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**SCIENTIFIC
JUSTIFICATION
OF CUSTARD
SEMI-FINISHED PRODUCT
TECHNOLOGY
OF HERODIETIC
PURPOSE**

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The topicality. According to Ukrainian hygienists, there are significant shortcomings in the actual nutrition of people over 60 years of age. According to gerontologists, the use of heroic products is extremely important for medical nutrition and prevention of premature aging, so the development of technology for confectionery products for special purposes becomes especially relevant. **Purpose and methods.** The purpose of the research is to substantiate the use of the composition of dietary supplements (flaxseed oil with selenium, walnut oil with selenopyran, pumpkin seed fiber, and zoster) in the technology of confectionery from herodietic custard. Determination of the dough properties was performed on a Brabender farinograph according to DSTU 4111.2-2002. The dependence of stress on the shear rate of custard with zoster in a mixture with walnut oil with selenopyran was determined using a Brookfield viscometer. The adhesion stress of the dough masses from the influence of different concentrations of the model system of zoster in a mixture with walnut oil with selenopyran was performed on a rupture machine MT-140 / RV2. **Results.** The data of the study of the effect of zoster with walnut oil with selenopyran and fiber from pumpkin seeds on the custard properties. On the basis of these data development of innovative technology of flour confectionery products from custard dough of herodietic purpose has been carried out. **Conclusions and discussions.** The use of the zoster composition with walnut oil with selenopyran and fiber from pumpkin seeds in the technology of flour confectionery allows obtaining products that meet the formula of herodietic nutrition. The developed products from the custard of the herodietic purpose can be used in people diet is more senior than 60 years both for disease prevention, and for the general improvement of an organism.

Keywords: herodietic products, custard, flaxseed oil with selenium, walnut oil with selenopyran, pumpkin seed fiber, zoster.

The topicality of the problem

Formulation of the problem. The problem of the Ukraine future, the Ukrainian nation should be considered first of all from the standpoint of determining the main priorities. The future of the state should be assessed not only by the level of economic development of the country, but above all by the health state of each citizen and the nation as a whole. The issue of preserving the health of Ukrainians arose not by chance. Over the

last decade, the health of the Ukraine population has deteriorated so much that this problem, without exaggeration, has grown into a threat to national security. The general situation with the nutrition of the older population in Ukraine is assessed by experts as a crisis (Svidlo & Evlash, 2018; Cherevko et al., 2017).

Therefore, the technology development for confectionery products for special purposes becomes especially relevant due to the need to use them in the diet of people over 60 years for their disease prevention and for the overall health of the body (Lazareva et al., 2016; D'Aquila et al.,).

The state of study of the problem. Domestic and foreign scientists have made a significant contribution to the development of theoretical and practical principles for the additives use in the production of products for hereditary purposes. A. K. Dyakonova, V. V. Nesterenko (2014) and V. A. Gnitsevich, M. V. Ivashchenko (2014) dealt with the problem of using herbal supplements in the technology of products for hereditary purposes. Domestic and foreign experts have proven the need to enrich food with biologically active substances of natural origin, which can increase the organism's resistance properties.

In recent years, scientists M. I. Peresichny and K. V. Svidlo (Svidlo & Peresichnyi, 2011), L. M. Mostova, O. V. Zhulinska, (Lazareva et al., 2016) have made a significant scientific and practical contribution to the technology of confectionery products development for heroic purposes; L. M. Mostova, K. V. Svidlo (2016), A.A. Ushchapovsky, N. P. Ivchuk (2017). By the common efforts of the Institute of Gerontology of the Academy of Medical Sciences in Ukraine, the Institute of Eco hygiene and Toxicology by L. I. Medved, the Institute of Southern Vegetable and Melon UAAS created new functional heroic products – halva, pumpkin oil, marmalade, candied fruit, cookies and others (Korzun & Svidlo, 2016, p. 235).

Unresolved issues. However, the question of the prospects for the use in confectionery of complex plant additives containing sources of vegetable oil, dietary fiber, iodine and selenium, remains completely unexplored, which confirms the feasibility of further research.

Purpose and research methods

The purpose of the article is to substantiate the composition of dietary supplements use (flaxseed oil with selenium, walnut oil with selenopyran, fiber from pumpkin seeds, zoster) in the technology of confectionery from custard herodietic purpose.

The methodological basis of the research is the analysis of the shortcomings of confectionery products in view of the requirements of herodienetics in the nutritional and biological value of products and finding ways to solve this problem in the technology confectionery products development for herodietic purposes.

Research methods: determination of the dough properties was performed on a Brabender farinograph according to DSTU 4111.2-2002. The dependence of stress on the shear rate of custard with zoster in a mixture with walnut oil with selenopyran was determined using a Brookfield viscometer. The adhesion stress of the dough masses from the different concentrations influence of the model system of zoster in a mixture with walnut oil with selenopyran was performed on a rupture machine MT-140 / RV2.

Object of research is of production of custard semi-finished product technology for confectionery products of herodietic purpose.

Subject of research is linseed oil with selenium, walnut oil with selenopyran (ISO 3961 DSTU 4568.2), fiber from pumpkin seeds (TU U 15.8-36968138-003: 2016), zoster (TU U 15.8-21663408-001: 2016); eclairs, custard tubes, profiteroles, model samples of custard dough with the addition of a dry mixture of zoster with selenopyran in a ratio of 2: 1 in the amount of 0.5-3.0% by weight of flour, pumpkin seed fiber in the amount of 5-7.0% by weight flour, walnut oil in the amount of 8-10.0% by weight of flour; model samples of confectionery with the addition of the above additives.

The information base is based on research covered in scientific articles and abstracts of reports of leading scientists of Ukraine and abroad.

Research results

The specifics of the requirements of herodietics need a radical change in the perception of the development of food compositions and technology for the production of confectionery products for herodietic purposes. Confectionery technology was chosen for modeling, which is problematic due to herodietics, namely: the amount of mono- and disaccharides in the diets of the elderly is limited to 40-60 g / day, and the recommended amount of flour for use in diets for herodietics is determined to be 20 g / day. That is confectionery products with limited use of sugar and flour or without them is necessary. When creating confectionery hero dietary appointment as guided daily physiological needs of the elderly in vitamins (retinol, tocopherol, pyridoxine, cyanocobalamin, ascorbic and folic acid), minerals (calcium, phosphorus, magnesium, iron, selenium, iodine) and food fibers. As it is known, the physiological daily requirement of the elderly in accordance with the requirements of FAO / WHO and in Ukraine differs in the following macro- and micronutrients, respectively: in iron is 0.55... 0.6 mg / kg and 15... 17 mg; iodine is 0.11 and 0.15 mg; selenium is 26... 34 and 50... 70 mcg. The physiological daily requirement in accordance with the requirements of FAO / WHO and in Ukraine for the following vitamins in the elderly is: retinol is 500... 600 and 1000 mcg, tocopherol is 12 and 15 mg, pyridoxine is 1.3 and 1.8... 2.0 mg, cyanocobalamin is 230... 250 and 300 mcg, ascorbic acid is 45 and 70... 80 mg and folic acid is 400 and 200 mg. The chemical composition of traditional flour confectionery from custard dough shows an imbalance towards carbohydrates of both starch and mono- and disaccharides. The energy value of this product is twice the permissible limit of 200 kcal recommended for the elderly. Thus, it is necessary to design nutrient-adequate flour confectionery to meet the needs of older people. Modeling of the food composition of flour confectionery (Fig. 1) allowed creating a custard semi-finished product for hero dietary purposes, containing fiber from pumpkin seeds, walnut oil with selenopyran and zoster.

When studying the technological properties and biologically active substances of zoster algae in a mixture with selenopyran in a ratio of 2: 1, the task was set to determine the number and form of their use in the technology of flour confectionery, in particular in the brewed semi-finished product. To determine the effect of zoster in a mixture with selenopyran on the physical properties of the dough prepared model systems: without additives (control), with the addition of 0.5-4.0% dry mixture of zoster algae with selenopyran in a ratio of 2: 1 by weight of flour (with an interval of 0, 5%) with an average particle size of 0.9 mm and similar compositions with hydrated zoster. According to the obtained data, the characteristics of pharynograms were performed (Table 1).

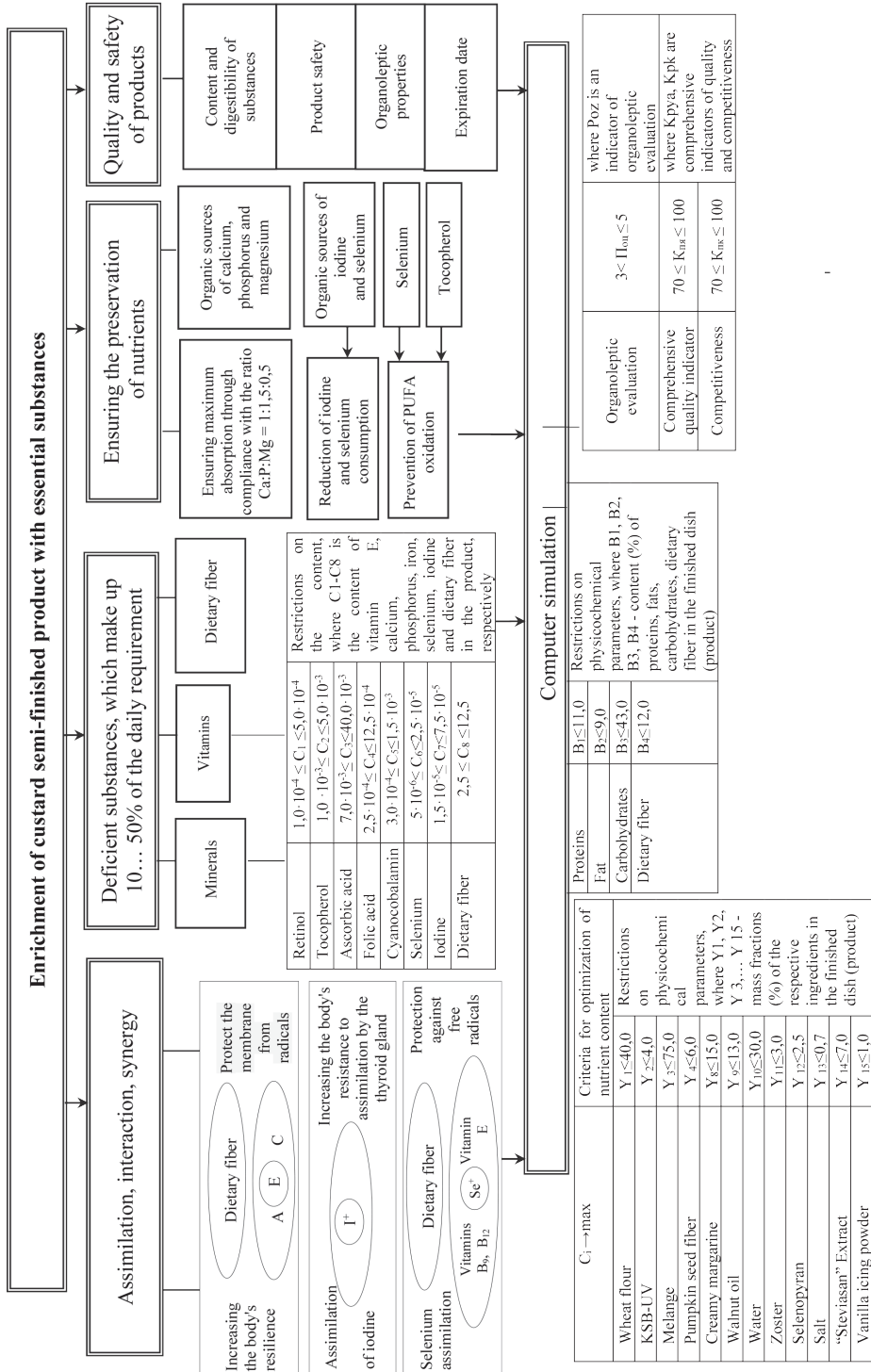


Fig. 1. Modeling of a gero-dietetic custard semi-finished product
 Source: authors' own development

Table. 1. Indices of pharyno grams of the test depending on the dosage of zoster in a mixture with selenopyran in a ratio of 2: 1

Model zoster mixed with selenopyran in a ratio of 2: 1	Indicator				
	Water absorption capacity of the dough,%	Time of formation, p	Stability, p	Rarefaction, units f.	Valorimetric estimation, %
Control	55,5	120	39	78	44
Dry mixture:					
0,5 %	55,5	120	39	70	43
1,0 %	55,7	120	27	70	43
1,5 %	56,2	108	21	70	44
2,0 %	56,9	90	15	60	45
2,5 %	57,0	90	9	60	46
3,0 %	57,3	90	5	60	46
Hydrated mixture:		0	0		
0,5 %	54,6	90	18	80	42
1,0 %	53,7	90	18	80	42
1,5 %	51,2	90	12	70	42
2,0 %	50,9	96	12	70	43
2,5 %	49,5	108	6	70	44
3,0 %	48,9	120	6	70	44

Source: own development

According to the norms of physiological needs in nutrients for the elderly (elderly, old and long-lived) and the data obtained on the presence of large amounts of iodine in zoster, its recommended daily dose in terms of iodine was 2.0-4.0 g of algae. Developing the latest technologies of confectionery, we assumed that the average daily requirement of iodine is 150-200 mcg per day and in the process of storage of seaweed raw materials and heat treatment flour confectionery loses up to 80% of this microelement. Therefore, in experimental studies, zoster was used in the amount of 0.5-4.0% by weight of flour. The average daily requirement of selenium is 50-70 mcg per day, so the ratio of zoster and selenopyran in the dry mixture was set at 2: 1. As the dosage of the dry mixture of dietary supplements increases, the water absorption capacity of the dough increases by 0.25–1.8%, the duration of its formation decreases by 12–30 s, the stability decreases to 6 s, and the liquefaction decreases by 10.3–23% compared to the control.

The viscoplastic properties of custard dough with the addition of 0.5, 1.0 and 1.5% dry mixture of zoster with selenopyran in a ratio of 2: 1 at the stage of mixing with melange and dough made by traditional technology (control) (Fig. 2).

Zoster was added with a particle diameter of 0.92 mm. Cylinder S-3 and mode B-2 were used in the experiments.

It has been established that with increasing concentration of zoster it is necessary to apply more stress to destroy the structure of experimental samples of custard.

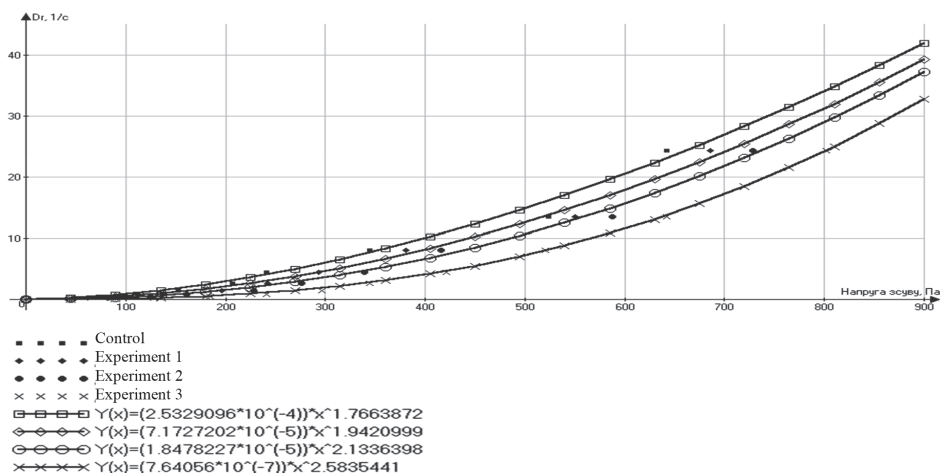


Fig. 2. Dependence of stress on the shear rate of custard with zoster in a mixture with selenopyran in the ratio 2: 1: K – control; experiment 1 – 0.5%; experiment 2 – 1.0%; experiment 3 – 1.5%
 Source: the author’s own research

When using 0.5-1.0% dry mixture of zoster with selenopyran in a ratio of 2: 1 by weight of flour, the curves of the flow of custard are at the level of control. In the systems studied, the effective viscosity depends on the stress and shear rate, which indicates that they belong to non-Newtonian pseudo plastic fluids.

It has been experimentally established that in the custard dough with a dry mixture of zoster with selenopyran in a ratio of 2: 1, the effective viscosity decreases with increasing shear stress more slowly than in the dough without additives. The result of the changes that occur is a decrease in the strength and elasticity of the dough due to the destruction of its structure. The viscosity of the dough with zoster significantly exceeds the viscosity of the control sample, which is especially noticeable at low values of shear stress.

The intensity of contact between food dispersion systems and the surface depends on a number of factors. In many cases, the lack of reliable information negatively affects the quality of products, does not allow determining the optimal parameters of technological processes of food production. In this regard, the adhesive stress of the custard depending on the proportion of application of the mixture “zoster in a mixture with selenopyran in a ratio of 2: 1 – walnut oil” (Fig. 3).

The data obtained indicate an improvement in the quality of the dough due to the use of a mixture of “zoster in a mixture with selenopyran in a ratio of 2: 1 – walnut oil”.

On the basis of technological researches of the received model samples (fig. 4), working off and testing of compounding and technology in laboratory conditions and at exhibitions-tastings the technology and recipes of custard baked semi-finished product of herodietic purpose for production of eclairs, custard tubes and profiteroles are offered.

Conclusions and results discussion

Thus, the presented research proves the feasibility of using a composition of dietary supplements (linseed oil with selenium, walnut oil with selenopyran, pumpkin seed fiber,

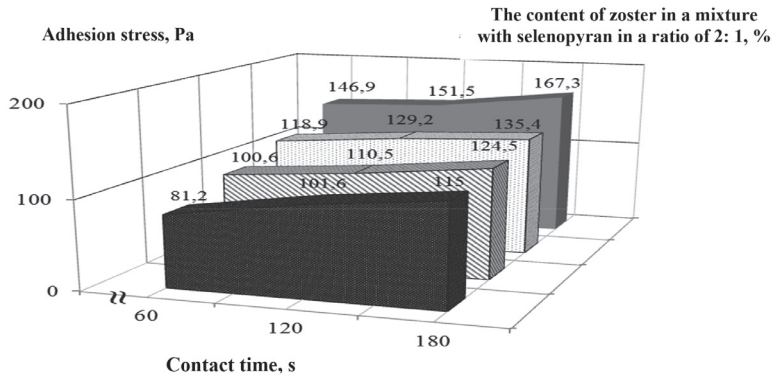


Fig. 3. Adhesion stress of dough masses from the duration of contact and the content of zosterin in a mixture with selenopyran in the ratio 2:1, %: ■- 0,5; ▨- 1,0; ▩- 1,5; ■- 2,0
 Source: the author's own research

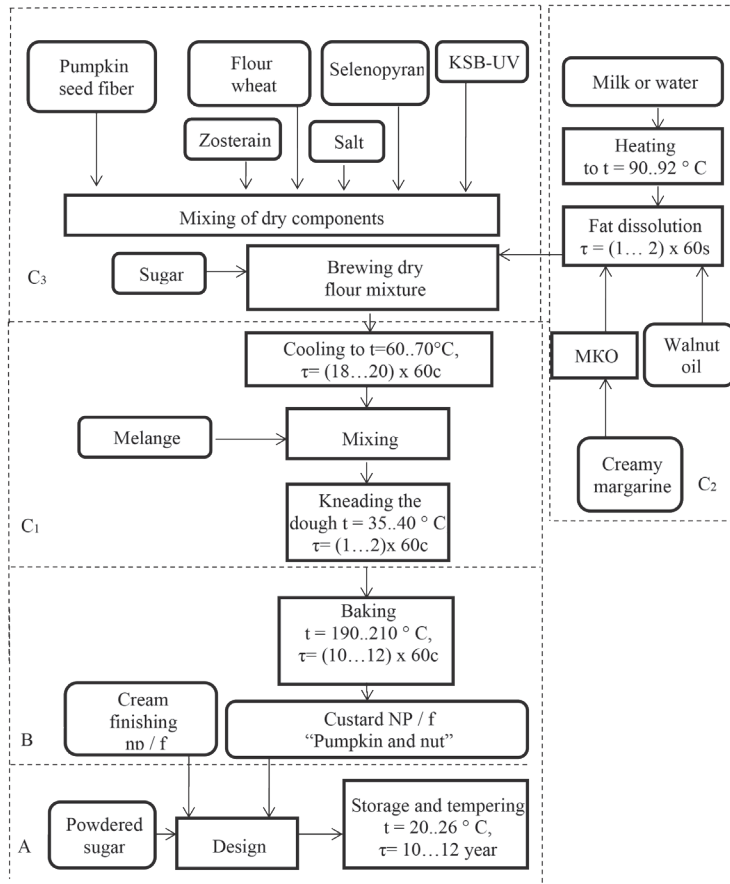


Fig. 4. Technological scheme of production of custard semi-finished product for herodietic purposes "Pumpkin-nut"
 Source: the author's own research

and zoster) in the technology of confectionery from custard for herodietic purposes. The introduction into the recipe of fiber pumpkin seeds in the amount of 5–7.0%, zoster and selenopyran in a ratio of 2: 1 in the amount of 0.5–3.0% and walnut oil in the amount of 8–10.0% by weight of flour causes the creation low-calorie mineral products enriched with mineral and vitamin ingredients products of the corresponding direction.

The scientific novelty of the obtained results is that for the first time the food composition of the custard semi-finished product was modeled in accordance with the requirements of herodienetics in terms of dietary fiber, ω -3 and ω -6, microelements (iodine and selenium). The regularity of the processes of influence of the composition of dietary supplements (flaxseed oil with selenium, walnut oil with selenopyran, fiber from pumpkin seeds, zoster) on the quality of custard is determined.

For the first time the regularity of the influence processes of the composition of dietary additives (flaxseed oil with selenium, walnut oil with selenopyran, fiber from pumpkin seeds, zoster) on the structure of custard formation, namely the interaction of additives as a complex affecting the structural and custard mechanical properties. The practical significance of the obtained results is manifested in the technology development for the production of eclairs, custard tubes and profiteroles for herodietic purposes. Prospects for further research are to conduct research on modeling and development of technology for confectionery products for hero dietary purposes using compositions of dietary supplements of plant origin to create products enriched with natural biologically active substances.

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НАУКОВЕ ОБГРУНТУВАННЯ ТЕХНОЛОГІЇ ЗАВАРНОГО НАПІВФА- БРИКАТУ ГЕРОДІЄТИЧНОГО ПРИЗНАЧЕННЯ

Актуальність. У фактичному харчуванні людей старше 60 років, за оцінками українських гігієністів, є суттєві недоліки. Як відмічають геронтологи, використання геропродуктів надзвичайно важливо в плані лікувального харчування та для профілактики передчасного старіння, тому набуває особливої актуальності розроблення технологій кондитерських виробів геродієтичного призначення. **Мета і методи. Метою дослідження є обґрунтування використання композиції** дієтичних добавок (олія льняна з селеном, олія волоського горіха з селенопіраном, клітковина з насіння гарбуза, зостера) в технології кондитерських виробів з заварного тіста геродієтичного призначення. Визначення властивостей тіста проводили на фаринографі Брабендера за ДСТУ 4111.2-2002. Залежність напруги від швидкості зсуву заварного тіста із зостерою у суміші з олією волоського горіха з селенопіраном визначали за допомогою віскозиметру Брукфільда. Адгезійне напруження тістових мас від впливу різної концентрації модельної системи зостери у суміші з олією волоського горіха з селенопіраном проводили на розривній машині МТ-140/ RV2. **Результати.** Наведені данні дослідження впливу зостери з олією волоського горіха з селенопіраном та клітковини з насіння гарбуза на властивості заварного тіста. На підставі цих даних **проведена** розробка інноваційної технології борошняних кондитерських виробів з заварного тіста геродієтичного призначення. **Висновки та обговорення.** Використання композиції зостери з олією волоського горіха з селенопіраном та клітковини з насіння гарбуза в технології борошняних кондитерських виробів дозволяє отримати продукцію, що відповідає формулі геродієтичного харчування. Розроблені вироби з заварного тіста геродієтичного призначення можливо використовувати в раціоні людей старше 60 років, як для профілактики захворювань, так і для загального оздоровлення організму.

Ключові слова: геродієтична продукція, заварне тісто, олія льняна з селеном, олія волоського горіха з селенопіраном, клітковина з насіння гарбуза, зостера.

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НАУЧНОЕ ОБОСНОВАНИЕ ТЕХНОЛОГИИ ЗАВАРНОГО ПОЛУФАБРИКАТА ГЕРОДИЕТИЧЕСКОГО НАЗНАЧЕНИЯ

Актуальность. В фактическом питании пожилых и старых людей, по оценкам украинских гигиенистов, есть существенные недостатки. Как отмечают геронтологи, использование геропродуктов чрезвычайно важно для лечебного питания и профилактики преждевременного старения, поэтому разработка технологии кондитерских изделий геродиетического назначения приобретает особую актуальность. **Цель и методы.** Целью исследования является обоснование использования композиции диетических добавок (масло льняное с селеном, масло грецкого ореха с селенопираном, клетчатка из семян тыквы, зостера) в технологии кондитерских изделий из заварного теста геродиетического назначения. Определение структурно-механических свойств теста проводили на фаринографе Брабендера по ДСТУ 4111.2-2002. Зависимость напряжения от скорости сдвига заварного теста с зостерой в смеси с маслом грецкого ореха с селенопираном определяли с помощью вискозиметра Брукфильда. Адгезионное напряжение тестовых масс от влияния различной концентрации модельной системы зостеры в смеси с маслом грецкого ореха с селенопираном проводили на разрывной машине МТ-140 / RV2. **Результаты.** Приведены данные исследования влияния зостеры с маслом грецкого ореха с селенопираном и клетчатки из семян тыквы на свойства заварного теста. На основании этих данных проведена разработка инновационной технологии кондитерских изделий из заварного теста геродиетического назначения. **Выводы и обсуждение.** Использование композиции зостеры с маслом грецкого ореха с селенопираном и клетчатки из семян тыквы в технологии кондитерских изделий позволяет получить продукцию, соответствующую формуле геродиетического питания. Разработанные изделия геродиетического назначения можно использовать в рационе людей старше 60 лет как для профилактики заболеваний, так и для общего оздоровления организма.

Ключевые слова: геродиетическая продукция, заварное тесто, масло льняное с селеном, масло грецкого ореха с селенопираном, клетчатка из семян тыквы, зостера.