

DEVELOPMENT OF COLLAGEN-CONTAINING DRINKS

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Introduction. Formulation of the problem

Traditionally, collagen preparations are used as components of various medicines and cosmetics, the action of which is aimed at improving the condition of the human skin, joints, and the gastrointestinal tract. Recently, more and more scientists consider collagen and its derivatives as an active food additive, which is a part of a food product or enters the human body orally. Drinking collagen is actively used by athletes, supporters of an active lifestyle, as well as in a variety of diets, it is recommended to be taken only for a limited time and in a certain prescription ratio with other components. At the same time, there are food products such as juice drinks, nectars, which contain many useful components and the addition of collagen to them will increase their nutritional value. When using collagen in juices and drinks it is necessary to take into account its amount and active acidity of the product, which affects the process of its delivery to the

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Abstract. The problem of human aging is very relevant today. The mechanisms of aging are closely related to the decrease of such a protein substance as collagen in the human body. One of the possibilities for restoration the amount of this vital component is the use of collagen-containing juice products of everyday use in the diet. Taking into account the relevance and prospects of this issue, the direction of further work has been chosen accordingly. The purpose of the research is the use of collagen in the formulation of an assortment of juice products based on fruit and vegetable raw materials. To achieve the goal of the study we formulated the tasks that allowed us to research the range and quality indicators of different types of collagen of plant and animal origin (tomato, beef, pork and fish) as well as to justify the choice of the most preferred collagen sample for drinks. We have determined the optimal amount of this biologically active additive to ensure the required quality of the finished product. We have investigated the preservation of the active properties of various types of collagen in fruit and vegetable drinks. As a result of the studies performed it has been shown that beef collagen is the most acceptable and retains its active properties in an amount of 5% to the mass of the drink; it adds salt, alcohol, alkaline protein fractions according to its fractional composition. It has been shown that the amino acids methionine, tryptophan and hydroxyproline which confirm the presence of collagen in the product are contained in ready-made juice drinks enriched with collagen of beef origin. The formulations of fruit and vegetable drinks with the addition of collagen have been developed accordingly. A comparison of the organoleptic and physicochemical characteristics of finished drinks with the requirements of normative and technical documentation (DSTU 4283-2007) was carried out and their full compliance was proved.

Key words: juice products, animal and plant collagen, recipe, quality indicators.

body and which will certainly affect the organoleptic characteristics of drinks [1].

This work is devoted to the development of food products with the use of collagen, in which the value of the active acidity is regulated for the most effective use of the beneficial properties of this substance.

Analysis of recent research and publications

Collagen and one of its derivatives, gelatin, has a beneficial effect on the human skin, improves the condition of the skin, its elasticity and moisture. Most of the collagen found in collagen fibers. Collagen is the main structural component of collagen fiber, the main function of which is associated with the formation and maintenance of the specific structure of organs and tissues during the growth and development of the body. The stabilizing and supporting function of collagen fiber is reached due to its unusual biological and physicochemical properties (metabolic inertness, resistance to the action of various substances, etc.) [1].

Collagen biosynthesis and the formation of collagen fibers are significantly enhanced during various processes accompanied by the proliferation of connective tissue (sclerotic changes in blood vessels and organs, chronic inflammatory changes, healing of wounds and bone fractures, etc.). Pathological changes in the metabolism and structure of collagen in humans occur in systemic diseases of the connective tissue (rheumatism, scleroderma, etc.), while changes in the biosynthesis or breakdown of collagen proteins occur, which leads to a violation of the mechanical properties of collagen fiber and, consequently, the supporting properties of the connective tissue. Collagen and gelatin are used for the manufacture of vascular prostheses and films for the treatment of wounds, as well as in connection with their use in some industries (food, light, film and photo production) [2-4].

Issues related to the intake of collagen preparations after surgery have been investigated [5]. Treating wounds with frequent comorbidities (eg, diabetes or vascular disease) is highly complicated. The positive effect of orally administered collagen peptides was confirmed, which led to accelerated epithelialization and shortened wound healing time with improved angiogenesis, as well as enhanced wound healing in patients with diabetes. Experimental studies have shown that collagen peptides are chemotactic for skin fibroblasts, stimulate their migration and growth of skin fibroblasts in mice, and enhance cell proliferation and hyaluronic acid synthesis.

Collagen peptides are absorbed in the intestine, distributed by the blood stream and accumulated in the skin, where they stimulate fibroblasts to produce dermal components of the extracellular matrix. We have conducted studies in which one group of patients with post-surgical wounds and a second group of patients with severely healed wounds took an active ingredient and a placebo. Both groups included patients receiving bioactive collagen peptides. The findings suggest that the collagen supplement product can be used to improve wound healing even in cases where normal wound regeneration occurs, to achieve a better aesthetic result. Clinical trials have demonstrated the beneficial effect of oral administration of specific bioactive collagen peptides on skin physiology. If you consume collagen and at the same time move enough, eat right or even completely change your lifestyle, the effect of collagen will be noticeable at any stage of life [6-11].

In this regard it is advisable to add collagen as an additive to those products that are used by people constantly, and not occasionally, for example, drinks. Collagen-enriched functional fruit juice drinks have been formulated from blends of orange, apple and white grape juice containing ingredients such as hydrolyzed fish collagen, citric acid, ascorbic acid and natural mint flavor. The results show that the formulation with the addition of 2.5% hydrolyzed collagen was optimal. The addition of hydrolyzed collagen increased the protein content of beverages from 0.56 to 2.22–2.48 g/100 ml. The results of in vitro

bioavailability showed that orange (95.37%) and apple (90.71%) drinks showed higher bioavailability (5-14%) than mixtures of white grape juice [12]. The technology of drinks like "Shorley" with collagen based on mineral waters of natural origin has been developed. They include various fruit and berry raw materials. The substantiation of the component composition and formulation of drinks based on soluble collagen of fish origin has been carried out. We have done research of use of a hydrate of collagen proteins from the skin of silver carp in the form of a 2% dispersion, three types of drinking mineral water: "Slavyanovskaya", "Essentuki 4" and "Narzan". Raspberry, cherry and black currant juices were selected as fruit and berry raw materials. The obtained beverage samples have good organoleptic and physicochemical characteristics [13]. Various collagen-based drinks have been developed and obtained in experimental laboratory conditions, using an additional decoction with sea buckthorn pulp, tincture of dried chicory root powder and a decoction with Jerusalem artichoke pulp. The active ingredients in the form of a collagen nutritional supplement can have a synergistic positive effect, effectively increase skin elasticity, moisture, reduce transepidermal water loss and reduce skin roughness. The additional number of antioxidants, peptides and amino acids contained in food with collagen can affect many functions of the body, for example, to protect connective tissue and joints, suppress inflammation, and slow down the aging process of the human body [14].

All the presented results of studies by various authors show that the main focus was not on the daily consumed foods. The developments concerned food products that are either occasionally used [13] or are functional and are used in the nutrition of certain specific groups of the population [12,14]. Juice products based on fruit and vegetable raw materials are used in the regular diet of all groups of the population and they are not limited. These products have easily adjustable physicochemical parameters, which affects the absorption of such a biologically active additive as collagen.

Therefore it is relevant to conduct research on the development of food products using collagen, in which the value of active acidity is regulated for the most effective use of the beneficial properties of this substance, to develop recipe compositions for juices and juice drinks using various types of collagen to create easily digestible food products and for solving problems of the musculoskeletal system, skin and hair by the human body.

The purpose and objectives of the study. Studying the properties of collagen for the introduction into formulations of juice products based on fruit and vegetable raw materials, the creation of new types of drinks for everyday use. In accordance with the set goal the research tasks are defined:

- studying the assortment of collagen and determining its organoleptic characteristics;

- selection of the type and optimal mass fraction of collagen in the finished product;
- study of the preservation of the active properties of various types of collagen in a drinking product, with its presence - fractional and amino acid composition of the protein;
- development of recipe compositions for juice-containing products based on vegetable raw materials enriched with collagen;
- study of organoleptic and physicochemical quality indicators of the developed juice compositions using collagen and their compliance with regulatory and technical documents.

Research materials and methods

Collagen of plant and animal origin was used for the research - tomato, beef, pork, fish, tomato, manufactured by GELITAAG (Germany). Determined the organoleptic characteristics of the additive in dry form and in aqueous solution in accordance with DSTU 8449: 2015 "Food canned food. Methods for the measurement of organoleptic indicators, the net mass of the mass of the warehouse parts.

Fruit, vegetable and berry juices, drinks with pulp and their blends made from semi-finished products and concentrates of peach, apples, bananas, strawberries, guava, black currants, pears, strawberries, raspberries, beets were taken as basic compositions in the development of recipes., blueberries, blackberries, mangoes of various domestic and foreign manufacturers: Kodymsky Juice Plant, Interfood TOV, Deler, Ghousia Food Products, Grunewald).

When developing formulations of juice-containing blended products enriched with collagen, the basic formulations of nectars and beverages with pulp were taken as a basis in accordance with DSTU 4283-2007 "Canned food. Juices and juice products "[19-24].

Recipes for collagen-enriched juice products,% per 1 ton of finished product:

1. Peach nectar: peach puree – 7, apple puree – 18, beta-carotene 10% DSM – 0.05, glucose-fructose syrup 0.2–0.13, citric acid – 0.1, ascorbic acid – 0.05, beef collagen – 5; treated water (reverse osmosis treatment) – 69.67.

2. Banana-strawberry nectar: sugar syrup – 8.9; apple juice concentrate – 6.5; strawberry juice concentrate – 6.0; blackcurrant juice concentrate – 6.0; banana puree – 8.7; citric acid – 0.11; apple pectin – 0.1; beef collagen – 5; treated water (reverse osmosis treatment) – 48.69.

3. Apple-guava-banana nectar: apple puree – 10; puree of white guava – 12; banana puree – 8.5; glucose-fructose syrup – 11.2; citric acid – 0.085; ascorbic acid – 0.085; apple pectin – 0.1; beef collagen – 5; treated water (reverse osmosis treatment) – 53.0.

4. Apple-pear nectar: apple puree – 80; pear puree – 40; glucose-fructose syrup – 12.2; citric acid – 0.07; ascorbic acid – 0.07; beef collagen – 5; treated water (reverse osmosis treatment) – 53.04.

5. Drink "Blueberry-blackberry-raspberry": concentrated blueberry juice – 5; glucose-fructose

syrup – 12.2; citric acid – 0.07; ascorbic acid – 0.07; natural flavoring "Blueberry" – 0.01; natural flavoring "Blackberry-Raspberry" – 0.01; beef collagen – 5; treated water (reverse osmosis treatment) – 76.64.

6. Beet-mango-apple nectar: concentrated apple juice – 5.6; concentrated beet juice – 15.5; concentrated mango puree – 10; sugar syrup – 8.9; citric acid – 0.07; beef collagen – 5; treated water (reverse osmosis treatment) – 54.93.

7. Drink "Apple-mint": concentrated apple juice – 6.5; glucose-fructose syrup – 12.2; citric acid – 0.07; ascorbic acid – 0.07; natural flavoring "Apple" – 0.01; natural flavoring "Mint" – 0.01; beef collagen – 5; treated water (reverse osmosis treatment) – 76.14.

Dry collagen supplement was added to the finished prescription blend. The injection of collagen was carried out with continuous stirring of the blend in a mixing tank for uniform distribution of the additive throughout the volume of the product.

As an example the main indicator of juice components for the production of nectar "Beet-mango-apple" is the mass fraction of soluble solids: beet juice – 15.5%, apple juice – 5.6%, mango puree – 10%. Using these components, a recipe composition of the specified nectar per 1000 kg of the finished product was developed:

Beet juice (Deler) – 21 kg (protein content 1.2%)

Apple juice (Grunewald) – 9 kg (protein content 0.3%)

Mango puree (Ghousia Food Products) – 48 kg (protein content 0.6%)

Granulated sugar – 101.8 kg

Citric acid – 1.8 kg

Treated water (reverse osmosis treatment) – 818.4 kg

The final product was characterized by the following indicators:

- Mass fraction of soluble solids (Brix) – 11.0%;

- Titratable acidity – 0.25%

- pH – 3.7.

The mass fraction of collagen in the nectar formulation varied from 5.0 to 20.0% of the total mass of the product, which was introduced due to a decrease in the main juice component in the formulation. This interval was chosen in order to determine the effect not only of the type of collagen on the mass fraction of protein in the final product, but also to obtain data on the content of the mass fraction of amino acids in the final product - methionine, tryptophan and hydroxyproline, which characterize the presence of collagen in the product (since only collagen positively affects the connective tissues of the body) and the absence of its denaturation into gelatin.

The preparation of samples for the determination of protein in beverages was carried out in accordance with the recommendations [15].

In finished juice products enriched with collagen, organoleptic indicators were determined in accordance with DSTU 8449: 2015.

Physicochemical parameters were determined in ready-made nectars and drinks with pulp, enriched with collagen:

- mass fraction of pulp according to DSTU 7001: 2009;
- mass fraction of titratable acids according to DSTU 4957: 2008;
- indicator of active acidity or pH according to DSTU EN 6045: 2008;
- color index of the product according to ISO 3424-85;
- mass fraction of soluble solids according to DSTU EN 12143: 2003;
- mass fraction of protein according to the Kjeldahl method according to DSTU 8063: 2015;
- fractional composition of proteins was determined by the method of AI Ermakov [15].

The principle of the method consists in the extraction of proteins with various solutions: saline, alkaline and alcoholic and obtaining, respectively, the fractional composition of proteins in the sample under study. To obtain a salt fraction of proteins, a one molar solution of potassium chloride (KCl) is used for extraction. To obtain an alkaline fraction, proteins are extracted using a 0.2% alkali solution (KOH). The alcoholic fraction of proteins from the samples is

obtained from the sediment in centrifuge tubes; upon receipt, the salt fraction was obtained by adding 70% ethyl alcohol heated to 60 °C.

The fractional composition of proteins was determined in samples of products with collagen supplements, which were previously freeze-dried.

- amino acid composition according to DSTU ISO 13903: 2009;
- the mass fraction of amino acids was determined according to DSTU ISO 13903: 2009.

Results of the research and their discussion

The study and detailed analysis of similar works by foreign and domestic researchers showed that the works provide specific values of organoleptic indicators only for the type of collagen used by the researchers. We have adopted an approach that allows us to compare existing types of collagens of different origins, and in this regard, this approach is original. The organoleptic indicators of collagen in the assortment were investigated, which are presented in Table 1:

Table 1 – Organoleptic indicators of collagen

Collagen type	Collagen in dried state	Collagen water solution	Stability of water solution
Beef	Without smell	Free of foreign smell and taste	No sediment, slight turbidity
Pork	Without smell	Free of foreign smell and taste	Formation of suspensions and small flakes
Fish	Pungent fishy smell	Pungent fishy smell and taste	Flocculation
Vegetable (tomato)	The smell of raw tomato	Smell and taste characteristic of tomatoes	Sludge formation

As follows from the table. 1 collagens, regardless of their origin are very similar in organoleptic characteristics, however some of them: pork, fish, tomato - have distinctive properties - characteristic or pungent smell and taste, as well as the formation of suspensions, flakes and sediment when dissolved in water. Both of these factors influence the use of these types of collagen in the production of juice drinks. Also, sensory studies have shown that collagen of plant origin (tomato) has a specific, characteristic smell of tomatoes, so it can only be used in juice products, the formulation of which includes tomato products. Therefore, we have chosen collagen of animal origin (beef) for further research

For the final choosing of a collagen supplement that can be used in the production of these products, experiments were carried out to determine the dependence of the protein content on the mass fraction of collagen supplements for all studied samples. The experiments were carried out using a sample of the product "Nectar" Beet-mango-apple", as the most sensitive in terms of organoleptic characteristics – color, taste and smell from the studied juice-containing products.

The component included in it is beet juice, which color the product in a bright burgundy tone. The addition of dry collagen, which is white, changes the color of the drink. The base product has an apple note that changes

with the addition of a collagen supplement. The smell of the original recipe contains a mango aroma, which changes even taking into account the fact that beef and pork collagen organoleptically odorless. Thus, the product chosen for research is the most revealing. The research results are shown in Fig. 1.

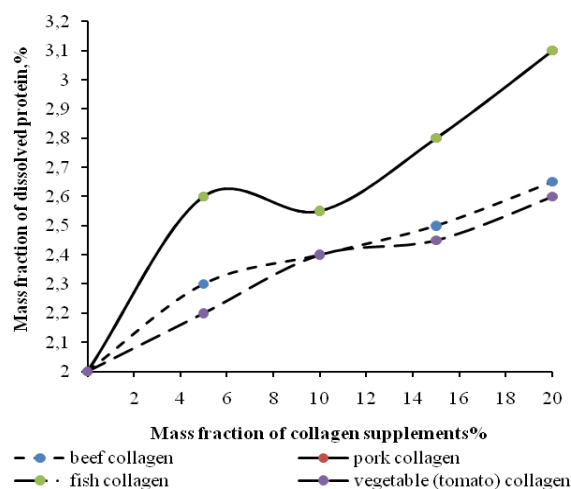


Fig. 1. Dependence of the protein content on the mass fraction of the collagen additive in the recipe for the "Beet-mango-apple" nectar

Analyzing the graphs presented, it can be noted that plant collagen has almost the same type of dependence as traditional types of collagen of animal origin. Moreover, the obtained values of the mass fraction of soluble protein when adding pork and plant collagen coincide. It should be noted that starting from 10% of the mass fraction of collagen supplements to the formulation, the growth of protein in the juice product begins. At the same time, in the range from 5% to 10% for all types of collagen, the protein content in the juice product remains almost constant. But an increase in the collagen supplement in the formulation from 5% to 10% and more leads to a deterioration in the "drinking" quality of juice products, i.e. the appearance of a thick consistency. After the preparation of the products, the juices were stored for 3 months so that all metabolic processes take place in them, including the hydrolysis of collagen under the action of food acids of the product. In the composition of these juice products, the native protein content is insignificant and the addition of collagen to the formulation increases it. Research has been carried out to determine the fractional composition of the protein in the finished product (nectar "Beet-mango-Apple" with a mass fraction of 5% collagen to the main recipe). Experiments were carried out on samples obtained after freeze drying, which are presented in Table 2. Experimental data have shown that when plant collagen is added, only the water fraction of the protein is present in the composition of the test drink, this is its distinctive feature. With the addition of other types of collagen, in addition to water, salt, alcohol and alkaline fractions were found in the product. Collagen of animal origin, beef and pork, introduces all types of investigated fractions in the maximum amount, so these types of collagen can be used for enrichment of juice products.

We carried out experiments to determine the content of basic amino acids, which characterize the

presence of collagen (methionine, tryptophan and hydroxyproline) in the juice product. Investigated the product – nectar "Beet-mango-apple" with 5% mass fraction of various types of collagen. The results of these experiments are shown in Table 3.

Analyzing the data obtained in table. 3, it can be noted that the amount of amino acids in the studied nectar is practically equal to the amount of the same amino acids in the product, which was made according to the original recipe without adding collagen. Only the amount of hydroxyproline is significantly different from the amount of other amino acids. Collagen added to the nectar formulation was also hydrolyzed in the product into one of its markers – hydroxyproline, which shows the catabolism of this protein. The experiment showed that in the nectar sample only beef collagen provided the presence of all the amino acids under study and, therefore, as an additive we choose collagen of animal origin - beef.

Therefore, based on all the studies carried out above, we can conclude that the most preferable is collagen of animal origin especially beef as a biological additive in fruit and vegetable nectars and drinks, in the amount of 5%. This will ensure maximum collagen enrichment of the finished product.

Research was carried out to determine the range of juice products, taking into account that collagen is a protein and its introduction into liquid products leads to the appearance of a jelly-like substance in the volume of products, which leads to a deterioration in the appearance of the finished product, consistency; to the appearance of extraneous organoleptic sensations (smell, taste) of the finished product.

Table 2 – Fractional composition of proteins in the nectar "Beet-mango-apple" with a mass fraction of collagen 5% to the main recipe (the experiments were carried out in 5-fold repetition, reliability 0.95)

Collagen type	Water fraction, mg/dm ³	Salt fraction, mg/dm ³	Alcohol fraction, mg/dm ³	Alkaline fraction, mg/dm ³
Beef	93.16	5.14	1.10	0.60
Pork	85.98	5.06	6.40	2.56
Fish	97.15	1.50	1.30	Trace
Vegetable	99.40	Trace	Trace	Trace

Table 3 – Mass fraction of methionine, tryptophan and hydroxyproline in the "Beet-mango-apple" nectar (the experiments were carried out in 5-fold repetition, reliability 0.95)

Collagen type	Methionine, %		Tryptophan, %		Oxyproline, %	
	*	**	*	**	*	**
Beef	0.009867	0.6676	0.00296	0.020	0.342009	2.314
Pork	0.10919	0.6176	0.000792	0.005	0.421314	2.383
Fish	0.018089	0.1142	0.00583	0.035	0.382577	2.295
Vegetable	0.16649	1.153	0.002383	0.0165	0.028302	0.196
Without collagen	0.0018089	0.1142	0.000792	0.005	0.007492	0.0473

* for the original product

** for absolutely dry matter

In this regard, a range of juice-containing products was selected, into which collagen can be introduced without deteriorating the appearance of the product from the point of view of the buyer and the appearance of unusual organoleptic sensations in the consumer. This assortment includes nectars and drinks, which, due to the presence in the composition of a sufficiently large amount of fruit pulp (6–12%) [18], naturally hide from the consumer the presence of a jelly-like substance in the volume of the product, and the uniform distribution of the pulp throughout the product volume, ensured by the process of homogenization of the product during its manufacture, does not allow unusual organoleptic sensations to appear when consuming the finished product.

Organoleptic studies of the obtained samples of nectars and drinks with pulp enriched with collagen were carried out. The organoleptic indicators of the developed formulations of juice products with collagen made it possible to determine the optimal formulations – these are juices and drinks with pulp in the assortment with the addition of beef collagen in an amount of 5%, which are presented in Table 4.

The presented research results in Table 4 allow us to make an unambiguous conclusion that the

obtained juice-containing products (nectars, drinks), to which collagen is added in an amount of 5%, fully satisfy consumer requirements for organoleptic indicators for this food product, including consistency, in accordance with current regulatory and technical documentation.

Also, the physicochemical parameters of the developed basic samples of nectars and beverages with pulp enriched with collagen were studied and determined, presented in Table 5.

Table 5 shows the main physical and chemical parameters of nectars and drinks with pulp and collagen. These indicators are: mass fraction of soluble dry substances – not less than 9.0% for nectars, not less than 8.0% for drinks; active acidity, pH – not less than 3.5 for nectars, not less than 2.5 for drinks; mass fraction of titratable acids – not less than 0.25% for nectars, not less than 0.22% for drinks; mass fraction of pulp – not less than 9.0% for nectars, not less than 1.0% for drinks; color index – not less than 3.0 for nectars, not less than 2.0 for drinks; Brix indicator – not less than 11.0% for nectars, not less than 9.0% for drinks.

The values of the indicators fully comply with the current regulatory and technical documentation for this type of food product DSTU 4283-2007 “Canned food. Juices and juice products.

Table 4 – Organoleptic characteristics of juice products enriched with collagen

Index quality	Collagen-rich range of juice products						
	Peach nectar	Apple-guava-banana nectar	Banana-strawberry nectar	Nectar "Pear-apple"	Blueberry-Blackberry-Raspberry Drink	Beet-mango-apple nectar	Drink "Apple-mint"
Appearance and consistency	The product is homogeneous, opaque, with evenly distributed finely ground pulp.						
Taste and smell	Natural, pleasant, pronounced, characteristic of the ingredients included in the product, without foreign odors.						
Color	Typical for canned vegetables, fruits, berries and their mixtures from which the product is made.						

Table 5 – Physicochemical indicators of juice-containing products enriched with collagen

Juice product name	Name of physical and chemical indicators					
	Mass fraction of soluble solids, %	Active acidity, pH	Mass fraction of titratable acids, %	Mass fraction of pulp, %	Color index, Abs 420 nm, 10 mm	Brix, %
Peach nectar	11.0	3.6	0.3	9.2	4.340	12.7±0.1
Nectar "Banana-strawberry"	11.0	3.8	0.25	15.0	3.553	12.3±0.1
Nectar "Apple-Guava-Banana"	10.0	3.8	0.28	14.0	4.060	12.0±0.1
Nectar "Apple-pear"	10.0	3.8	0.25	15.0	3.358	12.0±0.1
Blueberry-blackberry-raspberry drink	8.0	2.8	0.24	2.5	4.256	9.0±0.1
Nectar "Beet-mango-apple"	12.0	3.5	0.25	2.7	3.339	13.0±0.1
Apple-mint drink	9.0	3.5	0.22	1.2	2.893	9.1±0.1
Indicators in accordance with DSTU 4283-2007	At least 9.0 for nectars Not less than 8.0 for drinks	At least 3.5 for nectars At least 2.5 for drinks	Not less than 0.25 for nectars 0.22 minimum for drinks	At least 9.0 for nectars At least 1.0 for drinks	Not less than 3.0 for nectars At least 2.0 for drinks	Not less than 11.0 for nectars At least 9.0 for drinks

Conclusions

1. The assortment and organoleptic characteristics of different types of collagen of animal and plant origin were investigated and collagen of beef origin was selected for nectars and drinks.

2. We have studied the features of various types of collagen for the possibility of their use in juice products. It has been established that the introduction of collagen in an amount of 5% of the product mass allows to obtain drinks in terms of quality indicators, corresponding to the normative document DSTU 4283-2007.

3. The preservation of the active properties of various types of collagen in a drinking product was investigated, with its prescription content – the fractional and amino

acid composition of the protein. The presence of methionine, tryptophan and hydroxyproline in the finished product was established, which indicates the preservation of the collagen supplement.

4. Formulations of juice-containing products with collagen have been developed – these are fruits and vegetables and berries, blended nectars and drinks with pulp.

5. The organoleptic and physicochemical indicators of the quality of ready-made juice drinks enriched with collagen and their compliance with the requirements of regulatory and technical documentation have been investigated.

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РОЗРОБЛЕННЯ СОКОВІСНИХ НАПОЇВ З КОЛАГЕНОМ

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Анотація. Проблема старіння людини дуже актуальна сьогодні. Механізми старіння тісно пов'язані зі зниженням в організмі людей такої білкової речовини, як колаген. Однією з можливостей поповнення кількості цього життєво важливого компонента є використання в харчуванні колагенвмісних сокових продуктів щоденного вживання. Мета дослідження – використання колагену в рецептурі асортименту сокових продуктів на основі плодовоовочевої сировини. Для досягнення мети дослідження сформульовано завдання, які дозволили вивчити асортимент і показники якості різних видів колагену рослинного і тваринного походження (томатного, яловичого, свинячого та рибного), обгрунтовано вибір найбільш зразків колагену для напоїв. Визначено оптимальну кількість цієї біологічно активної добавки, що забезпечує необхідну якість готового продукту. Досліджено збереження активних властивостей різних видів колагену в питних плодовоовочевих продуктах. У результаті виконаних досліджень, показано, що найбільш прийнятним є яловичий колаген в кількості 5% до маси напою, він максимально зберігає свої активні властивості, за фракційним складом вносить сольову, спиртову, лужну фракції білку. Показано, що амінокислоти метіонін, триптофан, оксипролін, які є підтвердженням наявності колагену в продукті, містяться в готових сокових напоях, збагачених колагеном яловичого походження. Розроблено рецептури плодовоовочевих напоїв з додаванням колагену. Проведено порівняння органолептичних та фізико-хімічних характеристик готових напоїв з вимогами нормативно-технічної документації (ДСТУ 4283-2007) та доведено їхню повну відповідність.

Ключові слова: сокові продукти, тваринний і рослинний колаген, рецептура, показники якості.

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