Даулет Какижанович Айтмухамбетов – ауыл шаруашылық ғылымдарының кандидаты, С. Сейфуллин атындағы Қазақ агротехникалық зерттеу университеті, Астана қаласы, Қазақстан Республикасы; e-mail: daulet-kerei@mail.ru. ORCID: https://orcid.org/0000-0002-8178-3080.

Гульназым Хамитовна Оспанкулова – биология ғылымдарының кандидаты, «Тамақ және қайта өңдеу өндірістерінің технологиясы» кафедрасының қауымдастырылған профессор м.а., С. Сейфуллин атындағы Қазақ агротехникалық зерттеу университеті, Астана қаласы, Қазақстан Республикасы; e-mail: bulashevag@mail.ru. ORCID: https://orcid.org/0000-0002-6043-4658.

Сведения об авторах

Линара Азаматқызы Мурат* – докторант кафедры «Технологии пищевых и перерабатывающих производств»; Казахский агротехнический исследовательский университет им. С. Сейфуллина, г. Астана, Республика Казахстан; e-mail: linaraazamatkyzy@mail.ru. ORCID: https://orcid.org/0000-0001-5684-0621.

Әмірсана Бекмұхаметұлы Қиықбай* – старший научный сотрудник, Казахский агротехнический исследовательский университет им. С. Сейфуллина, г. Астана, Республика Казахстан; e-mail: Sanabayq@gmail.com. ORCID: https://orcid.org/0009-0008-8866-582X.

Даулет Какижанович Айтмухамбетов – кандидат сельскохозяйственных наук, Казахский агротехнический исследовательский университет им. С. Сейфуллина, г. Астана, Республика Казахстан; e-mail: daulet-kerei@mail.ru. ORCID: https://orcid.org/0000-0002-8178-3080.

Гульназым Хамитовна Оспанкулова – кандидат биологических наук, и.о. ассоциированного профессора кафедры «Технологии пищевых и перерабатывающих производств»; Казахский агротехническийисследовательский университет им. С. Сейфуллина, г. Астана, Республика Казахстан; e-mail: bulashevag@mail.ru. ORCID: https://orcid.org/0000-0002-6043-4658.

Author Information

Linara Murat* – Doctoral student at the Department of «Food and Processing Production Technologies», S. Seifullin Kazakh Agro Technical Research University, Astana, Republic of Kazakhstan; e-mail: linaraazamatkyzy@mail.ru. ORCID: https://orcid.org/0000-0001-5684-0621.

Amirsana Kiyikbay –Senior researcher S. Seifullin Kazakh Agro Technical Research University, Astana, Republic of Kazakhstan; e-mail: Sanabayq@gmail.com. ORCID: https://orcid.org/0009-0008-8866-582X.

Daulet Aitmuhambetov – Candidate of Agricultural Sciences, S. Seifullin Kazakh Agro Technical Research University, Astana, Republic of Kazakhstan; e-mail: daulet-kerei@mail.ru. ORCID: https://orcid.org/0000-0002-8178-3080.

Gulnazym Ospankulova – Candidate of Biological Sciences, Acting Associate Professor at the Department of «Food and Processing Production Technologies», S. Seifullin Kazakh Agro Technical Research University, Astana, Republic of Kazakhstan; e-mail: bulashevag@mail.ru. ORCID: https://orcid.org/0000-0002-6043-4658.

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G.E. Orymbetova[1]*, E.M. Orymbetov[1], M.K.Kassymova[2], Z.I. Kobzhasarova[2], B.T. Yeshimbetova [2]

[1]South Kazakhstan Medical Academy,
160001, Republic of Kazakhstan, Shymkent, 1/1 Al-Farabi square
[2]M. Auezov South Kazakhstan University,
160012, Republic of Kazakhstan, Shymkent, 5 Tauke-Khan avenue;
*e-mail: orim_77@mail.ru

DEVELOPMENT OF TECHNOLOGY FOR PRODUCING PASTA WITH ADDED PUMPKIN PUREE

Abstract: *The production of high-quality products and their balance in the human diet are of great importance. Pasta products are in constant demand in the market. Therefore, the creation of products using non-traditional raw materials in order to increase the nutritional value is relevant. The work proposes a technology for the production of tubular pasta with the addition of non-traditional raw materials – pumpkin*

puree with purpose to increase their nutritional and biological value. A pasta dough recipe developed, containing pumpkin puree in varying proportions, enriches product by β-carotene, dietary fiber, vitamins, and microelements. Research has determined the optimal component ratio (20% by weight of pumpkin puree), ensuring the preservation of the product's technological properties, such as shape, density, and cooking stability, while improving its nutrient composition. Changes in the organoleptic and physicochemical characteristics of pasta products containing pumpkin puree were assessed, enabling identification of the best parameters for industrial production. A promising technology is proposed that can be used in the industrial production of functional pasta products using plant-based raw materials.

Key words: *flour, pasta, pumpkin puree, technology,* organoleptic and physicochemical properties

Introduction

In recent years, there has been a steady increase in the consumption of pasta both in Kazakhstan and abroad. This is due to their availability, variety and ease of preparation. Tubular pasta such as penne, rigatoni and cannelloni are becoming increasingly popular due to their versatility and ability to be combined with various sauces and fillings. The development of new technologies allows us to expand the range and improve the quality of products. Modern consumers are increasingly paying attention to the quality and composition of products. The development of technologies that allow the use of more natural and healthy ingredients meets the demands of the market and consumers [1].

In recent years, a field of research has emerged aimed at developing functional pasta products with increased biological value. This issue has been reflected in works at various levels: articles in scientific journals, patents, reports at thematic conferences.

Pumpkin puree, rich in vitamins, minerals and antioxidants, can be a valuable addition to traditional pasta, increasing its nutritional value. Carotenoids help prevent cell mutation, and therefore cancer. In addition, they prevent the formation of atherosclerosis, one of the causes of cardiovascular diseases.

Using pumpkin puree can help to use agricultural resources more efficiently, as pumpkin is an affordable and easy-to-grow crop. It can also help to utilize excess pumpkin, which is important in seasonal production.

The authors Chomanov U., Zhumalieva G., Shoman A. and Kasimbek R. proposed a method for producing pasta based on adding 10-15% of the flour weight of a bioadditive from the remains of canned fish production (perch) and crushed licorice root to the flour mixture. Perch meat allows increasing the nutritional value of the finished product due to the vitamins B and D, ascorbic and nicotinic acid, minerals (iron, chromium, iodine, etc.) it contains [2].

The patent of the authors Ospanov A., Muslimov N.Zh., Timurkekova A.K. and Dzhumabekova G. B. implies the introduction of 25% dry wheat gluten into a poly-cereal flour mixture, allowing the creation of new compositions for the production of pasta products, with an increased amount of macro- and microelements, including the amount of amino acids and vitamins, improving the organoleptic qualities of pasta products [3].

Daribayeva G.T., Iztayev B.A., Iztayev A., Iskakova G.K., Yakitayeva M.A. in patent No. 5821 proposed a method for increasing the nutritional and biological value of pasta products. The result is achieved through a production method by mixing whole-grain wheat flour from soft wheat varieties and whole-grain flour from tretikal grain (10-20% of the total flour weight) with kneading on ionozonated water [4].

In order to increase the nutritional and biological value of pasta made from soft wheat grain, the authors Shelubkova N. S. et al. (2018) studied the effect of adding chickpea flour to pasta dough. In their work, the researchers optimized the mixing parameters of pasta dough made from composite flour [5].

Wheat, buckwheat and flaxseed flour for use in pasta production were studied in the work of Aptrakhimov et al. A comparative characteristic of the plant components of the developed pasta products is presented in terms of their content of proteins, fats, carbohydrates, dietary fiber, vitamins, macro- and microelements. Buckwheat and flaxseed flour are characterized by significantly higher indicators of both food and biological value than wheat flour. The authors noted that vitamins and minerals are presented in buckwheat flour more widely. It has been proven that the use of buckwheat or flaxseed flour, both separately and in a mixture with other types of flour, will expand the raw material base and range of pasta products for dietary therapeutic and dietary preventive nutrition, including for patients with diabetes and celiac disease [6].

In the work [7], flour of gluten-free crops, such as rice, buckwheat, and corn, was studied for the production of pasta for consumers with food intolerance to gluten (celiac disease). Various vegetable and fruit powders, starch, as well as pea, soy, amaranth, and millet flour were added to the gluten-free flour. The considered series of plant enriching additives in pasta dough allows expanding the range of manufactured pasta products for dietary therapeutic and dietary preventive nutrition of consumers suffering from celiac disease.

The author Rodionov and others studied the possibility and feasibility of using parsnip and pumpkin powders to improve the quality of finished pasta. The authors of the study determined the most acceptable amount of vegetable powder added to pasta dough, and noted that the addition of vegetable components to pasta dough improves the quality indicators of finished products: appearance, surface condition, color. The paper presents the results of a study of the effect of added vegetable powder on the physicochemical and mechanical properties of finished pasta, as well as on quality indicators. Of interest are the results of a study of the effect of added vegetable powder on the dough structure. In their study, the authors proved that adding vegetable powders to pasta dough entails a decrease in dough adhesion. A decrease in adhesion improves technological characteristics, facilitates the process of pasta production [8].

Argentine researchers studied the nutritional value of gluten-free pasta made from cassava starch and corn flour (4:1), as well as milk, eggs, salt and xanthan gum. Analysis of the chemical composition showed a high content of dietary fiber and a low glycemic index. The resulting pasta is recommended in diets with a high fiber content and a low glycemic index [9].

The authors Orymbetova G.E. and Aripova Sh.A. considered the method of adding the extract of wormwood (A. absinthium) to increase the nutritional and biological value of the final product, as well as to increase the anthelmintic properties of food, everyday use. Based on the experiments, the following conclusions were provided: spaghetti with the addition of 10% wormwood are the most rational. Since with such a dosage, the organoleptic and physicochemical indicators of finished products are not violated. According to organoleptic indicators, spaghetti with green inclusions have a taste and smell characteristic of wormwood [10].

Thus, the development of technology for the production of tubular pasta with the addition of pumpkin puree is an important and urgent task that helps improve the quality of food products and meet consumer demand.

Materials and methods

All samples of finished pasta were analyzed for organoleptic and physicochemical properties.

Methods for determining organoleptic and physicochemical (moisture, acidity) indicators of pasta products were determined in accordance with GOST 31743-2017 Pasta products. General specifications [11].

Five samples of the test product (n=5), weighing 5 g each, were selected for analysis. Each sample was analyzed in triplicate. Results were processed using Excel. Mean values and standard deviations were calculated. The Student's t-test was used to assess the statistical significance of differences.

The moisture content of the products was determined by drying to constant weight. Pasta samples were dried at temperature of 100-105°C for 4 hours. After the drying time, cooled samples were weighed until weight difference between two subsequent weighings did not exceed 0.002 g.

Acidity was determined by titrating an aqueous suspension of ground products with sodium hydroxide. A 1% phenolphthalein solution was added to the prepared sample, which was then titrated with sodium hydroxide until pink color appeared, which persisted for a minute.

Dietary fiber was determined in accordance with GOST 34844-2022 [12]. Food products. Determination of the mass fraction of dietary fiber. The method is based on enzymatic sample processing followed by precipitation, filtration, washing, drying, and weighing of the residue containing dietary fiber. The determination was performed using enzymatic gravimetric analysis, which involves the enzymatic hydrolysis of starch and non-starch compounds using α-amylase, protease, and amyloglucosidase to mono-, di-, and oligosaccharides. The dietary fiber is then precipitated with ethyl alcohol, dried, and quantified using gravimetric method.

The sample was ground in laboratory mill. Enzymatic treatment was carried out using three enzymes. For testing, 1 g sample was mixed with 50 cm^3 of phosphate buffer. 100 mm^3 of α-amylase solution was added to the resulting solution. The solution was kept in boiling water bath for 30 minutes. Next, 500 mm^3 of protease enzyme solution was added and kept in a water bath at 60°C

for 30 minutes. In the third stage of fermentation, 300 mm³ of amloglucosidase enzyme solution was added and kept in a water bath at 60°C for 30 minutes. After enzymatic treatment, the solution was cooled to room temperature. To precipitate soluble fibers, 95% ethyl alcohol was added, mixed, and kept in a water bath at 60°C for 60 minutes. The solution was filtered, the residue was washed with 78% ethyl alcohol, and dried at 130°C to constant weight. The resulting precipitates were analyzed for residual protein content in one sample and ash content in the other.

The β-carotene content of pasta was determined by using spectrophotometer [13]. This method is based on the extraction of β-carotene from plant samples with hexane and optical determination of β-carotene in the hexane extract. The samples were thoroughly ground in a porcelain mortar until a paste-like mass was obtained. Three 50-ml glass beakers were filled with 3 g of the test sample. The samples were transferred to porcelain mortars and ground with a small amount of sand for 3-5 min. A small amount of Na_2CO_3 was added, then Na_2SO_4, and the mixture was ground for no more than 15 min until a powdery consistency was achieved. The mixture was then left in a dark place for 30 min. The sample was rinsed with a small amount of hexane through a Buchner funnel fitted with a paper filter. The extract was filtered using a vacuum pump, constantly adding a small amount of hexane to the funnel to cover the sample and allow pure hexane to pass through the filter. The amount of extract obtained was measured with a glass cylinder (the total volume of solution did not exceed 200 ml). The optical density of the resulting solutions was measured spectrophotometrically at a wavelength of λ = 440 nm using a 10 mm thick cuvette.

Comparative analysis of the content of macro- and microelements in the control sample and in the finished product according to the selected recipe by the SEM (scanning electron microscopy) method using the equipment of the «Structural and Biochemical Materials» laboratory of the M. Auezov South Kazakhstan University.

Research results and their analysis

For the research, the most suitable types of wheat flour for the production of pasta were selected: «Ak nan» of the first grade, «Granum» of the first grade and «Dani nan» of the highest grade.

The use of pumpkin puree in the production of pasta in combination with durum wheat flour for first-grade pasta ensures an increase in the quality indicators of these pasta products.

At pumpkin is added to pasta, the content of vitamins and dietary fiber increases, while the content of fats and carbohydrates, on the contrary, decreases.

Five samples with different percentages of flour were prepared:

Sample 1 – 5 wt.% functional additive (powder);

Sample 2 – 10 wt.% functional additive (powder);

Sample 3 – 10 wt.% functional additive (puree);

Sample 4 – 20 wt.% functional additive (puree);

Sample 5 – 30 wt.% functional additive (puree).

This is necessary in order to trace the dependence of the amount of additive and the deterioration or improvement of the pasta properties of the dough and organoleptic indicators.

The samples showed changes in the organoleptic characteristics of pasta with the addition of pumpkin puree, shown in Table 1.

Table 1 – Organoleptic characteristics of the dough with the addition of non-traditional raw materials – pumpkin

№	Sample number	Indicators
1	1 (5 wt.% powder)	It acquired a faint yellow-orange color, and faint pumpkin smell and taste appeared.
2	2 (10 wt.% powder)	It acquired an orange color, a strong smell and a sweetish taste of pumpkin.
3	3 (10% wt.% puree)	Organoleptic properties have not changed significantly. It acquired a faint yellow color, the smell and taste have not changed
4	4 (20 wt.% puree)	It acquired a distinct yellow-orange color, and a faint smell and taste of pumpkin appeared.
5	5 (30 wt.% puree)	It acquired an orange color, a strong smell and a sweetish taste of pumpkin.

Thus, sample 1 and sample 4 were the most suitable for molding in all respects, since the humidity is close to the solid type of dough kneading, and the extensibility above the ruler is average.

It should be noted that when receiving pumpkin powder, during the drying process, some vitamins decomposed, others suffered % loss, but did not disappear, and some turned out to be

resistant to high temperatures. But significant losses in the vitamin composition reduce the biological value of finished products, it is also necessary to take into account that the pasta dough must be dried, at the stage of which thermal exposure also occurs, respectively, the decomposition of vitamins will occur again.

Therefore, sample 1 (5 wt% pumpkin powder) is not suitable for further formulation development.

Methyltethionine completely disintegrated and lost its properties. Thiamine, under the influence of high temperatures, decreased by 27% of the total content in raw pumpkin. Riboflavin also, at high temperatures, decreased by 15% of the total content in raw pumpkin. Ascorbic acid at high temperatures decreased by 90% of its total content in raw pumpkin. Folic acid at high temperatures decreased by 90% of its total content in raw pumpkin. Nicotinic and Pantothenic acids disintegrate at high temperatures.

It should be noted that this type of drying has a more detrimental effect on the vitamin composition than boiling under pressure, since the pressure pumped into the screw boiling-blanching machine allows the same cooking processes to be carried out at a reduced temperature.

With an increase in the mass content of puree in the dough (sample 5), the pasta properties of the dough worsened: the dough became very elastic and difficult to form.

Acidity and moisture content analyses were performed on five samples and a control test sample.

It should be noted that the acidity of the dough decreases with the correct drying mode.

Pasta with added tomato products was also used as a control sample for the acidity study, since pumpkin is characterized by a high content of ascorbic, nicotinic, folic and pantothenic acids.

Thus, it should be noted that the acidity of the dough increases depending on the amount of additive added. At the same time, pumpkin powder has less effect on the acidity of the dough than adding pumpkin puree. When drying pasta, the acidity decreases.

If pumpkin powder has a moisture content of no more than 10%, then pumpkin puree has its own high moisture content, namely 84.6%. In the future, when calculating the recipe, it is necessary to recalculate the water added to the dough to achieve a moisture content of about 30% in the pasta dough.

Thus, it should be noted that pumpkin powder at 10 wt.% (sample 2), as well as pumpkin puree at 30 wt.% (sample 5) negatively affects the quality of washed gluten, which will subsequently affect the formation of pasta. Therefore, it is necessary to refuse these samples in the future.

Sample 3 (10% by weight pumpkin puree) – suitable for further development of the recipe, but does not significantly affect the organoleptic properties of the finished product, therefore, the production of products with 10% by weight pumpkin puree will be economically unprofitable.

Based on the obtained data, the most suitable sample is sample 4, containing 20% by weight of pumpkin puree.

Pumpkin powder, due to the fiber it contains, has a high level of hygroscopicity. Consequently, pumpkin powder, due to its high moisture absorption capacity, has a negative effect on the gluten content. A similar process occurs with sample 5 (30% by weight of pumpkin puree), due to the high content of plant fibers in the raw material, there is a decline in the indicators.

Acidity and moisture content analyses were carried out on five samples and a control sample of finished products (Table 2).

Table 2 – Comparative analysis of acidity and moisture content of samples

№	Sample #	Acidity, deg. T	GOST 31743-2017	Moisture, %	GOST 31743-2017
1	Control sample (tomato pasta)	9,8	⩽ 10	11,8	<13
2	Sample 1 (5 wt.% powder)	5		13	
3	Sample 2 (10 wt.% powder)	8		11,4	
4	Sample 3 (10 wt.% puree)	6		12	
5	Sample 4 (20% wt.% puree)	9		12,1	
6	Sample 5 (30 wt.% puree)	14		12,9	

Thus, the table shows a decrease in humidity in sample No. 2. This is due to the high fiber content in pumpkin powder, it is hygroscopic, but when exposed to high temperatures it easily releases moisture, therefore, with a high powder content, the humidity of the finished product decreases.

The decrease in acidity of finished pasta products in sample No. 2 (10% by weight of pumpkin powder) occurs due to the change in the raw materials introduced into the pasta dough.

It should be noted that despite the difference in the processing of the introduced plant material, the increase in acidity on the graph from sample 1 (5 wt.% pumpkin powder) to sample 2 (10 wt.% pumpkin powder) is approximately equal to the increase in acidity from sample 3 (10 wt.% pumpkin puree) to sample 4 (20 wt.% pumpkin puree).

At the same time, due to the difference in the content of dry substances in pumpkin puree (15.4%) and pumpkin powder (90.2%), there is a decrease in the acidity graph after the position «Sample 2 (10 mass.% pumpkin powder)», regardless of the amount of the additive added, since the amount of dry substances in the pumpkin processing products in the position «Sample 3 (10 mass.% pumpkin puree)» became lower.

The most compliant with GOST 31743-2017 «Pasta products. General specifications» is sample 4, the acidity of which is increased due to the content of pumpkin puree and can be classified as tomato products.

A comparative analysis of the content of macro- and microelements in the control sample and in the finished product according to the selected recipe using the SEM (scanning electron microscopy) method was carried out using the equipment of the «Structural and Biochemical Materials» laboratory of the M.Auezov South Kazakhstan University.

The obtained data showed the following results (presented in Table 3 and Figure 1).

Table 3 – Comparative analysis of the content of food substances

Food substances	Control sample (without additive)	Sample 4 (20 wt.% puree)	Difference
Content β-carotene, mg/100g	>0,01	1,2	+1,2
Mass fraction of dietary fiber, %	1,8	3,1	+1,3
Macro- and microelements, weight %			
C	5.84	9.78	3.94
O	41.17	41.26	0.09
Na	0.81	5.29	4.48
Mg	5.38	3.66	-2.02
Si	0.60	-	-0.60
P	17.68	12.62	-5.06
S	0.50	1.16	0.66
K	22.96	21.99	-0.97
Ca	4.59	3.68	-0.91
Fe	0.46	0.55	0.09

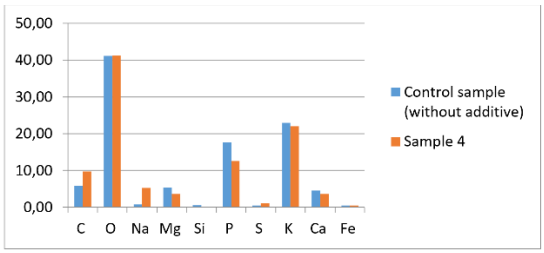

Figure 1 – Comparative analysis of the content of macro- and microelements

Table 3 shows that the content of β-carotene increased by 1.2 mg, the mass fraction of dietary fiber also increased by 1.3%, which indicates the functionality of the finished product.

An analysis of the obtained results allows us to draw the following conclusions: the sodium content in sample 4 (20% by weight of pumpkin puree) increased by 4.48%, which allows us to cover the daily sodium requirement for people when consuming 100 grams of the finished product. It should be noted that for people who engage in active training with profuse sweating, the need for daily sodium consumption increases twofold [14].

The content of sulfur and iron increases, which has a beneficial effect on people with iron deficiency anemia.

In light of the above, the losses in the form of magnesium, potassium and calcium are justified. Even the reduced phosphorus content in sample 4 (20% by weight of pumpkin puree) corresponds to the daily human consumption rate (from 12 to 16%) [15].

Description of the production flow chart

To produce tubular pasta with the addition of pumpkin puree, it is necessary to prepare raw materials that act as a functional additive. Therefore, it is necessary to consider a technological line for the production of pumpkin puree, which can be combined with a technological line for the production of tubular pasta [16].

The technological scheme for the production of tubular pasta with the addition of pumpkin puree is shown in Figure 2.

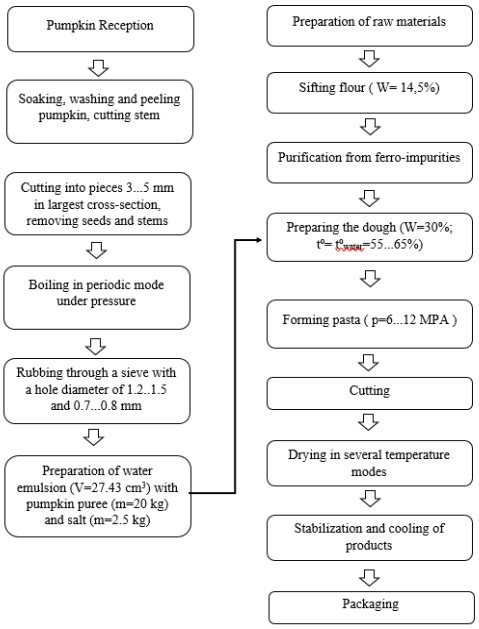

Figure 2 – Flow chart for the production of tubular pasta with addition of pumpkin puree

Conclusion

Optimization of tubular pasta production technologies can lead to a reduction in raw material and energy costs, which in turn will increase the competitiveness of products in the market. The introduction of new technologies, such as the use of alternative sources of raw materials (for example, gluten-free or enriched with vitamins and minerals), opens up new horizons for the development of the industry and meeting the needs of various consumer groups. The development of technologies aimed at reducing waste and using environmentally friendly packaging materials is also an important aspect that takes into account modern trends in sustainable development. Thus, work on the development of tubular pasta production technology is relevant and in demand, which will not only improve the quality of products, but also increase their competitiveness in the market. As a result of the research, an optimal sample of tubular pasta with the addition of pumpkin puree in an amount of 20 wt.% of the weight of all ingredients was selected.

Список литературы

1. Аптрахимов Д.Р. Обзор рынка макаронных изделий / Д.Р. Аптрахимов // Качество продукции, технологий и образования. – 2019. – С. 254-257.

2. Пат. 2363. РК: МПК: A23L 7/109. Способ производства макаронных изделий: / У.Ч. Чоманов, Г.Е. Жумалиева; заявитель и патентообладатель ТОО «Казахский научно-исслед-ий инст. перераб. и пищ. промыш-ти. – 2016/0491.2; заявл. 05.09.2016; опубл. 15.09.2017, Бюл. № 17.

3. Пат. 4291. РК: МПК: A23L 7/10. Макаронные изделия из нетрадиционного сырья (варианты) и способ их производства: / А. Оспанов, Н.Ж. Муслимов, А.К. Тимурбекова, Г.Б. Джумабекова; заявитель и патентообладатель Оспанов А., Муслимов Н. Ж., Тимурбекова А. К., Джумабекова Г. Б. – 2019/0275.2; заявл. 27.03.2019; опубл. 13.09.2019, Бил. № 37.

4. Пат. 5821. РК: МПК: A23L 7/109 B02B 1/00 B02B 5/00. Способ производства макаронных изделий / Г.Т. Дарибаева, Б.А. Изтаев, А. Изтаев, Г.К. Искакова, М.А. Якитаева; заявитель и патентообладатель Изтаев Б.А., Дарибаева Г.Т., АО «АТУ» – 2021/0057.2; заявл. 13.11.2019; опубл. 05.02.2021, Бил. № 5.
5. Оптимизация параметров замеса макаронного теста из композитной муки / Н.С. Шелубкова и др. // Вестник КрасГАУ. – 2018. – № 5. – С. 232-239.
6. Аптрахимов Д.Р. Сравнительная характеристика растительных компонентов разработанных макаронных изделий / Д.Р. Аптрахимов, Ф.Х. Смольникова, М.Б. Ребезов // Молодой ученый. – 2016. – № 21(125). https://moluch.ru/archive/125/34892.
7. Пат. 2446708 Рос. Федерация. Способ производства макаронных изделий: / Шнейдер Т.И., Казеннова Н.К., Шнейдер Д.В., Шилин С.А. № 2010146282/13; заявл. 13.11.2010; опубл. 10.04.2012, Бюл. № 10.
8. Влияние порошка пастернака на качественные показатели лапши и макаронных изделий / Родионов Ю.В. и др. // Технологии пищевой и перерабатывающей промышленности. – 2017. – № 1. – С. 56-61.
9. Milde L.B. Nutritional characterization of gluten free non-traditional pasta / L.B. Milde, P.S. Chigal, Z.M.O. Chiola // International Journal of Food Science and Nutrition. – 2018. – Vol. 3, № 5. – P. 19-24.
10. Пат. 6443. РК: МПК: A23L 7/109. Состав для изготовления спагетти с полынью / Орымбетова Г.Э., Арипова Ш.А.; заявитель и патентообладатель НАО «Южно-Казахстанский университет им. М. Ауэзова». – 2021/0491.2; заявл. 19.05.2021; опубл. 24.09.2021, Бил. № 38.
11. ГОСТ 31743-2017 Изделия макаронные. Общие технические условия. – Введ. 01.06.2017. – М. Стандартинформ, 2017. – 12 с.
12. ГОСТ 34844-2022. Продукция пищевая. Определение массовой доли пищевых волокон. – Введ. 29.04.2022. – Москва. Российский институт стандартизации, 2022. – 16 с.
13. Курегян А.Г. Спектрофотометрия в анализе каратиноидов / А.Г. Курегян // Фундаментальные исследования. – 2015. – № 2-23. – С. 5166-5172. URL: https://fundamental-research.ru/ru/article/view?id=38175 (дата обращения: 04.10.2025).
14. Терентьева О. А. Особенности сбалансированного питания при силовой тренировке / О.А. Терентьева // VIII Лужские научные чтения. Современное научное знание: теория и практика. – 2020. – С. 81-84.
15. Atef A. Studies on sheets properties made from juice and puree of pumpkin and some other fruit blends / A. Atef, A.S. Nadir, T.R. Mostafa. // Journal of applied sciences research. – 2012. – Т. 8. – № 5. – С. 2632-2639.
16. Пат. 6565. РК: МПК: A23L 1/16. Состав для изготовления макаронных изделий с добавлением пюре из тыквы / Орымбетова Г.Э., Охотенко Д.А.; заявитель и патентообладатель НАО «Южно-Казахстанский университет им. М. Ауэзова». – 2021/0492.2; заявл. 19.05.2021; опубл. 22.10.2021, Бил. № 42.

References

1. Aptrakhimov D.R. Obzor rynka makaronnykh izdelii / D.R. Aptrakhimov // Kachestvo produktsii, tekhnologii i obrazovaniya. – 2019. – S. 254-257. (In Russian).
2. Pat. 2363. RK: MPK: A23L 7/109. Sposob proizvodstva makaronnykh izdelii: / U.CH. Chomanov, G.E. Zhumalieva; zayavitel' i patentoobladatel' TOO «Kazakhskii nauchno-issled-ii inst. pererab. i pishch. promysh-ti. – 2016/0491.2; zayavl. 05.09.2016; opubl. 15.09.2017, Byul. № 17. (In Russian).
3. Pat. 4291. RK: MPK: A23L 7/10. Makaronnye izdeliya iz netraditsionnogo syr'ya (varianty) i sposob ikh proizvodstva: / A. Ospanov, N.ZH. Muslimov, A.K. Timurbekova, G.B. Dzhumabekova; zayavitel' i patentoobladatel' Ospanov A., Muslimov N. ZH., Timurbekova A. K., Dzhumabekova G. B. – 2019/0275.2; zayavl. 27.03.2019; opubl. 13.09.2019, Bil. № 37. (In Russian).
4. Pat. 5821. RK: MPK: A23L 7/109 B02B 1/00 V02V 5/00. Sposob proizvodstva makaronnykh izdelii / G.T. Daribaeva, B.A. Iztaev, A. Iztaev, G.K. Iskakova, M.A. Yakitaeva; zayavitel' i patentoobladatel' Iztaev B.A., Daribaeva G.T., AO «ATU» – 2021/0057.2; zayavl. 13.11.2019; opubl. 05.02.2021, Bil. № 5. (In Russian).
5. Optimizatsiya parametrov zamesa makaronnogo testa iz kompozitnoi muki / N.S. Shelubkova i dr. // Vestnik KraSGAU. – 2018. – № 5. – S. 232-239. (In Russian).

6. Aptrakhimov D.R. Sravnitel'naya kharakteristika rastitel'nykh komponentov razrabotannykh makaronnykh izdelii / D.R. Aptrakhimov, F.KH. Smol'nikova, M.B. Rebezov // Molodoi uchenyi. – 2016. – № 21(125). https://moluch.ru/archive/125/34892. (In Russian).
7. Pat. 2446708 Ros. Federatsiya. Sposob proizvodstva makaronnykh izdelii: / Shneider T.I., Kazennova N.K., Shneider D.V., Shilin S.A. № 2010146282/13; zayavl. 13.11.2010; opubl. 10.04.2012, Byul. № 10. (In Russian).
8. Vliyanie poroshka pasternaka na kachestvennye pokazateli lapshi i makaronnykh izdelii / Rodionov YU.V. i dr. // Tekhnologii pishchevoi i pererabatyvayushchei promyshlennosti. – 2017. – № 1. – S. 56-61. (In Russian).
9. Milde L.B. Nutritional characterization of gluten free non-traditional pasta / L.B. Milde, P.S. Chigal, Z.M.O. Chiola // International Journal of Food Science and Nutrition. – 2018. – Vol. 3, № 5. – P. 19-24. (In English).
10. Pat. 6443. RK: MPK: A23L 7/109. Sostav dlya izgotovleniya spagetti s polyn'yu / Orymbetova G.EH., Aripova SH.A.; zayavitel' i patentoobladatel' NAO «Yuzhno-Kazakhstanskii universitet im. M. AuehzovA». – 2021/0491.2; zayavl. 19.05.2021; opubl. 24.09.2021, Bil. № 38. (In Russian).
11. GOST 31743-2017 Izdeliya makaronnye. Obshchie tekhnicheskie usloviya. – Vved. 01.06.2017. – M. Standartinform, 2017. – 12 s. (In Russian).
12. GOST 34844-2022. Produktsiya pishchevaya. Opredelenie massovoi doli pishchevykh volokon. – Vved. 29.04.2022. – Moskva. Rossiiskii institut standartizatsii, 2022. – 16 s. (In Russian).
13. Kuregyan A.G. Spektrofotometriya v analize karatinoidov / A.G. Kuregyan // Fundamental'nye issledovaniya. – 2015. – № 2-23. – S. 5166-5172. URL: https://fundamental-research.ru/ru/article/view?id=38175 (data obrashcheniya: 04.10.2025). (In Russian).
14. Terent'eva O. A. Osobennosti sbalansirovannogo pitaniya pri silovoi trenirovke / O.A. Terent'eva // VIII Luzhskie nauchnye chteniya. Sovremennoe nauchnoe znanie: teoriya i praktika. – 2020. – S. 81-84. (In Russian).
15. Atef A. Studies on sheets properties made from juice and puree of pumpkin and some other fruit blends / A. Atef, A.S. Nadir, T.R. Mostafa. // Journal of applied sciences research. – 2012. – T. 8. – № 5. – S. 2632-2639. (In English).
16. Pat. 6565. RK: MPK: A23L 1/16. Sostav dlya izgotovleniya makaronnykh izdelii s dobavleniem pyure iz tykvy / Orymbetova G.EH., Okhotenko D.A.; zayavitel' i patentoobladatel' NAO «Yuzhno-Kazakhstanskii universitet im. M. AuehzovA». – 2021/0492.2; zayavl. 19.05.2021; opubl. 22.10.2021, Bil. № 42. (In Russian).

Г.Э. Орымбетова[1]*,Э.М. Орымбетов[1], М.К. Касымова[2], З.И. Кобжасарова[2], Б.Т. Ешимбетова[2]
[1]Оңтүстік Қазақстан медицина академиясы,
160019, Қазақстан, Шымкент, Ал-Фараби ал., 1
[2]М. Әуезов атындағы Оңтүстік Қазақстан университеті,
160012, Қазақстан, Шымкент, Тауке хан даңғ., 5
*e-mail: orim_77@mail.ru

АСҚАБАҚ ЕЗБЕСІ ҚОСЫЛҒАН МАКАРОН ӨНІМДЕРІН ӨНДІРУ ТЕХНОЛОГИЯСЫН ӘЗІРЛЕУ

Сапалы өнім өндіру және олардың адам рационында теңгерімді болуының маңызы зор. Макарон өнімдері нарықта тұрақты сұранысқа ие. Сондықтан тағамдық құндылығын арттыру мақсатында дәстүрлі емес шикізатты пайдаланып өнім жасау өзекті болып табылады. Жұмыста тағамдық және биологиялық құндылығын арттыру үшін дәстүрлі емес шикізатты – асқабақ езбесін пайдалана отырып, құбырлы макарон өнімдерін өндіру технологиясы ұсынылған. Құрамында әртүрлі пропорцияда асқабақ езбесі бар макарон қамырының әзірленген рецепті өнімді β-каротинмен, тағамдық талшықтармен, витаминдермен және микроэлементтермен байытады. Зерттеулер өнімнің қоректік құрамын жақсарта отырып, оның пішіні, тығыздығы және ыстыққа төзімділігі сияқты технологиялық қасиеттерін сақтауды қамтамасыз ететін компоненттердің оңтайлы арақатынасын (асқабақ езбесі массасының 20%) белгіледі. Құрамында асқабақ езбесі бар макарон өнімдерінің органолептикалық және физика-химиялық көрсеткіштерінің өзгерістері бағаланды, бұл өнеркәсіптік өндірістің оңтайлы параметрлерін анықтауға мүмкіндік берді. Өсімдік шикізатын пайдалана отырып, функционалды макарон өнімдерін өнеркәсіптік өндіруде қолдануға болатын перспективалы технология ұсынылады.

Түйін сөзер: *ұн, макарон өнімдері, асқабақ езбесі, технология, органолептикалық және физика-химиялық қасиеттері.*

Г.Э. Орымбетова[1]*, Э.М. Орымбетов[1], М.К. Касымова[2], З.И. Кобжасарова[2], Б.Т. Ешимбетова[2]
[1]Южно-Казахстанская медицинская академия,
160001, Казахстан, Шымкент, пл. Аль-Фараби, 1
[2]Южно-Казахстанский Университет им.М.Ауэзова,
160012, Казахстан, Шымкент, пр.Тауке хана, 5
*e-mail: orim_77@mail.ru

РАЗРАБОТКА ТЕХНОЛОГИИ ПРОИЗВОДСТВА МАКАРОННЫХ ИЗДЕЛИЙ С ДОБАВЛЕНИЕМ ТЫКВЕННОГО ПЮРЕ

Производство качественных продуктов и его баланс в рационе человека имеют важное значение. Макаронные изделия имеют постоянный спрос на рынке. Поэтому создание продукции с использованием нетрадиционного сырья с целью повышения пищевой ценности является актуальным. В работе предложена технология производства трубчатых макаронных изделий с добавлением нетрадиционного сырья – тыквенного пюре – с целью повышения их пищевой и биологической ценности. Разработанная рецептура макаронного теста, содержащего тыквенное пюре в различных пропорциях, обогащает продукт β-каротином, пищевыми волокнами, витаминами и микроэлементами. Исследованиями установлено оптимальное соотношение компонентов (20% от массы тыквенного пюре), обеспечивающее сохранение технологических свойств продукта, таких как форма, плотность и термостойкость, при одновременном улучшении его нутриентного состава. Проведена оценка изменений органолептических и физико-химических характеристик макаронных изделий с тыквенным пюре, что позволило определить оптимальные параметры для промышленного производства. Предложена перспективная технология, которая может быть использована при промышленном производстве функциональных макаронных изделий с использованием растительного сырья.

Ключевые слова: *мука, макаронные изделия, тыквенное пюре, технология, органолептические и физико-химические свойства.*

Авторлар туралы мәліметтер

Гулбаги Эмитовна Орымбетова* – техника ғылымдарының кандидаты, доцент, Оңтүстік Қазақстан медицина академиясы, Фармация факультеті, Шымкент, Қазақстан; e-mail: orim_77@mail.ru. ORCID: https://orcid.org/0000-0001-8987-3366.

Эмит Махатович Орымбетов – техника ғылымдарының кандидаты, доцент, Оңтүстік Қазақстан медицина академиясы, Фармация факультеті, Шымкент, Қазақстан; e-mail: abzal53@mail.ru. ORCID: https://orcid.org/0000-0003-4929-3118.

Махабат Куандыковна Касымова – химия ғылымдарының кандидаты, профессор, М. Әуезов атындағы Оңтүстік Қазақстан университеті, Тоқыма және тамақ инженериясы жоғары мектебі. Шымкент, Қазақстан; e-mail: mahabbat_67@mail.ru. ORCID: https://orcid.org/0000-0002-7150- 3014.

Зиба Исаховна Кобжасарова – техника ғылымдарының кандидаты, доцент. М. Әуезов атындағы Оңтүстік Қазақстан университеті, Тоқыма және тамақ инженериясы жоғары мектебі, Шымкент, Қазақстан; e-mail: k.z.i.@bk.ru. ORCID: https://orcid.org/0000-0001-5419-7484.

Балжан Торебековна Ешимбетова – магистр, аға оқытушы. М. Әуезов атындағы Оңтүстік Қазақстан университеті, Тоқыма және тамақ инженериясы жоғары мектебі, Шымкент, Қазақстан; e-mail: baljan2275@mail.ru.

Сведения об авторах

Гулбаги Эмитовна Орымбетова* – кандидат технических наук, доцент, Южно-Казахстанская медицинская академия, Факультет фармации. Шымкент, Казахстан; e-mail: orim_77@mail.ru. ORCID: https://orcid.org/0000-0001- 8987-3366.

Эмит Махатович Орымбетов – кандидат технических наук, доцент. Южно-Казахстанская медицинская академия. Факультет фармации. Шымкент, Казахстан; e-mail: abzal53@mail.ru. ORCID: https://orcid.org/0000-0003-4929-3118.

Махабат Куандыковна Касымова – кандидат химических наук, профессор, Высшая школа текстильной и пищевой инженерии, Южно-Казахстанский университет им. М. Ауезова, Шымкент, Казахстан; e-mail: mahabbat_67@mail.ru. ORCID: https://orcid.org/0000-0002-7150- 3014.

Зиба Исаховна Кобжасарова – кандидат технических наук, доцент. Высшая школа текстильной и пищевой инженерии, Южно-Казахстанский университет им. М. Ауезова, Шымкент, Казахстан; e-mail: k.z.i.@bk.ru. ORCID: https://orcid.org/0000-0001-5419-7484.

Балжан Торебековна Ешимбетова – магистр, старший преподаватель. Высшая школа текстильной и пищевой инженерии, Южно-Казахстанский университет им. М. Ауезова, Шымкент, Казахстан; e-mail: baljan2275@mail.ru.

Information about authors

Gulbagi Emitovna Orymbetova* – candidate of technical science, associate professor, South Kazakhstan Medical Academy, Faculty of Pharmacy, Shymkent, Kazakhstan; e-mail: orim_77@mail.ru. ORCID: https://orcid.org/0000-0001- 8987-3366.

Emit Makhatovich Orymbetov – candidate of technical science, associate professor, South Kazakhstan Medical Academy, Faculty of Pharmacy, Shymkent, Kazakhstan; e-mail: abzal53@mail.ru. ORCID: https://orcid.org/0000-0003-4929-3118.

Makhabat Kuandykovna Kassymova – candidate of chemical science, associate professor, M. Auezov South Kazakhstan state university, Textile and Food Engineering higher school, Shymkent, Kazakhstan; e-mail: mahabbat_67@mail.ru. ORCID: https://orcid.org/0000-0002-4789-7148.

Ziba Isakhovna Kobjasarova Kobjasarova – candidate of technical science, associate professor, M. Auezov South Kazakhstan state university, Textile and Food Engineering higher school, Shymkent, Kazakhstan. ORCID: https://orcid.org/0000-0001-5419-7484.

Balzhan Torebekovna Yeshimbetova – master, senior lecturer. Textile and Food Engineering higher school M. Auezov' South-Kazakhstan University, Shymkent, Kazakhstan; e-mail: baljan2275@mail.ru.

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Ф.Х. Смольникова*, А.Д. Мұхаметқали, Э.К. Окусханова, А.С. Камбарова
Шәкәрім университет,
071412, Республика Казахстан, г. Семей, ул. Глинки, 20 А
*e-mail: smolnikovafarida@mail.ru

ПРИМЕНЕНИЕ РАСТИТЕЛЬНЫХ КОМПОНЕНТОВ В ТЕХНОЛОГИИ МЯСНЫХ ИЗДЕЛИЙ ДЛЯ ПИТАНИЯ ПОЖИЛЫХ ЛЮДЕЙ

Аннотация: *В условиях стремительного роста численности пожилого населения одной из приоритетных задач является разработка специализированных пищевых продуктов, способствующих поддержанию здоровья, профилактике возрастных заболеваний и обеспечению физиологически полноценного питания. Целью настоящей работы стало создание технологии мясного полуфабриката геродиетического назначения с использованием растительных компонентов — муки из булгура и кабачков, обладающих высокой пищевой и биологической ценностью. Разработаны три варианта рецептур, различающихся процентным содержанием сырья животного и растительного происхождения. Оценка образцов включала органолептический анализ по бальной системе (внешний вид, цвет, запах, вкус, консистенция), а также определение химического состава оптимального варианта. Результаты показали, что добавление растительных ингредиентов способствует улучшению сенсорных характеристик изделия, снижению массовой доли жира и увеличению содержания пищевых волокон, витаминов и минеральных веществ. Наилучшие показатели были зафиксированы у образца № 2, содержащего около 20 % растительных добавок. Предложенная рецептура представляет собой оптимальное сочетание по органолептическим характеристикам и пищевой ценности, что позволяет рекомендовать её для внедрения в технологии мясных изделий геродиетического назначения. Учитывая её сбалансированный состав и высокие потребительские свойства, данную рецептуру целесообразно использовать как в системе организованного питания пожилых людей, так и при производстве функциональных продуктов, ориентированных на геродиетическое питание.*

Ключевые слова: *геродиетическое питание, мясной полуфабрикат, мука из булгура, растительное сырьё, пищевая ценность.*

Введение

Мясо и мясные продукты представляют собой широко известные продукты питания, богатые биологически ценными питательными веществами, которые важны для здорового питания человека. Тем не менее, приготовленные мясные продукты редко рассматриваются как основной источник витаминов из-за потери большей части витаминов в процессе