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INNOVATIVE CULINARY PRODUCTION TECHNOLOGIES USING QUINOA AND INULIN

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Topicality. The research consists in solving the problem of developing innovative technologies of culinary products from cereals containing dietary supplements of vegetable origin (inulin), and substantiation of the main components of technological process of production and formation of ready meals of high quality. **Purpose of the research** is the scientific substantiation and innovative technology development of dishes using whole grain rice, quinoa and inulin for health purpose. **Research methods.** Standard conventional, organoleptic, physicochemical, statistical, sociological, qualimetry and mathematical processing of experimental data using computer technologies have been used. **Results.** The research is aimed at scientific substantiation of technological parameters of obtaining culinary products using quinoa and inulin. As a result of scientific researches, regularities of technological processes under complex use of quinoa and inulin have been substantiated and experimentally established in wholegrain rice based culinary products; developed innovative technologies of culinary products using quinoa and inulin; their quality and consumer properties are determined. The social effect of the development implementation is to preserve and protect the health of the population, to improve the quality and improve the consumer properties of cereals, to fully utilize the nutritional potential of natural vegetable raw materials, and to expand the range of culinary products in restaurants. **Conclusions and discussion.** The results of the research are the innovative food technology development based on whole grain rice with quinoa and inulin. Experimental studies have found that culinary products have been characterized by high organoleptic characteristics and high nutritional value of wellness destination and can be recommended for patients with for diabetes.

Keywords: innovative technologies, culinary products, inulin, quinoa, rice pudding.

The problem topicality

Problem statement. Fitness Nutrition is one of the most important factors influencing human health. Of particular importance for the maintenance of health and longevity is the full and regular supply of the body with all the necessary nutrients: essential amino acids, vitamins, mineral components. And the most expedient and physiological way of entering these components to the body is food.

In recent years, there has been a trend in Ukraine to increase consumption of fats and easily digestible carbohydrates. Protein deficiency averages 20 %, most vitamins and microelements – 15 – 55 %, dietary fiber – 30 % (Mazaraki et al., 2012). Imbalances in the structure of human nutrition have led to a significant increase in diseases that underlie disorders of carbohydrate and lipid metabolism: the number of patients with diabetes increases, every second person has a problem with the cardiovascular system, and 55 % of people have excess body weight and obesity over 30 years old.

Diabetes has become a global problem of the 21st century, affecting countries around the world. Today, over 425 million people live with diabetes, and by 2030, according to the International Diabetes Federation (IDF), their number may increase to 438 million. According to the official data of the Center for Medical Statistics of the Ministry of Health of Ukraine, 2017 is registered in Ukraine 1,270,929 diabetic patients, including 103,927 people who were diagnosed with the disease for the first time, and at the end of the year there were 1 183 047 people under medical supervision (Dontsova, 2018).

Studies show that people who are prone to diabetes can prevent the development of the disease by changing their lifestyle through weight control, regular exercise and especially proper nutrition.

Inulin is promising for use in functional foods for people who are prone to developing diabetes.

Inulin is a plant-based food product obtained by “cold” technology, which allows preserving its structure as much as possible and biological activity. It is a naturally occurring natural plant polysaccharide that is a part of more than 36,000 plants and is a fructose polymer. Inulin refers to prebiotic substances, i.e., substances that are practically not adsorbed in the human intestine, but have a unique selective effect that leads to the activation of metabolism and growth of beneficial intestinal microflora (Mazaraki et al., 2012).

The high molecular weight form of inulin has a positive effect on the functions of the gastrointestinal tract, regulation of metabolism, strengthening of the immune system, lowering of cholesterol and blood sugar, purification and strengthening of blood vessels, etc. This polysaccharide is extremely important for people with diabetes who, by consuming inulin, reduce the risk of hypo- and hyperglycemia because it not only reduces but also stabilizes blood sugar (Hrushetskyi, 2003).

Diabetes patients, people with gluten intolerance, heart disease and hypertension, with excess weight in the diet should include quinoa containing fiber (7 g per 100 g of quinoa), so that this product helps to eliminate harmful substances, cholesterol blood sugar levels, prevents the cardiovascular disease development.

Involving inulin and quinoa as a source of high-grade protein improves overall human health by normalizing carbohydrate and lipid metabolism, reducing the negative effects of chronic stress and adverse environmental conditions that deplete the insulin and weaken the immune system (Hrushetskyi, 2018).

In Ukraine, food technology based on vegetable raw materials such as cereals, which are widely used and popular among the population, but contain a small amount of proteins – up to 14 %, vitamins B1, B2, PP, minerals, dietary fiber but with high content have been recognized starch – up to 72 %.

However, people who are prone to developing diabetes should, first of all, reduce their intake of easily digestible carbohydrates, as they give a significant load to the pan-

creas, with the energy the body receives minimum, and the feeling of satiety from such food lasts for quite a while. Therefore, in the structure of carbohydrates it is important to reduce the amount of mono- and disaccharides with a corresponding increase in the number of polysaccharides.

Status of problem study. Significant contributions to basic research on the development of innovative technologies for culinary products for health purposes with the use of vegetable raw materials and dietary supplements have been made by such scientists as R. Hrushetskyi, I. Hrynenko, H. van Klink (2019), G. Deynichenko, M. Peresichnyi, S. Peresichna (2019), K. Svidlo, A. Sobko, I. Turikova, O. Cherevko (2017), L. Khomichak and others. The nutrition of the modern man must be functional. This means that foods that are intended for daily nutrition must not only be fun not only to provide the body with nutrients, but also to perform preventive functions: to reduce the risk of various diseases, to protect from adverse environmental conditions, to reduce the impact of the wrong lifestyle.

Unresolved issues. In this regard, scientists pay great attention to the innovative technology development for the culinary products of increased nutritional value of functional purpose, which has the ability to reduce the risk of diabetes.

Purpose and research methods

The purpose of the research is to develop and validate innovative technologies for culinary products using cereals using quinoa as a source of complete protein containing essential amino acids and inulin, which is 95 % composed of fructose and is a source of dietary fiber for people who are prone to diabetes; conducting a comprehensive assessment of the quality of the culinary products developed.

Research Methods are physico-chemical, organoleptic, qualimetric, mathematical processing of experimental data using computer technologies.

On the basis of the analysis of scientific sources the objects of research are determined: quinoa, food inulin (TUJU 15.8-35633283-001-2009), rice pudding with inulin and quinoa. For control we have selected a large dish “Rice Pudding” made using traditional technology (Zdobnov et al., 2018). In the traditional recipe, some of the rice in the rice pudding dish is replaced with quinoa in the amount of 20, 50, 80 % by weight of the rice by the recipe, and 8 g of sugar is replaced by inulin.

Information base of the research: monographs, abstracts of dissertations, scientific articles in professional collections of scientific works, materials of international congresses and symposia, scientific and practical conferences, regulatory and technical documentation, statistics.

Research results

Inulin is found in chicory, garlic, dandelion, Echinacea, artichoke, burdock, etc. (Table. 1), but the traditional raw material to produce it considered artichoke, chicory and dahlias.

In the gastrointestinal tract, the molecule of inulin under the influence of hydrochloric acid and some enzymes splits into fructose and other fragments that enter the

bloodstream. Undiluted inulin is excreted, but pre-binds to glucose, reducing blood sugar levels (vital for diabetics). Also, the unbranched part of the inulin molecule binds to products of impaired metabolism (acetone, ketones), cholesterol, fatty acids, eliminating them from the human body.

Table 1. Inulin content in inulin-bearing plants

Vegetable source	The edible part	Inulin, %
Jerusalem artichoke	tuber	16–20
Chicory	roots	15–20
Dandelion	roots	17–20
Garlic	tuber	9–16
Artichoke	leaves / core	3–10
Marnong	roots	8–13
Scorzoneria	roots	4–11
Dahlia	tuber	9–13
Real burdock	roots	19–23

Source: own development (Hrushetskyi, 2003)

First of all, inulin is a dietary fiber, the main properties of which are: reduction of sugar, cholesterol, triglycerides and phospholipids in the blood; reduction of cardiovascular risk factors; counteracting oncological diseases; excretion of salts and radionuclides; modification of intestinal microflora, promoting the development of Bifidus bacteria and inhibiting the development of pathogenic microflora; promoting the normal functioning of the gastrointestinal tract. An ability of inulin is important to improve calcium absorption (by almost 20 %) (Mazaraki et al., 2012).

Also, people who are prone to diabetes have a decrease in protein synthesis in the body, which requires an increase in daily requirement in the full-fledged amino acid composition of the protein. In this regard, it is advisable to include foods with sufficient fiber content in the diet, since these foods are less sugary. It is desirable that foods contain a small amount of fat (~ 30 %), with more than half (up to 75 %) of it being represented by vegetable oils.

An excellent source of complete plant protein, and well absorbed, is quinoa or quinoa (Lat. *Chenopodium quinoa*) – cereals, annual plant, a species of quinoa originating in South America. Quinoa is of ancient origin, in the Inca civilization this grain was one of the three major foodstuffs along with corn and potatoes.

On average, raw quinoa grains contain 16.2 % protein, and in some varieties more than 20 % (for comparison: 3.5 % is in corn, 7.5 % is in rice, 9.9 % is in millet and 11 – 14 % in wheat). In addition, the composition of quinoa proteins is balanced and is close to the protein of milk, which is why this grain is called vegetable “breast milk”.

In addition to proteins, quinoa also contains carbohydrates, fats (high in lecithic acid), fiber, minerals and B vitamins. Riboflavin (0.32 mg /%), phosphorus (457 mg /%), folates predominate in quinoa (42 mg /%) and fiber (7 g /%). It contains a sufficient amount of lysine, an amino acid that promotes better absorption of calcium (Table 2).

The ratio of the quinoa grains to the most important amino acids is tryptophan: lysine: methionine + cystine, tryptophan: threonine, tryptophan: leucine approaching the recommended FAO / WHO (Table 3).

Table 2. Nutritional and energy value of quinoa based on 100 gram

Nutrients	Number	Meeting the daily requirement, %
Proteins,g	14,1	19,3
<i>Essential amino acids, g:</i>		
Valine	0,9	37,1
Isoleucine	0,8	40,3
Leucine	1,1	23,3
Lysine	0,8	20,2
Methionine + cysteine	0,7	39,8
Threonine	0,6	25,9
Tryptophan	0,2	29,8
Phenylalanine + tyrosine	1,1	24,9
Fat, g	6,1	8,2
<i>Fatty acids, g:</i>		
Oleum	1,4	2,3
Linoleum	2,9	14,3
Linolenic	0,3	8,6
Arachidonic	0,1	1,1
Carbohydrates, g	57,2	13,5
Dietary fiber, g	7,0	28,0
<i>Macronutrients, mg</i>		
Potassium (Ca)	563,0	22,5
Potassium (Ca)	47,0	3,8
Magnesium (Mg)	197,0	49,3
Sodium (Na)	5,0	0,4
Phosphorus (P)	457,0	57,1
<i>Microelements, mg</i>		
Iron (Fe)	4,6	45,7
Manganese (Mn)	2,0	101,5
Selenium (Se)	0,1	12,1
Zinc (Zn)	3,1	25,8
<i>Vitamins, mg</i>		
Retinol (A)	0,01	0,1
Beta-carotene	0,01	0,2
Tocopherol €	2,44	16,3
Thiamine (B1)	0,36	21,2
Riboflavin (B2)	0,32	16,0
Pantothenic acid (B5)	0,77	15,4
Pyridoxine (B6)	0,49	24,5
Folate (B9)	0,18	46,0
Niacin (PP)	1,52	7,6
Choline (B4)	70,20	14,0
Energy value, Kcal	368,00	13,9

Source: own development

Table 3. The ratio of essential amino acids in quinoa

The ratio of amino acids	FAO / WHO Recommendations	Content of amino acids, g	The ratio of amino acids
Tryptophan: lysine: methionine + cysteine	1 : (3-5) : (2-4)	0,24 : 0,83 : 0,72	1 : 3,5 : 3
Tryptophan: Threonine	1 : (2-3)	0,24 : 0,62	1 : 2,6
Tryptophan: leucine	1 : (4-6)	0,24 : 1,07	1 : 4,5

Source: own development

Analyzing the amino acid quinoa score (Table 4), we can conclude that quinoa proteins are complete.

Table 4. Amino acid quinoa score

Name of amino acids	FAO / WHO Recommendations, g/100 g	Amino acid content per 100 g quinoa (14.12 g protein)	Amino acid content, g per 100 g of protein	Amino-Lot Score
Valine	5	0,93	6,57	131,46
Isoleucine	4	0,81	5,71	142,78
Leucine	7	1,07	7,58	108,36
Lysine	5,5	0,83	5,85	106,37
Methionine + cystine	3,5	0,72	5,08	145,04
Threonine	4	0,62	4,42	110,43
Tryptophan	1	0,24	1,69	168,96
Phenylalanine + tyrosine	6	1,10	7,78	129,59
Amount of essential amino acids	36	6,31	44,68	130,37

Source: own development

Thus, the innovative technologies development of foods with high nutritional value using biologically active additives and raw materials of plant origin is relevant.

In order to determine the rational concentration of the complex additive (quinoa + inulin), a study of the organoleptic evaluation of «Rice Pudding» was conducted using quinoa, inulin with complete replacement of white rice with whole grains (brown). Whole grain rice is good for people with diabetes because it saturates the body with trace elements and vitamins and has a reduced glycemic index. On a 5-point scale, such quality indicators as appearance, color, smell, taste, consistency were determined. The upper limit of concentration at which the organoleptic evaluation of the dish is higher than the control sample (Table 5) is rationally selected.

Table 5. Organoleptical indicators of rice pudding from quinoa and inulin, marks

p < 0,05

Options for rice pudding	Evaluation for Quality					Overall organic-leptical evaluation, taking into account the weight factor
	External look	Smell	Color	Taste	Consistence	
	weight ratio					
	2	1,5	1,5	3	2	
Control	4,80±0,14	4,90±0,09	4,80±0,13	4,80±0,06	4,90±0,14	4,84±0,13
Research I (20 % quinoa + inulin)	4,70±0,16	4,80±0,14	4,75±0,15	4,80±0,14	4,70±0,17	4,75±0,14
Research II (50 % quinoa + inulin)	4,8±0,14	4,8±0,06	4,84±0,13	5,00±0,06	4,9±0,14	4,87±0,10
Research III (80 % quinoa + inulin)	4,6±0,18	4,2±0,09	4,6±0,16	4,2±0,19	4,2±0,18	4,36±0,12

Source: own development

Studies have shown that with increasing the concentration of quinoa to 80 % deterioration of the consistency of products, pudding has a loose brittle texture, which makes the products deformed, and their appearance becomes less attractive. There is also deterioration in the taste of the dish due to the specific taste inherent in the quinoa. Thus, it was found that the most rational variant of the proposed experiments is No. 2 with a quinoa content of 50 % by weight of rice. It has been proved that the organoleptic quality indicators of rice pudding prepared according to the proposed technology do not differ from the indicators of a dish prepared in the traditional way: rice pudding with quinoa and inulin is 4.87 points, control is 4.84 points.

In order to optimize the cereals technology and their nutrient composition, the technology of rice pudding with quinoa and inulin, which is the basis of the technological scheme of preparation (Fig. 1), has been scientifically substantiated and developed.

When replacing in traditional technology 50 % rice for quinoa (25 g) and sugar for inulin (8 g), the cooking technological process is not complicated.

An analysis of the chemical composition of the pudding shows that the use of quinoa and inulin improves the nutritional value of the dish (Table 6).

An analysis of the chemical composition of rice pudding shows that the use of quinoa and inulin improves its nutritional value. The protein content of pudding with a complex additive increases by 29.4 % compared to the control. Experimental studies have found that the content of essential amino acids increases in rice pudding with quinoa and inulin by 40.2 % compared with the control (table. 6), which indicates the high biological value of the proteins of the product under study.

The carbohydrate content of rice pudding with quinoa and inulin increased by 14.7 g and constitutes 6.5 % of the human daily requirement, while the structure of the car-

bohydrates of the dish significantly changed due to the complete replacement of sugar sucrose with the inulin polysaccharide.

The dietary fiber content of the experiment increased by 458.3 % and provides 8 % of the human daily requirement, while in control their amount reaches 1.4 % of the daily requirement. Dietary fiber enhances the protective effect of the human body, because they have absorbent and complexing properties.

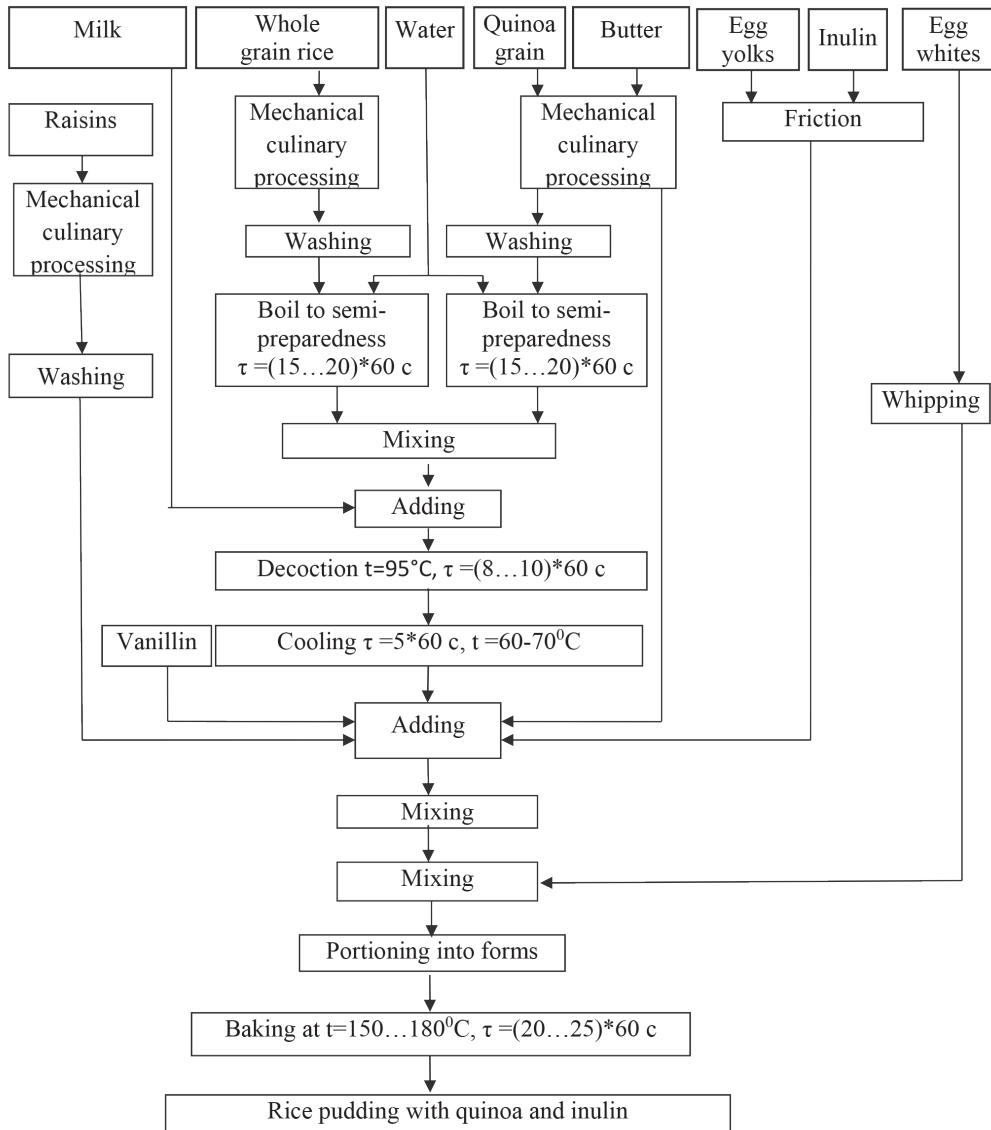


Fig. 1. Technological scheme of making rice pudding with quinoa and inulin

Source: own development

Table 6. Chemical composition and energy value of rice pudding with quinoa and inulin (100 g)

Indexes	The daily need for nutrients	Control		Research		Deviation, %
		Rice pudding	Provision of daily needs, %	Quinoa and inulin rice pudding	Provision of daily needs, %	
Proteins, g	73,0	6,1	8,3	7,8	10,7	+29,4
Essential amino acids, g, including:	22,6	2,4	10,6	3,4	14,8	+40,2
Valine, g	2,5	0,4	14,4	0,5	19,6	+36,1
Isoleucine, gr	2,0	0,3	14,5	0,4	20,5	+41,3
Leicin, g	4,6	0,5	11,7	0,7	14,1	+20,4
Lysine, g	4,1	0,3	7,8	0,5	11,2	+43,8
Methionine + cystine, g	1,8	0,2	10,6	0,3	18,3	+73,7
Threonine, g	2,4	0,2	10,0	0,3	13,8	+37,5
Tryptophan, g	0,8	0,1	11,3	0,1	16,3	+44,4
Phenylalanine + tyrosine, g	4,4	0,4	8,2	0,6	12,5	+52,8
Fat, g	74,0	6,8	9,2	8,2	11,1	+20,4
Carbohydrates, g, incl.	424,0	12,7	2,9	27,4	6,5	+116,0
Dietary fiber, g	25,0	0,4	1,4	2,0	8,0	+458,3
Minerals						
Potassium, mg	2500,0	143,8	5,8	271,1	10,8	+88,5
Calcium, mg	1250,0	71,1	5,7	76,9	6,2	+8,1
Magnesium, mg	400,0	22,1	5,5	64,8	16,2	+193,9
Phosphorus, mg	800,0	113,8	14,2	203,8	25,5	+79,1
Iron, mg	10,0	1,0	9,7	1,9	18,7	+92,8
Vitamins						
Thiamine (B1), mg	1,7	0,1	4,1	0,1	8,2	+100,0
Riboflavin (B2), mg	2,0	0,1	6,5	0,2	10,0	+53,9
Pyridoxine (B6), mg	2,0	0,1	5,5	0,2	9,5	+72,7
Tocopherol (E), mg	15,0	0,4	2,7	0,9	6,0	+119,5
Energy value, Kcal	2650,0	284,9	10,8	273,9	10,3	-3,9

Source: own development

There is a significant improvement in the mineral composition of the dish: the potassium content increased by 88.5 % (10.8 % of daily requirement), magnesium is by 193.9 % (16.2 % of daily requirement), phosphorus is by 79.1 % (25.5 % of daily requirement), iron is by 92.8 % (18.7 % of daily requirement). Quite important for people who are prone to developing diabetes is to reduce the energy value of a meal by changing the quality of their carbohydrates.

Research on the content of vitamins indicates their increase in the dish with the addition of quinoa and inulin, in particular vitamin B1 is by 100 %, vitamin B2 is by 53.9 %, and vitamin B6 is 72.7 %, vitamin E is 119.5 % compared with the control sample.

To evaluate the quality of quinoa and inulin rice pudding, a complex quality index was calculated (Table 7) and a quality model was constructed (Fig. 2). The following indicators were used to construct the quality model: organoleptic evaluation, protein content, carbohydrates, essential amino acids, dietary fiber, and energy value. These indicators are of great importance for ensuring the quality of products of the restaurant industry and providing the dish with functional properties. The importance of each Quality Score in their totality was estimated by weighting factors.

Table 7. Complex indicator of quality rice pudding with quinoa and inulin

Indicator	Weighting factor	Rice pudding (control)	Quinoa and inulin rice pudding (experiment)
Absolute indicators			
Organoleptic evaluation	0,2	4,80	4,50
Carbohydrates	0,2	12,68	27,39
Proteins	0,1	6,05	7,83
Essential amino acids	0,2	2,39	3,35
Dietary fiber	0,2	0,36	2,01
Energy value	0,1	284,94	273,91
Relative indicators			
Organoleptic evaluation	0,2	0,22	0,61
Carbohydrates	0,2	0,22	0,61
Proteins	0,1	0,11	0,31
Essential amino acids	0,2	0,22	0,61
Dietary fiber	0,2	0,22	0,61
Energy value	0,1	0,11	0,31
Integrated Quality Score, unit		1,12	3,07

Source: own development

It is established that the complex index of quality of quinoa and inulin rice pudding is 3.07 units, which is 2.7 times higher than in the control sample (1,12).

Thus, improving the chemical composition, quantitative and qualitative indicators of cereals indicates the feasibility of using dietary supplements (quinoa and inulin) and its consumption in preventive nutrition.

Conclusions and results discussion

The research results showed that the use of whole grain rice, quinoa and inulin in the technology of cooking cereals promotes the fuller use of the nutritional potential of natural supplements, increases their nutritional and biological value (provides a balanced content of essential amino acids), optimizes the structure of carbohydrate and carbohydrate structure. Products with improved taste properties of high quality with low glycemic index. This approach can be recommended for the innovative technology development for cereals.

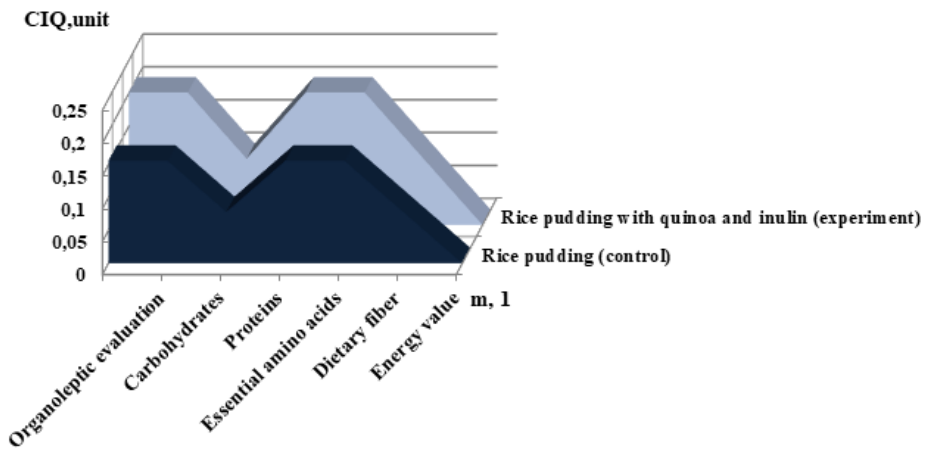


Fig. 2. Model of quality of rice pudding with quinoa and inulin
Source: own development

The social impact of the introduction of innovative inulin and quinoa culinary products is to expand health food in restaurants, to preserve and protect human health, and to prevent diabetes.

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ІННОВАЦІЙНІ ТЕХНОЛОГІЇ КУЛІНАРНОЇ ПРОДУКЦІЇ З ВИКОРИСТАННЯМ КІНОА ТА ІНУЛІНУ

Актуальність. Дослідження полягають у вирішенні проблеми розроблення інноваційних технологій кулінарної продукції із круп, що містять дієтичні добавки рослинного походження (інулін), та обґрунтуванні основних складових технологічного процесу виробництва та формування готових страв підвищеної якості. **Мета досліджень** – наукове обґрунтування та розроблення інноваційної технології страв із використанням цільнозернового рису, кіноа та інуліну оздоровчого призначення. **Методи дослідження.** Використані стандартні загальноприйняті, органолептичні, фізико-хімічні, статистичні, соціологічні, методи кваліметрії та математичної обробки експериментальних даних із використанням комп'ютерних технологій. **Результати.** Дослідження спрямовані на наукове обґрунтування технологічних параметрів отримання кулінарної продукції з використанням кіноа та інуліну. В результаті наукових досліджень обґрунтовано і експериментально встановлено закономірності перебігу технологічних процесів при комплексному використанні кіноа та інуліну в кулінарній продукції на основі в'язкої рисової каші з цільнозернового рису; розроблено інноваційні технології кулінарної продукції з використанням кіноа та інуліну; визначено їхню якість і споживчі властивості. Підтверджено соціальний ефект від впровадження розробки, який полягає у збереженні та захисті здоров'я населення, підвищенні якості та поліпшенні споживчих властивостей страв із круп, повному використанні харчового потенціалу природної рослинної сировини і розширенні асортименту кулінарної продукції у закладах ресторанного господарства. **Висновки та обговорення.** Результатами досліджень є розроблення інноваційних технологій страв на основі цільнозернового рису із кіноа та інуліном. Експериментальними дослідженнями встановлено, що кулі-

нарна продукція характеризується високими органолептичними показниками та підвищеною харчовою цінністю оздоровчого призначення і може бути рекомендована для людей, хворих на цукровий діабет.

Ключові слова: інноваційні технології, кулінарна продукція, інулін, кіноа, рисовий пудинг.

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ИННОВАЦИОННЫЕ ТЕХНОЛОГИИ КУЛИНАРНОЙ ПРОДУКЦИИ С ИСПОЛЬЗОВАНИЕМ КИНОА И ИНУЛИНА

Актуальность. Исследования заключаются в решении проблемы разработки инновационных технологий кулинарной продукции из круп, содержащих диетические добавки растительного происхождения (инулин), и обосновании основных составляющих технологического процесса производства и формирования готовых блюд повышенного качества. **Цель исследований** – научное обоснование и разработка инновационной технологии блюд с использованием цельнозернового риса, киноа и инулина оздоровительного назначения. **Методы исследований.** Используются стандартные общепринятые, органолептические, физико-химические, статистические, социологические, методы квалитетрии и математической обработки экспериментальных данных с использованием компьютерных технологий. **Результаты.** Исследования направлены на научное обоснование технологических параметров получения кулинарной продукции с использованием киноа и инулина. В результате научных исследований обоснованы и экспериментально установлены закономерности течения технологических процессов при комплексном использовании киноа и инулина в кулинарной продукции на основе вязкой рисовой каши из цельнозернового риса; разработаны инновационные технологии кулинарной продукции с использованием киноа и инулина; определены их качество и потребительские свойства. Определен социальный эффект от внедрения разработки, который заключается в сохранении и защите здоровья населения, повышении качества и улучшении потребительских свойств блюд из круп, рациональном использовании пищевого потенциала растительного сырья и расширении ассортимента кулинарной продукции на предприятиях ресторанного хозяйства. **Выводы и обсуждение.** Результатами исследований является разработка инновационных технологий блюд на основе цельнозернового риса с киноа и инулином. Экспериментальными исследованиями установлено, что кулинарная продукция характеризуется высокими органолептическими показателями и повышенной пищевой ценностью оздоровительного назначения и может быть рекомендована людям, больным сахарным диабетом.

Ключевые слова: инновационные технологии, кулинарная продукция, инулин, киноа, рисовый пудинг.