USE OF SEMI-FINISHED CHERRY-BEET PUREE IN TECHNOLOGY OF SWEET DISHES AND DESSERTS

Sолодкі страви та десерти користуються підвищеним попитом у споживача. Проте дана продукція, як правило, має незбалансований хімічний склад, високу калорійність, значний вміст жирів і вуглеводів, відносно низький вміст білку та недостатню кількість біологічно активних речовин. Джерелом природних біологічно активних речовин (БАР) є пюре, соки, екстракти, підварки з плодів, овочів, культурних та дикорослих ягід, лікарських трав тощо. Тому важливим питанням на сьогодні, для даного виду продукції, є вдосконалення рецептури існуючого асортименту солодких страв за рахунок використання природних компонентів підвищеної біологічної цінності. Таким чином, об'єктом дослідження є технологія десерту оздоровчого призначення на основі вишнево-бурякового пюре-напівфабрикату та його вплив на структурно-механічні, фізико-хімічні й органолептичні показники готових виробів.

У роботі використано стандартні методики досліджень згідно вимог нормативної документації. Дослідження вмісту бетаніну проводили спектрофотометричним методом. Антиоксидантну активність визначали методом бромної кулонометрії. Органолептичні та фізико-хімічні показники готової страви визначали у відповідності до ДСТУ 3718:2007 «Солодкі страви, желе, муси, пудинги, концентрати молочні».

Для збагачення солодких страв та десертів при створенні оздоровчих та функціональних харчових продуктів пропонується використовувати пюре-напівфабрикат, до складу якого входять пюре з вишні та пюре з буряку столового (співвідношення 2:1). Встановлена можливість покращення органолептичних, фізико-хімічних та структурно-механічних показників готових виробів за рахунок використання композиційного поєднання вишнево-бурякового пюре-напівфабрикату та желатину у кількості 3 %. Розроблено технологію десерту оздоровчого призначення, досліджені його якість за органолептичними та фізико-хімічними показниками, вмістом біологічно активних і поживних речовин. Наявність значної кількості біологічно активних речовин, які володіють антиоксидантними властивостями, забезпечують оздоровчу та профілактичну дію десерту. Розроблений десерт рекомендований для виробництва у закладах ресторанного господарства.

Ключові слова: солодкі страви, оздоровчий продукт, вишнево-буряковий пюре-напівфабрикат, біологічно активні речовини, органолептичні показники, фізико-хімічні показники.

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and economic efficiency from the implementation of developed technologies in restaurant establishments [6–8].

Thus, the object of research is the technology of a dessert for health purposes based on cherry-beetroot puree and a semi-finished product and its effect on the structural, mechanical, physico-chemical and organoleptic characteristics of finished products. For the production of semi-finished cherry-beet puree, beetroots of the Bordeaux variety and Volodymyrska cherries were selected. Semi-finished puree was obtained according to the developed method [9]. The aim of research is to justify the prospects of using semi-finished cherry-beetroot puree product in the technology of sweet dishes and desserts with a high content of biologically active substances for restaurant establishments.

2. Methods of research

The study of the nutritional and biological value of raw materials and finished products, as well as their organoleptic characteristics, was carried out according to standard methods in accordance with the requirements of regulatory documents:
- solids and moisture content in raw materials according to GOST 28561-90;
- mass fraction of titratable acids (in terms of malic acid) – by volume titration method according to DSTU EN 12147-2003;
- active acidity (pH) was determined using a pH meter according to GOST 26188-84;
- total content of phenolic substances – by the Folin-Ciocalteu method in terms of gallic acid according to DSTU 3845-99;
- vitamin C content – by iodometric method according to GOST 8069:2015;
- titratable acidity (in terms of malic acid), % – by titrimetric method according to DSTU 3718:2007;
- organoleptic evaluation of finished products – DSTU 3718:2007.

The study of the betanine content was carried out by spectrophotometric method.

The absorption of light was measured at wavelengths of 538 nm and 476 nm, which corresponds to the absorption maximum for betanine (red beet beta) and Volga xanthin-I (red beet beta).

The total concentration of betalaines was expressed as the sum of the concentrations of betacyans and betaxanthine [10]. Bromine antioxidant activity was determined by coulometric titration with bromine of the studied samples. The bromine antioxidant ability (AOA) was calculated in coulombs (C) per 100 g of raw material and ready-to-cook semi-finished puree [11].

The organoleptic and physico-chemical characteristics of the finished dessert were determined in accordance with DSTU 3718:2007 «Sweet foods, jellies, mousses, puddings, milk concentrates».

3. Research results and discussion

To enrich sweet dishes and desserts when creating healthy and functional food products, it is proposed to use mashed semi-finished product, which includes mashed cherry and mashed beetroot (2:1 ratio).

To obtain semi-finished cherry-beetroot puree, use fresh berries of the Volodymyrska cherries and pre-boiled root crops of the Bordeaux table beet [12].

To obtain a ready-made dessert with high quality indicators and a high content of biologically active substances, it is proposed to first study the physicochemical parameters of semi-finished cherry-beetroot puree, the determination results of which are given in Table 1.

### Table 1

| Index                                | Mashed semi-finished product |
|--------------------------------------|-----------------------------|
| Humidity, %                          | 76±0.9                      |
| Active acidity, pH                   | 3.9±0.2                     |
| Titratable acidity (in terms of malic acid), % | 1.38±0.1                   |
| Bromic AOA, C/100 g                  | 194.2                       |
| Solids content, %                    | 22.1±0.6                    |
| Pectin substances content, g         | 0.95±0.2                    |

To obtain a dessert with a high content of biologically active substances, the content of anthocyanins, phenolic compounds and betalaines in semi-finished cherry-beetroot puree shown in Table 2 is studied.

### Table 2

| Raw materials | The total content of phenolic compounds, mg in terms of gallic acid/100 g of raw material | The total content of anthocyanins, mg/100 g | The content of betanine, mg/100 g |
|---------------|----------------------------------------------------------------------------------------|---------------------------------------------|----------------------------------|
| Semi-finished cherry-beetroot puree | 472                                                                            | 750                                         | 45                               |

According to the results of the studies given in Table 1 and Table 2, it is possible to conclude that semi-finished cherry-beetroot puree has satisfactory physico-chemical characteristics, high antioxidant activity, valuable biochemical composition. Therefore, it can be used in the manufacture of dessert products.

It is extremely important that the semi-finished cherry-beetroot puree contains significant amounts of biologically active substances, which allows to get the finished product for health purposes.

The main components of the dessert are semi-finished cherry-beetroot puree, water, white crystalline sugar, gelatin and citric acid.

During the experimental study and in order to determine the structural and mechanical parameters of the dessert, the amount of gelatin is calculated. Gelatin is added in an amount of 3%, 5%, and 7% by weight of the semi-finished cherry-beetroot puree. The studies are carried out by uniaxial compression at a temperature of 20 °C and a load of 50 g.

The obtained time dependences of the strain for a dessert with different amounts of gelatin show that the instantaneous elastic deformation of a sample with 3% gelatin is 5500·10^-5. For dessert samples with gelatin contents of 5% and 7%, the instantaneous elastic deformation was 6000·10^-5 and 6800·10^-5, respectively. Given the organoleptic characteristics of the studied samples, a sample with a gelatin content of 3% has the best quality. Also, after removal of the load, the restoration of elastic deformation in all samples is observed. Based on the studies, a dessert formulation is developed on the basis of semi-finished cherry-beetroot puree, which is given in Table 3.
Based on the data obtained, a dessert production technology is developed that includes the following main steps:
- preparation of semi-finished cherry-beetroot puree;
- mixing mashed semi-finished product with sugar;
- soaking gelatin with water in a ratio of 1:8, swelling at a temperature of 35–40 °C for (15–20)·60 s;
- mixing the components of the dish from a gelatinous solution;
- filling in containers, dragging, storage of the finished dish.

Organoleptic and physico-chemical parameters of the finished dessert are also investigated, which are given in Table 4 and Table 5, respectively.

Table 3

| Dessert recipe | Raw materials | Gross, g | Net, g |
|----------------|---------------|----------|--------|
| semi-finished puree | 745 | 737 |
| water | 208 | 208 |
| sugar | 28 | 28 |
| gelatin | 26 | 26 |
| lemon acid | 1 | 1 |
| output | – | 1000 |

According to the organoleptic characteristics, the finished dessert is characterized by the corresponding taste and aromatic characteristics: pleasant taste and smell, as well as the consistency, corresponds to the quality indicators of the products

Table 4

| Name of indicator | Characteristics of sweet foods |
|------------------|-------------------------------|
| According to the traditional recipe | With semi-finished cherry-beetroot puree |
| **Shape** | |
| Correct, with a clear contour | Correct, with a clear contour, no deformation |
| **Taste and smell** | |
| Peculiar to sweet dishes, without extraneous taste and smell | Pronounced, due to the presence of mashed potatoes, without extraneous taste and smell |
| **Colour** | |
| Dark yellow | Dark red |
| **Consistency** | |
| Jelly-like, not lingering | Jelly-like, not lingering |
| **Surface condition** | |
| Elastic | Elastic not sticky |

The obtained physico-chemical parameters of the finished dessert meet the requirements of the current regulatory documentation for this type of product.

The content of biologically active substances with antioxidant and decitration properties in the finished dessert is also studied, which is: anthocyanins – 750 mg/100 g, vitamin C – 8 mg/100 g, betalain – 45 mg/100 g and pectin substances – 1.8 g/100 g.

4. Conclusions

So, on the basis of the results obtained, it can be concluded that the use of cherry-beetroot puree is a semi-finished product in the technology of sweet dishes and desserts. An analysis of the physicochemical and organoleptic characteristics of the finished dessert shows that the use of gelatin in its formulation in an amount of 3 % allows to obtain a product with good gelling properties. The presence of semi-finished cherry-beetroot puree in the dessert recipe enriches the product with biologically active substances of phenolic nature, vitamin C and pectin substances.

The presence of a significant amount of biologically active substances that have antioxidant properties, provide a healing and preventive effect of the dessert. The developed dessert is recommended for production in restaurant facilities.

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