AND VEGETABLE PRODUCTS

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Abstract. *The research is based on the idea of creating a puree semi-finished product made with Jerusalem artichoke, ginger and celery, which can act both as a filler and a functional ingredient (geroprotector) in the cutlet mass at the same time. The rational ratio of components in the vegetable semi-finished product was determined and the technology of fish cutlet products using the semi-finished product was developed as a functional filler; a comprehensive assessment of the gerodietic potential of the developed products was carried out by calculating the satisfaction degree of the daily physiological need for geroprotective components.*

Key words: *herodietic potential, puree semi-finished product, fish cutlet mass products.*

Introduction.

Aging is an irreversible process that occures by changes affecting all levels of the entire organism. Dissimilation prevails over assimilation in body tissues and organs, immunological shifts occur, the regulation of the neurohumoral system changes and the self-regulation system is disrupted. All of this is manifested in a decreasing intensity of metabolic processes, an increase in the risk of developing atherosclerosis and chronic diseases, a decrease in strength and physical capabilities. Gerodietic products can be used by both the elderly and younger people in order to prevent (or slow down) the aging processes of the human body and prevent age-related diseases [1]. The gerodietic group includes products with geroprotectors (which slow down the aging process), with pro- and prebiotics, as well as enriched with micro- and macronutrients (vitaminized, enriched with calcium and iron, dietary fibers, etc.) [2].

The products rangefor for gerodiet food in Ukraine is quite limited. Most of these are fermanted dairy products, meat and vegetables canned ones, which have antioxidant and immune-correcting properties, enriched with additional sources of calcium, vitamins, amino acids, and enzymes; low-lactose milk drinks [3]. Also known are gerodiet products based on fish components, as well as fortified gluten-

free and with a low salt content [2, 4].

Valuable plant raw materials, in our opinion, are Jerusalem artichoke, ginger, and celery, which have a very high cumulative index of minor biologically active substances (inulin, bioflavonoids, indole compounds, derivatives of coumarin, ascorbic acid, tocopherols). Thanks to the set of biologically active substances, they all possess powerful geroprotective properties: anti-atherosclerotic (ginger, celery), prebiotic (Jerusalem artichoke), antioxidant (ginger, Jerusalem artichoke), anticancer (ginger, Jerusalem artichoke), cardioprotective (ginger, celery, Jerusalem artichoke), activators of the digestive process (ginger, celery) [5].

The specifics of storage and mechanical processing of all the listed plants have some difficulties, so their use in restaurant enterprises is very limited. In this connection, there is a need for industrial processing of Jerusalem artichoke, ginger and celery and the production of semi-finished products, the technologies of which allow to preserve biologically active substances as much as possible. In addition, ginger and celery are able to interrupt the unpleasant smell of fish and at the same time harmonize well with it. The basis of the research is the idea of creating a pureed semi-finished product from Jerusalem artichoke, ginger, and celery, which can simultaneously act in the meatball mass as a filler and a functional ingredient (geroprotector).

Main text.

The development of the recipe composition for minced fish products with the semi-finished product «Geroprotect» was carried out in four stages: selection of types of main raw materials, their ratios; technological modeling, discussion of the results; adjustment of the initial recipe and proposed technology; testing the new recipe and technology in laboratory conditions and in production. To implement this approach, research needed to determine the impact of the plant additive on the functional-technological, rheological, and consumer properties of the mincemeat and their correlation with organoleptic indicators. Based on the experimental data on the physico-chemical, technological, and organoleptic properties of model mincemeat, it was possible to identify certain parameters of the semi-finished product production

technology.

Technological schemes for the production of culinary minced fish products (cutlets, steamed fish patties, fish sticks, fish balls) were developed. The developed products received positive feedback and were implemented in the production of a restaurant facility.

The main indicators of the chemical composition of two developed minced products types (fish patties and cutlets) were calculated, with traditional products using bread as a filler chosen as a control.

Table 1 – Chemical composition of the fish cutlet mass products

Name indicator	Fish patties		Cutlets	
	control	experiment	control	experiment
Dry matter, %	23,2	25,4	21,3	20,7
Protein, %	13,0	12,8	15,0	14,2
Fat, %	11,0	7,8	5,6	3,7
Carbohydrates, %				
- simple	1,6	traces	1,3	traces
- complex	13,6	11,0	14,2	12,5
Starch, %	12,0	traces	12,9	traces
Ash, %	1,42	1,69	1,54	1,87
Energy value, kcal/100 g	211,4	165,4	172,4	140,1

Author's development

Analyzing the data in table 1, it can be noted that replacing the bread component with the semi-finished product «Geroprotect» allows for the production of lower-calorie products against the backdrop of a significant change in the qualitative carbohydrate composition. The considerable variation in fat content between the control and experimental samples is explained by the different fat absorption capacities of the bread component and the «Geroprotect» semi-finished product.

For a comprehensive assessment of the gerodietetic potential of the developed

products, analytical studies were conducted on the degree of meeting the daily physiological needs (DPN) of the elderly in protective and geroprotective components (table 2). For this purpose, we proposed dividing food resources into six main groups: the sixth group includes products with a DPN satisfaction level of 101% and above, the fifth group – 81-100%, the fourth – 51-80%, the third – 31-50%, the second – 11-30%, and the first – 1-10%. The calculated data is presented in table 6.

Table 2 – Gerodietetic potential of the developed products

Name indicator	Amino acids		Vitamins						Microelements			
	M+C*	Trp**	B_1	B_2	B_3	B_6	B_9	B_{12}	Se	J	Mn	Cu
Fish cutlets												
Geroprotect	5	5	1	1	2	2	1	1	4	4	3	3
Control	3	3	1	1	1	2	-	-	2	2	1	2
Steamed fish patties												
Geroprotect	4	3	1	2	1	3	2	2	3	3	2	2
Control	3	2	1	2	1	2	1	1	2	2	1	1

* methionine + cysteine ** tryptophan

Author's development

Thus, the gerodietetic potential of products with the «Geroprotect» semi-finished product is higher in terms of the content of such geroprotectors as methionine, cysteine, tryptophan, vitamins B_9 and B_{12}, selenium, iodine, manganese, and copper.

Summary and conclusions.

The chemical composition of minced products has been calculated. It has been determined that replacing the bread component with the semi-finished product «Geroprotect» allows obtaining products with reduced calorie content against a radical change in the qualitative carbohydrate composition. A comprehensive assessment of the developed product geroprotective potential of the was carried out by calculating the satisfaction degree of the daily physiological needs for

geroprotective components. It has been determined that the geroprotective potential of products with the semi-finished product «Geroprotect» is higher than the geroprotectors content such as methionine, cysteine, tryptophan, vitamins B_9 and B_{12}, selenium, iodine, manganese, and copper.

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