NEW PRODUCT WITH COLLAGEN HYDROLYZATE
КОЛЛАГЕН ГИДРОЛИЗАТЫ КОСЫЛГАН ЖАҢА ӨНІМ

ANNOTATION
Modern knowledge about diet and health is increasingly pushing the use of foods with functional properties that meet the requirements of healthy food.

The present work considers the possibility of producing mayonnaise sauces using a balanced fat base and collagen hydrolyzate as a functional additive, which has emulsifying properties and is a source of protein.

The aim of the work was the development of formulations and analysis of physicochemical, organoleptic indicators according to the scoring system and safety indicators of new mayonnaise sauces with functional properties.

It has been established that the use of a base and a functional additive balanced in terms of fatty acid composition makes it possible to obtain sauces with good organoleptic characteristics: a characteristic structure, pronounced taste and aroma (assessed with high scores). According to physical and chemical indicators, new types of mayonnaise sauce meet the requirements of the standard.

In terms of product quality indicators, namely, microbiological safety indicators comply with the standards established by the Technical Regulations of the Customs Union.

Key words: collagen hydrolysate, vegetable oils, fatty acidity, mayonnaise sauce, safety

Introduction. Today, diet and social education about health have forced people to consume foods with functional features. In this regard, consumers need nutritious and healthy food, knowing that diet has a significant impact on their health. Each ingredient plays an important role in the stability of the product's texture, and the use of alternative emulsifiers and fat substitutes can affect the sensory, texture and antioxidant properties of mayonnaise. In addition to fat substitutes, mayonnaise comes with biologically active ingredients to keep the body healthy [1,2,3]. Developing new foods is becoming an increasingly difficult task, as it must meet the food requirements of consumers, especially for proper nutrition. In this regard, it is important to include in the diet of functional foods that are healthy, especially low-fat foods [4,5]. The main aspects of the formation of functional properties of mayonnaise: reducing the mass fraction of vegetable oils, improving the fatty acid content of the fat phase through the use of mixed vegetable oils by prescription; reduction of cholesterol-containing raw mayonnaise or complete elimination of mayonnaise by increasing the emulsifying capacity of egg products or their conversion to plant phospholipids or other active substances; Prevention of microbiological, hydrolytic and oxidative damage of mayonnaise with the use of natural additives with high antioxidant activity - tocopherols, plant extracts, increase shelf life [6].
Nowadays, the consumption of functional foods has spread all over the world and contributes to the growing dietary interest of consumers. Consumers want to buy functional foods that recognize the health benefits that are not found in normal foods [7,8].

For this purpose, a useful ingredient - collagen hydrolysate was added to the mayonnaise sauce. One of the properties of collagen hydrolysate is its emulsifying ability [9], which affects the shelf life and consistency of mayonnaise, respectively.

The results of the study show that the use of collagen in sour milk products allows the human body to absorb collagen peptides faster and better [10,11]. Research show that in sour milk products hydrolyzed collagen has a beneficial effect on some probiotic crops traditionally used in dairy products [12,13].

Despite the growth of the mayonnaise assortment in the last year, the problem of making domestic mayonnaise with a balanced composition that meets all the requirements for this type of products remains relevant. In particular, they include the consumption of animal fats and the lack of polyunsaturated fatty acids [14,15].

Thus, the development and production of competitive food products with consumer, high biological value and long shelf life is one of the promising directions of innovative development of the oil industry. From this point of view, a promising direction for creating mayonnaise products with a balanced composition is the use of complex biologically active mixtures of natural origin containing antioxidants [16,17].

That is, mayonnaise sauce with collagen is an effective way to use hydrolyzed collagen as a prophylaxis compared to other forms. Studies have shown that in the production of functional mayonnaise sauce, some functional ingredients are added to mayonnaise [18,19].

**Materials and research methods.** The research was conducted in the laboratory of the Kazakh National Agrarian Research University (KazNAZU) at the Department of "Technology and Safety of Food Production", in the Kazakh-Japanese Center at KazNAZU, in the laboratories of "Erkin Talgam" LLP.

Objects of study: is a mayonnaise sauce with collagen hydrolysate based on a fat mixture with a balanced composition of sunflower and fatty acids.

Moisture was determined by drying to a constant mass and mass fraction of fat - with the help of Soxhlet apparatus. Determination of organoleptic characteristics was carried out at a temperature of (20 ± 2) °C not earlier than 12 hours after product preparation. Determination of tocopherols was carried out by thin-layer chromatography in accordance with GOST EN 12822-2014.

The determination of humidity was carried out by drying to a constant mass and mass fraction of oil - with the help of a Soxlet device. Determination of organoleptic parameters was carried out at a temperature of (20±2) °C not earlier than 12 hours after the preparation of the product. Determination of the content of tocopherols was carried out by thin-layer chromatography in accordance with GOST en 12822-2014.

Determination of microbiological indicators: number: yeast and mold fungi according to GOST 10444.12-88; bacteria of the Escherichia coli group - GOST 31747-2012; pathogenic, including salmonella - GOST 31659-2012.

The preparation of mayonnaise sauce was carried out in the way described below. Water, salt, sugar, food additives are pre-mixed to form a homogeneous solution, heated to 80-85°C, then kept for 10 minutes and cooled to 60°C. Then the egg product was added.

The resulting solution is stored at a temperature of 60-65°C for 3 minutes. Next, parts of the vegetable oil mixture were added to the resulting solution, stirring slowly. After mixing, the product was homogenized by introducing acetic acid, which was previously diluted in prescription water in a ratio of 1:8.

Taking into account the benefits of collagen hydrolysate for the human body, when preparing the recipe, it was observed that equal parts of vegetable oils were mixed in a dissolved form. The work uses collagen hydrolysate as a functional ingredient to expand the range of mayonnaise sauces.

The daily required amount of collagen for the human body is easily covered by using only a portion of mayonnaise containing 2-3 g of hydrolyzed collagen. At the same time, the consumer uses not only a healthy product, but also a delicious one.

The introduction of collagen into the recipe does not require additional equipment or changes in the technological process. Collagen is completely dissolved in vegetable oil, there are no temperature or mechanical restrictions. This property is one of the most important and expands the benefits of using hydrolyzed collagen in mayonnaise sauces [9].

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Results and its discussion.

The composition of mayonnaise sauce with a balanced composition of vegetable oils with the addition of collagen hydrolysate is shown in Table 1. Three samples were studied as the subject of the study: a sunflower oil product was used as a control sample. In the future, this sample of the mixture became the basis for obtaining samples of mayonnaise sauce. The recipe is shown in Table 1.

Table 1 – Recipe for 1 kg of functional mayonnaise sauce of the finished product (g)

<table>
<thead>
<tr>
<th>Name of the recipe components</th>
<th>Composition of the component, grams</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>test sample</td>
</tr>
<tr>
<td></td>
<td>№1</td>
</tr>
<tr>
<td>Refined deodorized sunflower oil</td>
<td>49,8</td>
</tr>
<tr>
<td>Vegetable oil (a mixture of sunflower, safflower and linseed oils with a balanced fat content)</td>
<td>-</td>
</tr>
<tr>
<td>Vinegar</td>
<td>0,1</td>
</tr>
<tr>
<td>Table salt</td>
<td>1,1</td>
</tr>
<tr>
<td>Mustard or mustard oil</td>
<td>2,0</td>
</tr>
<tr>
<td>Sugar</td>
<td>2,8</td>
</tr>
<tr>
<td>Eggs</td>
<td>4,0</td>
</tr>
<tr>
<td>Collagen hydrolysate</td>
<td>-</td>
</tr>
</tbody>
</table>

As a result, samples of mayonnaise sauce with a fatty-acid composition and collagen hydrolysate were obtained from a balanced mixture of vegetable oils.

Organoleptic indicators of mayonnaise sauce samples are shown in Figure 1 and physico-chemical indicators in Table 2. The consistency of the resulting samples was in the form of a uniform liquid creamy mass.

Figure 1 – Organoleptic indicator of mayonnaise sauce samples

Mayonnaise sauce No. 1 from sunflower oil has acquired a uniform creamy color over the entire mass, and sample No. 2 has a uniform yellowish-cream color over the entire mass, both samples clearly show the color.
Table 2 – Organoleptic and physico-chemical parameters of mayonnaise sauce samples, %

<table>
<thead>
<tr>
<th>Name of the indicator</th>
<th>Sample of normative value control according to GOST</th>
<th>Practical example of mayonnaise sauce</th>
<th>Practical example of mayonnaise sauce</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>according to the technical document for the product</td>
<td>№1</td>
<td>№2</td>
</tr>
<tr>
<td>Mass fraction of moisture, %</td>
<td>not less than 15,0</td>
<td>70,47</td>
<td>74,34</td>
</tr>
<tr>
<td>Mass fraction of fat, %</td>
<td>No more than 1,0</td>
<td>20,03</td>
<td>18,3</td>
</tr>
</tbody>
</table>

In mayonnaise sauce made from sunflower oil, the fat content was 18.3%, and in sample № 2 of mayonnaise sauce with a balanced composition of vegetable oils, this figure was at the level of 18.5%. The acid content in sample №2 was 0.61 mg Kon/G, and in sample №1 mayonnaise sauce -0.50 mg Kon/G was of great importance.

The concentration of heavy metals, pesticides, as well as mycotoxins in mayonnaise and mayonnaise sauce was analyzed in accordance with TR CU 021/2011 of the technical regulations of the customs union "on the safety of food products" [20].

The content of heavy metals, pesticides, and mycotoxins in experimental samples is shown in Table 3.

Table 3 – Determination of safety indicators of mayonnaise sauces

<table>
<thead>
<tr>
<th>Name of the indicator</th>
<th>Sample of normative value control according to GOST</th>
<th>Practical example</th>
<th>Practical example of mayonnaise sauce</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>№1</td>
<td>№2</td>
</tr>
<tr>
<td>Toxic elements:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead, mg / kg,</td>
<td>0,3 no more</td>
<td>0,23</td>
<td>0,23</td>
</tr>
<tr>
<td>Cadmium, mg / kg,</td>
<td>0,05 no more</td>
<td>not found</td>
<td>not found</td>
</tr>
<tr>
<td>Arsenic, mg / kg,</td>
<td>0,1 no more</td>
<td>not found</td>
<td>not found</td>
</tr>
<tr>
<td>Synap, mg / kg,</td>
<td>0,05 no more</td>
<td>not found</td>
<td>not found</td>
</tr>
<tr>
<td>Pesticide:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HCG (α, β, γ-isomers), mg / kg,</td>
<td>0,2 no more</td>
<td>not found</td>
<td>not found</td>
</tr>
<tr>
<td>DDT and its metabolites, mg / kg, no more</td>
<td>0,2 no more</td>
<td>not found</td>
<td>not found</td>
</tr>
<tr>
<td>Mycotoxins:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aflatoxin B1, mg / kg,</td>
<td>0,005 no more</td>
<td>not found</td>
<td>not found</td>
</tr>
</tbody>
</table>

The results of the analysis of mayonnaise sauce samples showed that the maximum lead contamination (Pb) of sample No. 2 was 0.1 mg/kg, which does not exceed the standard value.

The composition of cadmium (Cd), arsenic ions (As) and Mercury (Hg), pesticides (GHCG (α, β, γ-isomers), (DDT and its metabolites) and mycotoxin (Aflotoxin B1) were not found in the samples.

The results obtained showed that the values of heavy metals, pesticides and mycotoxins in experimental samples did not exceed the maximum permissible concentrations established by regulatory documents. Microbiological indicators established by the technical regulations for fat products TR CU 024/2011 [11] are shown in Table 4.

The study of a new sample of mayonnaise sauce meets all the criteria of the regulatory document and complements the range of fat products. From the data obtained, mayonnaise sauce with collagen hydrolysate, based on an oil mixture with a balanced fatty acid composition, showed better results than a sample based on sunflower oil.

Table 4 – Microbiological indicators of mayonnaise sauces

<table>
<thead>
<tr>
<th>Name of the indicator</th>
<th>Sample of normative value</th>
<th>Practical example</th>
<th>Practical example of</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
Organoleptic and physico-chemical indicators in mayonnaise sauce made from sunflower oil the fat content was 18.3%, and in the sample of mayonnaise sauce with a balanced composition of vegetable oils, this indicator was at the level of 18.5%. Of great importance was the amount of acid in sample № 2 - 0.61 mg Kon/G, and in mayonnaise sauce made from sunflower oil-0.50 mg Kon/G.

In the study of safety indicators of mayonnaise sauces, the maximum lead contamination (Pb) was 80 mg/kg at 15:05:0.1, cadmium (Cd), arsenic ions (As) and Mercury (Hg), pesticides (GHCG (α, β, γ-isomers), (DDT and its metabolites) and mycotoxin (Aflotoxin B1) were not found in the samples. The product quality indicator, which is Microbiological Safety, corresponds to the standards established by TR CU 024/2011.

Taking into account the above, it should be noted that the new recipe for mayonnaise sauce with the addition of collagen hydrolysate based on a mixture of oils with a balanced fatty acid composition meets the requirements of regulatory documents in all indicators of quality and safety.

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REFERENCES

1 Naumova N.L. Formation of the quality of mayonnaise with antioxidant properties in the process of oxidative spoilage [Text]// N.L. Naumova, A.A. Lukin, A.S. Koval// Bulletin of the Altai State Agrarian University No. 6 (116), 2014
5 Kochetkova A. A. Functional products in the concept of healthy nutrition. Food industry, 2019, no. 3, p. 4-5
6 Kochetkova A. A. et al. Modern theory of positive nutrition and functional foods. - Food industry, 2019, no. 4, p. 7-10
7 Gazalla Akhtar, F.A. Masoodi, Structuring functional mayonnaise incorporated with Himalayan walnut oil Pickering emulsions by ultrasound assisted emulsification,Ultrasonics Sonochemistry,Volume 86,2022
9 Ran Zhao, Weiliang Guan, Xiaomin Zhou, Minjun Lao, Luyun Cai,The physiochemical and preservation properties of anthocyanidin/chitosan nanocomposite-based edible films containing cinnamon-perilla essential oil pickering nanoemulsions, LWT,Volume 153, 2022, p 1145


15 Aznauryan E. M. Development formulated and the advanced technology of physiologically full of mayonnaise[Text]/ Dissertation work / Aznauryan, Elena Melkonovna / Moscow, 2017.


ТУЙІН

Диета және денсаулық туралы заманауи білім пайдальы тағам талаптарына сәйкес келетін функционалдық қасиеттері бар тағамдарды пайдалануды күшейтеді.

Бұл жұмыста эмульгациялауы қасиетке әсер етпей және белок көзі болып табылатын функционалдық қоспа ретінде теңдеугі май негізі мен коллаген гидролизатыны пайдаланып майонез соустарын алу мүмкіндігі қарастырылады.

Жұмыстың мақсаты – функционалдық қоспалары бар жаңа майонез соустарының кауіпсіздігі, жаңа және стандарт жаңа майонез соустарының кауіпсіздігі, сауалдық қасиеттерін және тұжырымдарын анықтау.

Май қышқылдарының құрамы бойынша жаңа майонез соустарының кауіпсіздігі, жаңа және стандарт жаңа майонез соустарының кауіпсіздігі, сауалдық қасиеттерін және тұжырымдарын анықтау.

Оңим сапасының жаңа майонез соустарының кауіпсіздігі және стандарт жаңа майонез соустарының кауіпсіздігі, жаңа және стандарт жаңа майонез соустарының кауіпсіздігі, сауалдық қасиеттерін және тұжырымдарын анықтау.

РЕЗЮМЕ

Современные знания о диете и здоровье все больше подталкивают к использованию продуктов питания с функциональными свойствами, соответствующим требованиям здоровой пищи.

В представленной работе рассмотрена возможность производства майонезных соусов с применением в качестве функциональной добавки сбалансированной жирной основы и коллагенового гидролизата, который обладает эмульгирующими свойствами и являются источником белка.

Цель работы являлось разработка рецептур и проведения анализа физико-химических, органолептических показателей по балльной системе и показателей безопасности новых майонезных соусов с функциональными свойствами.

Установлено, что применение сбалансированной по жирно кислотному составу основы и функциональной добавки позволяет получить соусы, обла дающие хорошими органолептическими характеристиками: характерной структурой, ярко выраженным вкусом и ароматом (оценены
высокими баллами). По физико-химическим показателям новые виды майонезного соуса соответствуют требованиям стандарта.

По показателям качества продукции, а именно, показатели микробиологической безопасности соответствуют нормам, установленным Техническим регламентом Таможенного союза.