С.Сейфуллин атындағы Қазақ агротехникалық университетінің Ғылым жаршысы(пәнаралық) = Вестник науки Казахского агротехнического университета им.С.Сейфуллина (междисциплинарный). - 2022. – № 4 (115). –Ч.2. – Р.78-85

doi.org/ 10.51452/kazatu.2022.4.1229
UDC 338.43.45

QUALITATIVE INDICATORS MAYONNESIS «DOMASHNII» FROM A MIXTURE OF VEGETABLE OILS

Lorenzo Guerrini
PhD
Università di Firenze
Dipartimento di Scienze e Tecnologie
Firenze, Italy
E-mail: Lorenzo.guerini@unif.it

Mukhametov Almas Erekuly
PhD
Kazakh National Agrarian research university
Almaty, Kazakhstan
E-mail: myhametov_almas@mail.ru

Annotation

Polyunsaturated fatty acids account for 3.3% of the human diet in the daily market. Despite the growth in the range of mayonnaise over the past year, the problem of manufacturing domestic mayonnaise of a balanced composition that meets all the requirements for this type of product remains relevant. A comprehensive multi-level approach to assessing the nutrition of the Kazakh people revealed a wide range of nutritional status disorders. In particular, these include the consumption of animal fats and deficiency of polyunsaturated fatty acids. Polyunsaturated fatty acids are indispensable nutritional factors and their composition should correspond to 3-4% of the energy value of the diet.

This article presents options for the development of mayonnaise with a balanced composition.

A new functional mayonnaise product with a balanced composition of ω-3 and ω-6 fatty acids has been developed based on a mixture of vegetable oils (sunflower, linseed, and safflower) with a balanced composition of polyunsaturated fatty acids.

The main physico-chemical parameters and fatty acids of a sample of a mixture of vegetable oils were determined. Humidity was determined by drying to constant weight, the mass fraction of oil according to Soxhlet, pH indicators - by the potentiometric method according to GOST 31762-2012.

Based on the results of studies, taking into account the physicochemical parameters and biological properties of vegetable oil, it was found that when a new type of mayonnaise with high nutritional and biological value is obtained, human nutrition is

not disturbed during use. The use of vegetable raw materials in the production of new mayonnaise with high nutritional and biological value expands the range of this type of product, increases its biological value and extends its shelf life.

Keywords: vegetable oil; safflower oil; flax oil; sunflower oil; fatty acid composition; mayonnaise.

Introduction

Proper nutrition is one of the most important principles in maintaining a healthy lifestyle. The main way to prevent and treat many diseases and allergic reactions in the human body is to pay attention to the quality and combination of consumed food. The quality of food should take into account the individual indicators of the components and their compatibility. Due to this, recently, the world has been paying a lot of attention to the issues of rational nutrition of people of all ages [1].

Mayonnaise, mayonnaise or other sauces, which comprise a large part of the diet, are in high demand to study the composition of fat-containing condiments and make them as healthy as possible. Products with physiological value and high value - mayonnaise, sauces are quickly absorbed by the body and are characterized by excellent taste quality indicators [2].

Being highly nutritious and physiologically valuable products, mayonnaises and sauces are easily absorbed by the body and have excellent taste properties. They increase the nutritional value of sandwiches, meat and vegetable products and are widely used both in home cooking and public catering [3,4].

In addition, currently produced mayonnaise products do not fully meet the requirements for fat and watery, milky content. Besides, according to the medical indicators of many people, the consumption of fatty products - mayonnaise is restricted due to the high value of components such as egg products, sugar, vinegar, salt and spices. It is also important that mayonnaise has a short shelf life. The limited shelf life is primarily based on the quality of fatty raw materials and other components included in mayonnaise products, as well as the technology of their extraction and purification.

In short, increasing the quality of mayonnaise is not only modern equipment and new technology, but first of all, a set of correct and scientifically based components, which, in combination with special additives, provide physiologically complete mayonnaises and dietary, therapeutic and purposeful sauces with taste indicators according to the consumer's habits. should [4].

The physiological need for the total number of polyunsaturated fatty acids is 6-10% for adults, and for children - 5-14% of daily caloric intake.

Let's say that the physiological need for ω-6 fatty acids is 8-10 g per day for adults. Daily diet is 5-8% of calories, and ω-3 fatty acids are 0.8-1.6 g. makes up 1-2% of calories consumed with food throughout the day. The optimal ratio of ω-6 to ω-3 in the daily diet of fatty acids (5-10):1 [5, 6].

The world of vegetable oils is very diverse, each oil has its own special set of nutritionally important nutrients and biologically active substances. The most valuable vegetable oils include linseed, juniper, cedar, mustard, sunflower, olive, pumpkin, grape, watermelon, sesame, soybean oils, which are characterized by a high content of essential polyunsaturated fatty acids, a wide spectrum of biologically active compounds, and a good taste. It should be mentioned here the vegetable oils obtained from medicinal plants (rosehip, dogwood, viburnum, blackcurrant, borage, evening primrose), which are used as a pharmacological preparation or to increase the biological value and functionality of traditional edible oils.

However, it should be noted that the fatty acid composition of many vegetable oils is distinguished by the predominance of certain fatty acids and the presence or absence of others. In recent years, a new technology using genetic engineering techniques to produce these fatty acids has become widespread. However, due to the lack of information about the absence of harm to the human body in society, a negative attitude towards genetically modified products was formed. The advantage of mixed oils is that the vegetable oils included in their composition belong to traditional food products, there are no negative reactions in the body, and their production is more economically efficient [7].

The advantages of blended oils are characterized by the fact that the vegetable oils included in their composition are included in the composition of traditional food products, the absence of negative reactions on the body, and the efficiency of the economic conditions of production [7].

The purpose of this study is to study the qualitative characteristics of homemade mayonnaise made from a mixture of vegetable oils.

Materials and methods

The studies were carried out in the laboratory of the Kazakh National Agrarian Research University (KazNARU) at the Department of Technology and Safety of Food Production, in the Kazakh-Japanese Center at KazNARU, in the laboratories of Erkin Talgam LLP.

To achieve this goal, a mixture of 3 types of oil was made: sunflower, safflower, flax. The obtained samples were tested for quality indicators. Further, this mixture became the basis for obtaining "home" mayonnaise.

The object of research was a mixture of domestic vegetable oils: sunflower, safflower, linseed and "Home" mayonnaise made from a mixture of these vegetable oils.

The preparation of mayonnaise sauce was carried out as described below. Water, salt, sugar, were pre-mixed until a homogeneous solution was formed and heated to 80-85°C, followed by holding for 10 minutes and cooling to 60°C. Then the egg product was added. The resulting solution was kept at a temperature of 60-65°C for 3 minutes. Further, parts of the mixture of vegetable oil were slowly added to the resulting solution with simultaneous stirring. After mixing, acetic acid, previously diluted in prescription water in a ratio of 1:8, was added to the product. The product was then stirred and homogenized.

Indicators of oxidative damage in the mixture of vegetable oils were determined according to GOST 31933-2012 [9] and GOST 26593-85.

Determination of the composition of fatty acids by gas chromatography and sample preparation based on conversion of fatty acid triglycerides to their methyl esters and their gas chromatographic analysis of the mass fraction of individual fatty acid methyl esters to their sum determined according to their sum". Methyl ethers have a lower temperature than the primary acids, which greatly simplifies chromatography.

Preparation of a vegetable oil sample: 2-3 drops of the analyzed vegetable oil sample were dissolved in 1 ml of hexane. 2 M sodium methylate in methanol was added to 50 μl of dissolved sample and mixed for 1 min. Then the reaction mixture was stabilized for 15 minutes, centrifuged for 10 minutes, and chromatographic analysis was carried out.

Chromatography was carried out in a DB-23 capillary column at an evaporator temperature of 200°C and a detector temperature of 240°C. Carrier gas (mobile phase) nitrogen, consumption 80 ml/min.

According to GOST 31761-2012 [9], organoleptic and physicochemical indicators were determined in mayonnaise .

Moisture was determined by the method of drying to a constant mass, the mass fraction of oil was determined by Soxhlet, and Ph indicators were determined by the potentiometric method according to GOST 31762-2012 [9].

Results

The obtained results show the feasibility of using a mixture of vegetable oils in the production of mayonnaise to solve the problem of ensuring the balance of products in terms of fatty acid content, especially in terms of the content of ω-3 and ω-6 fatty acids. In the diet of a healthy person, the ratio of ω-3 fatty acids to ω-6 fatty acids should be 1:10. In terms of preventive diet and therapeutic nutrition, the ratio of ω-3 to ω-6 should be 1:5 or even 1:3 for a positive physiological effect. Analysis of the

actual nutrition of the world population shows that the ratio of general polyunsaturated fatty acids should be exactly 1: 10-1: 30. The problem of polyunsaturated fatty acid deficiency can be solved by the production of biologically active mixtures (media) containing essential fatty acids and their use for therapeutic and preventive purposes.

Discussion

Sunflower, safflower, and linseed oils were used in the research in a ratio of 80:15:05.

Table 1- Qualitative indicators of the mixture of vegetable oils

Indicators of oxidative damage	Norm*	Do not mix
1	2	3
Acid number, mg KOH/g, not much	Not more than 0.6	0.45±0.03
Active oxygen peroxide, mmol/kg	-	2.40±0.19
Mass fraction of volatile substances and moisture %	-	0.060±0.00003
Note: * - Order of the Customs Union Commission dated 09.12.2011. CU TR 024/2011 approved by decision No. 883, 1 appendix.		

The resulting clear, oily, yellow, sediment-free liquid with a slight taste and smell was studied according to quality indicators (table 1), fatty acid index (table 2).

The acid value indicates the edibility of oils and indicates the content of free fatty acids, which indicate deterioration of oil quality and loss of freshness.

Peroxide number is the most important chemical indicator of vegetable oils. During the extraction, processing and storage of this product, it is oxidized by atmospheric oxygen, which leads to deterioration of the nutritional value of the oil.

According to the given example, the amount of acid in the mixture is more than normal 0.45(±0.03) mg KOH/g, and the amount of hydrogen oxide was 2.40(±0.19) mmol of active oxygen/kg, which, in turn, made the obtained oily mixture " Showed suitability for use to obtain "Home" mayonnaise.

Table 2- Fatty-acid composition of the mixture of vegetable oils

Fatty acid name	Indicators
1	2
Saturated fatty acids, %	10,613
C16:0 Palmitic acid	6,080
C18:0 Stearic acid	2,886
C20:0 Arachinic acid	0.170
C22:0 Begenic acid	1,477
Monounsaturated fatty acids, %	10,966
C16:1 Palmitoleic acid	0.048
C18:1n9c Oleic acid	10,625

C20:1 Eicosenoic acid	0.292
Polyunsaturated fatty acids, %	78,422
C18:2n6cLinoleic acid	74,964
C18:3n6 Y-linolenic acid	0.092
C18:3n3Linolenic acid	3,366

The biological activity of PKM is not uniform. High activity is shown by linoleic acid, and the activity of linolenic acid is 8-10 times less. Among essential fatty acids, linoleic acid is particularly important for the human body [8].

As shown in Table 2, the fatty-acid content of the mixture of vegetable oils was 74.964+0.092=75.056% (C18:2n6cLinol, C18:3n6 Y-linolene), and ω-3 fatty acids was 3.366% (C18:3n3 Linolene).

Later, this obtained sample became the basis for obtaining "Home" mayonnaise. Mix water, salt, granulated sugar, and food additives to a homogeneous mass, heat to 80-85°C, then hold the mass for 10 minutes and cool to 60°C. Then we add raw eggs. We keep the resulting mass at a temperature of 60-65°C for 3 minutes. After that, we slowly add the vegetable oil mixture to the obtained mass in parts. Add acetic acid mixed with water in a ratio of 1:8 according to the previous recipe to the well-mixed mass. After adding all the ingredients, mix well and homogenize.

As a result, "Home" mayonnaise with a balanced fatty acid composition with a mixture of vegetable oils was obtained. The organoleptic and physico-chemical indicators of the finished product were determined.

According to tasters, the finished sample of "Home" mayonnaise had a characteristic cream-yellow uniform color, creamy texture, and unique smell.

Table 3-Results of organoleptic index (tasting).

Index name	Standard according to GOST 31761-2012	Product Description		
		Taster #1	Taster #2	Taster #3
1	2	3	4	5
Appearance, consistency	Smooth creamy product; inconspicuous air bubbles are allowed.	Smooth creamy and slightly jelly consistency	Smooth creamy and slightly jelly consistency	Smoothly creamy and with few air bubbles
Taste, smell	The taste is slightly bitter, sour, and has the taste and smell of added aromatic compounds	Sour, with a smell of mustard and acetic acid	It has a bitter, sour, acetic acid smell	It has a slightly bitter, acetic acid smell
Color	White to creamy-yellow color, uniform throughout the mass or based on aggregated	Creamy yellow	Creamy yellow, uniform	Creamy yellow, uniform

	lobules			

Physico-chemical indicators of "Home" mayonnaise are shown in table 4. According to the table, fat content was 51.3%, and moisture content was 25.05%.
The composition of egg products was 1.1% based on the dry yolk body [9], and the viscosity Pa·s at a temperature of 20 °C (Dr =3 s at the sliding age [9]) was 5.5%.
The quality physico-chemical indicators of " Home " mayonnaise exceeded the norm (Table 4).

Table 4 - Physico-chemical indicators of " Home " mayonnaise.

Qualitative indicators	According to GOST 31761-2012	"Home" mayonnaise
Fat content, %, not less	50,0	51,3
Humidity, %, not less	-	25,05
Egg production content per dry yolk body, %, not less	1,0	1,1
Acidity, % by acetic acid, not less	1,0	0,5
Emulsion stability, % intact emulsion, no less	98	98,2
pH	3,5-5,0	4,38
At a temperature of 20 °C, the viscosity is Pa·s (Dr = 3 s during the sliding period), not less	5,0	5,5

Assessment of emulsion stability of mayonnaise GOST 30004.2-93 "Mayonnaises. The emulsion stability was evaluated as a percentage of the intact emulsion according to the acceptance rule and experimental methods. The analysis was performed on freshly prepared samples and on samples that had been refrigerated for no more than 1 or 2 weeks. Received samples comply with regulatory documents.

Table 5- Emulsion stability of "Home" mayonnaise.

Name	The day it is ready	7th day	7th day
Intact emulsion, %	98,2	98,2	98,2
Peroxide number, mmol/kg	0,756	1,03	2,02

The obtained results in table 3-5 show that "Home" mayonnaise meets all the requirements of GOST 31761-2012 [9].

Microbiological safety is an important indicator of product quality, the indicators must always comply with all TR TS 024/2011 "Technical regulations on oil and fat products" [9]. Table 6 shows the microbiological indicators of the obtained product.

Table 6 - Microbiological indicators of "Home" mayonnaise.

Indicators		The norm	"Home" mayonnaise
Unacceptable body mass, (g)	0.1	Not defined	Not defined
	25	Not defined	Not defined
	It is not allowed	Not defined	Not defined
Yeasts, CFU/g[2], not many		$5*10^2$	Not defined
Mold, CFU/g, not much		50	Not defined
KMAFAnM[3], CFU/g, not much		It is not allowed	Not defined

The results in table 6 show that they are in accordance with the requirements specified in the regulatory document.

According to the results of the comparative analysis, taking into account the physico-chemical indicators and biological properties of vegetable oil seeds, it was found that when obtaining a new type of mayonnaise with high nutritional and biological value, human nutrition is not disturbed when using mayonnaise for various purposes. The use of plant-based raw materials in the production of fresh mayonnaise with high nutritional and biological value expands the range of this type of product, increases its biological value, and extends its shelf life.

Conclusion

Based on the results of studies, taking into account physical and chemical indicators, which showed fat content was 51.3%, and moisture content was 25.05%. and microbiological properties of mayonnaise "Domashny", which showed the best result of vegetable oil, it was found that when a new type of mayonnaise with high nutritional and biological value is obtained, human nutrition is not disturbed when used.

The use of vegetable raw materials in the production of new mayonnaise with high nutritional and biological value expands the range of this type of product, increases its biological value and extends its shelf life up to 7 days.Traditional regulated quality indicators were used as the main quality criterion during the development of technology of mayonnaise product with a balanced composition. Mayonnaise is a complex multi-component system, which includes not only the assessment of their independent nutritional value when introducing new components, but also the combination of all components. The new product - the product obtained during the production of "Home" mayonnaise, complies with the criteria mentioned in the regulatory document and complements the assortment of the product type.

Information about financing

This article was written as a part of the work carried out on the topic of IRN AP08053397 "Development of the technology of oil products with a balanced composition of fatty acids" won within the framework of the funding grant for the research of young scientists of the Ministry of Education and Science of the Republic of Kazakhstan.

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ӨСІМДІК МАЙЛАРЫ ҚОСПАСЫНДАҒЫ «ҮЙ» МАЙОНЕЗІНІҢ САПАЛЫҚ КӨРСЕТКІШТЕРІ

Лоренцо Геррини
PhD
Firenze университеті
Ғылым және технологиялар бөлімі
Фаренце, Италия
E-mail: Lorenzo. guerini@unif.It

Мухаметов Алмас Ерекұлы
PhD
Қазақ ұлтты аграрлық зерттеу университеті

Алматы қ., Қазақстан
E-mail: myhametov_almas@mail.ru

Түйін

Полиқанықпаған май қышқылдары күнделікті нарықта адам рационының 3,3% құрайды. Өткен жылы майонез ассортиментінің өсуіне қарамастан, өнімнің осы түріне қойылатын барлық талаптарға жауап беретін теңдестірілген құрамдағы отандық майонезді өндіру мәселесі өзекті болып қала береді. Қазақ халқының тамақтануын бағалаудың кешенді көп деңгейлі тәсілі тағамдық статустың бұзылуының кең ауқымын анықтады. Атап айтқанда, бұл жануарлар майларын тұтынуды және полиқанықпаған май қышқылдарының тапшылығын қамтиды. Полиқанықпаған май қышқылдары алмастырылмайтын қоректік факторлар болып табылады және олардың құрамы диетаның энергетикалық құндылығының 3-4% сәйкес келуі керек.

Бұл мақалада теңдестірілген құрамы бар майонезді әзірлеу нұсқалары берілген.

ω-3 және ω-6 май қышқылдарының теңдестірілген құрамы бар жаңа функционалды майонез өнімі полиқанықпаған май қышқылдарының теңдестірілген құрамы бар өсімдік майларының (күнбағыс, зығыр және мақсары) қоспасы негізінде әзірленді.

Өсімдік майлары қоспасы үлгісінің негізгі физика-химиялық көрсеткіштері мен май қышқылдары анықталды. Ылғалдылық тұрақты салмаққа дейін кептіру арқылы, Сокслет бойынша мұнайдың массалық үлесі, pH көрсеткіштері – МемСТ 31762-2012 бойынша потенциометриялық әдіспен анықталды.

Өсімдік майының физика-химиялық көрсеткіштері мен биологиялық қасиеттерін ескере отырып жүргізілген зерттеулердің нәтижелері негізінде тағамдық және биологиялық құндылығы жоғары майонездің жаңа түрін алған кезде пайдалану кезінде адамның тамақтануы бұзылмайтыны анықталды. Тағамдық және биологиялық құндылығы жоғары жаңа майонез өндіруде өсімдік шикізатын пайдалану бұл өнім түрінің ассортиментін кеңейтіп, оның биологиялық құндылығын арттырады және сақтау мерзімін ұзартады.

Кілт сөздер: өсімдік майы; мақсары майы; зығыр майы; күнбағыс майы; май-қышқыл құрамы, майонез.

КАЧЕСТВЕННЫЕ ПОКАЗАТЕЛИ МАЙОНЕЗА «ДОМАШНИЙ» ИЗ СМЕСИ РАСТИТЕЛЬНЫХ МАСЕЛ

Лоренцо Геррини
PhD
Университет Флоренции
Департамент науки и технологий
г. Флоренция, Италия

E-mail: Lorenzo.guerini@unif.it

Мухаметов Алмас Ерекұлы
PhD
Казахский национальный аграрный исследовательский университет
г. Алматы, Казахстан
E-mail: myhametov_almas@mail.ru

Аннотация

Полиненасыщенные жирные кислоты занимают 3,3 % рациона питания человека на ежедневном рынке. Несмотря на рост ассортимента майонеза за последний год, проблема изготовления отечественного майонеза сбалансированного состава, отвечающего всем требованиям, предъявляемым к продукции данного вида, остается актуальной. Комплексный многоуровневый подход к оценке питания казахского народа выявил широкий спектр нарушений пищевого статуса. В частности, к ним относятся потребление животных жиров и дефицит полиненасыщенных жирных кислот. Полиненасыщенные жирные кислоты относятся к незаменимым факторам питания и их состав должен соответствовать 3-4% энергетической ценности пищевого рациона.

В данной статье приведены варианты разработки майонеза со сбалансированным составом.

Разработан новый функциональный майонезный продукт со сбалансированным составом ω-3 и ω-6 жирных кислот на основе смеси растительных масел (подсолнечное, льняное, и сафлоровое) со сбалансированным составом полиненасыщенных жирных кислот.

Определены основные физико-химические показатели и жирные кислоты образца смеси растительных масел. Влажность определяли методом сушки до постоянной массы, массовую долю масла по Сокслету, показатели РН - потенциометрическим методом по ГОСТ 31762-2012.

По результатам исследований с учетом физико-химических показателей и биологических свойств растительного масла установлено, что при получении нового вида майонеза с высокой пищевой и биологической ценностью питание человека при использовании не нарушается. Использование растительного сырья при производстве нового майонеза с высокой пищевой и биологической ценностью расширяет ассортимент этого вида продукции, повышает ее биологическую ценность и продлевает срок ее хранения.

Ключевые слова: растительное масло; масло сафлора; масло льна; масло подсолнечное; жирно-кислотный состав; майонез.