

**Производственные и обрабатывающие отрасли**

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<https://doi.org/10.58805/kazutb.v.1.18-67>**JUSTIFICATION OF INTRODUCING MALTODEXTRIN INTO CURD DESSERT****A.A. Bekturganova<sup>ID</sup>, M.Ch. Tultabaev<sup>ID</sup>, A. M. Omaraliyeva<sup>ID</sup>,  
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Currently, interest in fortified foods for mass nutrition is steadily growing. Therefore, there was a need to create complex products that provide the body with the necessary nutrients and biologically active components, along with having physiological properties, taking into account the specifics of the needs of the body and based on the principles of adequacy. The article confirms the expediency of use in the composition of formulations and establishes the rational proportion of its introduction.

**Key words:** maltodextrin, technology, functional fermented milk products.

**ОБОСНОВАНИЕ ВНЕСЕНИЯ МАЛЬТОДЕКСТРИНА В ТВОРОЖНЫЙ ДЕСЕРТ****А. А. Бектурганова, М.Ч. Тултабаев, А. М. Омаралиева,  
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В настоящее время интерес к обогащенным продуктам питания для массового питания неуклонно растет. Поэтому возникла необходимость создания комплексных продуктов, обеспечивающих организм необходимыми нутриентами и биологически активными компонентами, наряду с этим обладающими физиологическими свойствами с учетом специфики потребностей организма и на основе принципов адекватности. В статье подтверждена целесообразность использования в составе рецептур и установлена рациональная доля его внесения.

**Ключевые слова:** мальтодекстрин, технология, функциональные кисломолочные продукты.

## МАЛЬТОДЕКСТРИНДІ СУЗБЕ ДЕСЕРТІНЕ ҚОСУДЫҢ НЕГІЗДЕМЕСІ

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Қазіргі уақытта жаппай тамақтану үшін байытылған тағамдарға қызығушылық тұрақты түрде артып келеді. Сондықтан ағзаны қажетті қоректік заттармен және биологиялық белсенді компоненттермен қамтамасыз ететін, сонымен қатар физиологиялық қасиеттері бар, ағзаның қажеттіліктерін ескере отырып және жеткіліктілік қағидаттарына негізделген күрделі өнімдер жасау қажеттілігі туындады. Мақалада оны құрамдас бөлігі ретінде пайдаланудың орындылығы расталады және оны енгізудің ұтымды үлесі белгіленеді.

**Түйінді сөздер:** мальтодекстрин, технология, функционалды сүт қышқылды өнімдері.

**Introduction.** Maltodextrin has various special properties, in recent years this product has been widely used in the food industry. The main raw materials for maltodextrin production are corn and rice. Maltodextrin is easily soluble in water, has thickening properties, inhibits crystallization of sugar, affects formation of stable foam. Affects the formation of the product, adjusts its structure, low moisture absorption, contributes to the separation of the product, increases the molding properties, protects the product from changes in shape, improves the appearance of the product [1].

Maltodextrin contains acid resistant salt and heat resistant components. It is easily absorbed by the human body, and can act as a raw material for functional nutrition. Thus, it can be said that maltodextrin is an excellent food additive for products when certain consumer properties need to be improved.

Maltodextrin is used in the dairy industry, ice cream production, baby food, diet food, etc. widely used. maltodextrins are obtained by partial hydrolysis of starch with acids or hydrolytic enzymes, then purified, concentrated and dried. The degree of starch hydrolysis determines the carbohydrate composition,

which provides a variety of functional properties of maltodextrins.

The properties of maltodextrin are directly related to the amount of DE (dextrose equivalent). Dextrose equivalent is a relative value that determines the recovery capacity of maltodextrin / glucose syrup expressed in grams of D-glucose (dextrose) per 100 g of dry matter. According to the classification of starch hydrolysis products, D-Glucose is equal to the coefficient of D. E. 100.

The dextrose equivalent of maltodextrins is 1 to 20. Dextrose: D. E. = 100. Glucose syrup and dry glucose syrup:  $20 < D. E. < 99$ . Maltodextrins: D. E.  $< 20$ .

The DE value is from 4% to 6% with no sugar component at all (the material consists of tetrose molecules). Low D. E. maltodextrins: high binding capacity; high viscosity of water solutions; good anti-crystallization ability; has the ability to raise the freezing temperature of the product [2].

When the DE value is between 9% and 12%, maltodextrin contains more saccharide macromolecules. Therefore, it does not have a sweet taste, absorbs moisture poorly, does not have a gray color. When using maltodextrin

contained in the product, its taste properties improve, viscosity properties increase, it is related to the production of cottage cheese desserts, and when using the technology, you can get the desired viscosity of the product.

When the DE value is from 13% to 17%, the amount of sweetness remains relatively low, absorbs moisture poorly, does not have a gray color, and has good solubility.

When the DE value is 18% to 20%, a slightly sweet taste appears, moisture absorption properties appear. With a certain ratio of dextrose, the color can change to gray, it has good solubility, and the product does not have the effect of increasing viscosity.

Physico-chemical indicators of maltodextrins, such as hygroscopicity, equilibrium relative humidity, osmotic pressure of aqueous solutions of maltodextrins, depend on the average value of the molecular masses of the components and the presence of bound and unbound moisture. So, D.E. Maltodextrins with 2, 6 have the least hygroscopic character. D.E. with increasing hygroscopicity and, as a result, a tendency to clogging is observed.

Properties such as sweetness, reddening when heated, fermentability D.E. increases with increasing and is usually characteristic of glucose syrups. The sweetness coefficient of maltodextrins is from D. E. 2, 6, 12 to  $\sim 0.1$ , and D.E. From 17, 19, 20, the sweetness factor is  $\sim 0.2$  (relative to sugar with a sweetness factor of 1).

The particle size of maltodextrins has a significant effect on the bulk density and solubility of maltodextrins. The usual form of maltodextrins offered for sale: in the form of fine powder and in the form of microgranules.

Microgranulated maltodextrins are characterized by excellent flowability, which provides convenience in production during mixing of dry components and product packaging. In the dry mixture, maltodextrins

promote good dispersion of the product and quick solubility in water. Also, they prevent the stratification of the components of the mixture and the formation of dust [3].

Thus, functional properties of maltodextrins D.E. knowing the dependence on the size and size of particles, it is possible to regulate and control important indicators of product quality, such as viscosity and structure, to improve the fluidity or flow characteristics of the product, to regulate sweetness, to prevent crystallization of sugar in the finished product [4].

As a result of the use of maltodextrins in dairy production technologies, the following are ensured: energy value of the product; the solubility of additives improves; the structure and homogeneity of the product is well formed; the processes of enriching the ingredients in the minimum amount are simplified; water absorption capacity of hygroscopic components of the mixture decreases.

In dry formulas for children, maltodextrins are very good carbohydrates, the average molecular size of which corresponds to the average value between starch molecules and simple sugar molecules. Long starch chains are difficult to digest, especially if the granular structure of the starch remains. On the other hand, sucrose, dextrose, etc. Simple sugars like these can cause intestinal upset.

It should be noted that maltodextrins provide an excellent nutritional base for dietary and therapeutic food products, and the wide range of maltodextrins allows choosing a specific type with osmotic pressure that is important for various diseases of the control-intestinal tract [5].

Currently, maltodextrins are the most popular and versatile component in the production of products used as a treatment and structure builder.

Product Features:

1) Changes the degree of viscosity of the product, has a thickening, emulsifying effect. If

it contains DE 3-5%, it can achieve a fat effect, it is often used as a fat substitute in mayonnaise, ice cream, sausage and other products;

2) inhibits the process of color change. When the product contains a large amount of dextrose and protein, the product can easily achieve a gray color at high temperatures;

A small amount of DE slows down the graying process.

3) performs the function of binding and gluing. It is a good carrier of sweetener, flavor, filler, pigment. Maltodextrin, which contains less DE component, has a shaping property that can improve the shape of the product and its appearance, plays the role of isolation from oxygen, is used to apply to fruits in order to preserve their freshness;

4) performs the function of lowering the freezing temperature. Adding maltodextrin to sucrose substitute ice cream can change the freezing point and slow down the crystallization process;

5) serves to reduce the degree of sweetness. By adding maltodextrin to sweets, their sweetness can be reduced, which protects against dental diseases, high blood pressure and other diseases;

6) increases the bending and solubility properties used in the production of hard wine, soluble drinks, allows to preserve the taste of the product longer, improve its appearance, improve solubility properties;

7) easily absorbed by the human body, can be used for athletes, patients and children's food.

In addition to the above-mentioned properties, maltodextrin is used in bulk products, it protects them from the formation of lumps, increases the solubility of the product, improves its structure, and helps to keep the product dry.

#### **Materials and methods.**

– “Special” curd mass. MEMST 31680-2012. Technical requirements;

– maltodextrin. MEMST 34274-2017. Technical requirements.

During the performance of the work, generally accepted standard methods of studying physico-chemical and microbiological indicators of raw materials and finished products, as well as sensory indicators, were used. Experiments were performed with three and five replicates. Standard research methods were used in the work: physico-chemical, biochemical and organoleptic analysis methods.

**Results and discussion.** When choosing a filler for maltodextrin, the following criteria were taken into account in the SRI: quality and hygienic indicators; neutrality of taste; good dispersion; stability under physical, chemical and biological effects; resistance to heat treatment. In order to use it in the technology of new products, we were guided by the regulatory requirements for maltodextrin listed in Table 1.

According to TR 021/2011 «On Food Safety»: «enriched food products are food products that contain one or more foods and (or) biologically active substances and (or) probiotic microorganisms that are not originally present, or are present in insufficient quantities, or production (preparation) lost in the process.

For enriched products, the content of a biologically active or other enrichment agent in the amount of at least 5% of the daily requirement of the body is a mandatory requirement. The results of microbiological studies have shown that maltodextrin is a safe raw material for the creation of new functional products due to the absence of pathogenic microorganisms and bacteria of the *Escherichia coli* group within the limits set by the standard [5].

Maltodextrins are able to form protein-polysaccharide complexes with caseinates, thereby increasing the emulsifying, stabilizing and water-retaining properties of fresh products. Thanks to the use of a filler, the cost of the finished product is reduced, since there

is no need to use expensive stabilizers to improve the consistency. The main requirements for the quality of maltodextrin are listed in Table 1.

**Table 1**

**Basic requirements for the quality of maltodextrin**

Indicators	Description
Appearance and consistency	In appearance, this white powder has high viscosity, fast solubility, and high moisture content. Homogeneous bulk finely dispersed powder, microgranules.
Taste and smell	Maltodextrin is characterized by low sweetness. Characteristic of maltodextrins, without extraneous taste and smell
Color	White or light yellow
Humidity, %	Not more than 6
The ash content is completely dry matter, %, not more	2
Mass fraction of dry matter, not less, %	94,0
Mass fraction of total ash by dry matter. %, not more	0,40
Hydrogen index, pH	4,5 —6,5
Amount of sulfur dioxide (SO <sub>2</sub> ), mg/kg; not more	20
The presence of foreign mechanical impurities	Not allowed
Amount of calories, kcal / kJ	372/1581

According to the microbiological indicators of maltodextrin, it should meet the requirements specified in Table 2

**Table 2**

**Microbiological indicators of maltodextrin**

Indicator	The norm
Pathogenic microorganisms (including salmonella), absence in product mass, g.	25,0
Escherichia coli bacteria (coliforms), absence in product mass, g.	0,1
The Number of Mesophilic Aerobic And Facultative Anaerobic Microorganisms, CFU/ g, not more	5,0*10 <sup>4</sup>
Microscopic fungi, CFU/ g, not more	not
Yeast, CFU / g, not more	not
Molds in 1 g. of product, no more	50
Coagulase-positive staphylococci in 1 g. of product	1
Pathogenic microorganisms	not

Preparation of components is an important moment in forming the quality of the finished product. Properly selected modes of heat treatment allow to preserve the nutritional value of raw materials, to ensure its high

sanitary and hygienic properties. In addition, maltodextrin is pasteurized and tissue enzymes are inactivated during heat treatment with the filler of the milk base, which increases the shelf life of the products [6,7].

The main goal at this stage of the work was to study the effect of filler dosage on sensory indicators to obtain functional new dry

products. As a control, milk powder according to MEMST 4495-97 was used. The results are presented in Table 3.

Table 3

**Effect of filler dosage on sensory parameters of the product**

Indicators	Control version	Filler doses					
		2%	7%	9%	15%	17%	20%
Consistency	3	3	3	3	3	2	2
Appearance	2	2	2	2	2	2	2
Taste and smell	10	6	8	7	10	5	4
Color	5	5	5	5	5	5	5
Ball	20	16	18	17	20	14	13

Sensory indicators were evaluated according to the method of evaluating the organoleptic indicators of dry milk products on a 20-point scale.

Table 4

**Effect of filler dosage on sensory parameters of the product**

Indicators	Control version	Filler doses					
		2%	7%	9%	15%	17%	20%
Consistency	3	3	3	3	3	2	2
Appearance	2	2	2	2	2	2	2
Taste and smell	10	6	7	8	10	5	4
Color	5	5	5	5	5	5	5
Ball	20	16	17	18	20	14	13

At work, D.E. Maltodextrins with 12, 18, 19 were used. Low DE maltodextrin solutions are better absorbed in the intestine than simple sugars: dextrose, sucrose, fructose or lactose, which have a low molecular weight. The faintly sweet taste of maltodextrins is not addictive for consumers.

As a result of the research, the control sample has a very fine, uniform consistency, pure milk taste, and white color. The most optimal organoleptic indicators were at 15% dose, where a light taste was felt. Products with a filler dosage of more than 7 and 9% do not have a pronounced taste. The product with a dose of 20% had a distinct taste and smell. A further increase in dosage leads to deterioration

of sensory properties of new products. Thus, adding maltodextrin to the milk base changes its structure and taste.

The control sample is very soft, has a uniform consistency, has a clean taste, and is white in color. At 3% loading dose, the products had a homogeneous, barely perceptible sweet taste. With a dose of 5% fructose, the products had a sweet taste. Further increase in the dosage of sweeteners from 7% leads to deterioration of the consistency of fermented milk products. It was found that the optimal dose of fructose introduction in products 2 and 3 is 5% dose. Thus, the addition of heat-treated, fructose fillers contributes to the production of products in which all fillers are well combined with each

other.

Based on the above, the addition of maltodextrin to the developed products leads to an increase in the volume of the product, protects the product from the formation of lumps, increases the solubility of the product, increases the shelf life of the product, and at the same time reduces its cost, is easily absorbed and absorbed by the human body, thus the role of maltodextrin used in cottage cheese dessert has been proven and approved.

**Conclusions.** Based on the above, it can be noted that the addition of maltodextrin to the developed products leads to an increase in the volume of the product, protects the product from the formation of lumps, increases the solubility of the product, extends the shelf life of the product, and at the same time reduces its cost, is easily absorbed and digested by the human body, so that it is used in curd desserts. the role of maltodextrin has been proven and confirmed.

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