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THE RANGE FORMATION OF THE SWEET DISHES OF SPECIAL PURPOSE FOR PUBLIC CATERING ENTERPRISES

Формирование ассортимента сладких блюд
специализированного назначения
для предприятий общественного питания

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Abstract

The article reveals the issue of the sweet dishes recipes and technologies development of the special use with a preventive orientation in respect with such widespread diseases as diabetes and lactose intolerance. The development need of these products is confirmed by the Decree of the Chief State Sanitary Doctor of the Russian Federation and by the Food Security Doctrine of the Russian Federation. The background for the study was the lack of such products range in the public catering enterprises and in this regard the choice limitations for consumers suffering from the diseases mentioned above. The researchers developed the orange, lemon, coconut jelly and berry cream recipes with natural sugar substitutes on the basis of the standard recipes including main stages in the overall concept of the jelly and cream production. As a sugar substitute, they used the aqueous stevia essence prepared by standard techniques and the stevioside "Svita" of industrial production in the developed recipes. The optimal concentrations of input substitutes were determined. In one of the berry cream recipes the coconut milk replaces the dairy cream. The authors revealed the optimal proportion of introduced components with respect to the organoleptic quality indicators. They developed the technology of the new sweet dishes of the special purpose: determined technological steps, basic operations, and process parameters, presented its descriptions and flow charts. The researchers developed the organoleptic quality indicators evaluation scale for sweet dishes of the specialized purpose. In accordance with this scale they assessed the new jelly and cream quality in comparison with the appropriate control samples prepared by the standard recipe. The obtained results of the organoleptic evaluation demonstrated a high level of the products quality. Adding of the stevia essence and stevioside did not affect considerably the consumer characteristics of the finished product.

Keywords:

sweet dishes;
sugar substitutes;
stevia;
stevioside;
range;
recipes;
technology;
sensory evaluation
of quality

Реферат

В статье раскрываются вопросы разработки рецептур и технологий сладких блюд специализированного назначения, обладающих профилактической направленностью в отношении таких широко распространенных заболеваний, как сахарный диабет и непереносимость компонентов молока. Необходимость разработки данной продукции подтверждена постановлением Главного государственного санитарного врача РФ и Доктриной продовольственной безопасности Российской Федерации. Предпосылками исследований послужили отсутствие сладких блюд специализированного назначения в ассортименте предприятий общественного питания и ограниченность в связи с этим выбора для потребителей, страдающих указанными выше заболеваниями.

Ключевые слова:

сладкие блюда;
заменители сахара;
стевия;
стевеозид;
ассортимент;
рецептура;

*технология;
органолептическая
оценка качества*

На основе стандартных рецептур, включающих основные этапы общей концепции производства желе и крема, разработаны рецептуры желе апельсинового, лимонного и кокосового, а также крема ягодного с натуральными заменителями сахара. В качестве заменителя сахара в разработанных рецептурах использовали водный экстракт стевии, приготовленный по стандартной технологии и стевииозид «Свита» промышленного производства. Рассчитаны оптимальные концентрации вводимых сахарозаменителей. В одной из рецептур крема ягодного производили замену сливок на кокосовое молоко. Определены оптимальные соотношения вносимых компонентов с учетом органолептических показателей качества.

Разработаны технологии приготовления новых видов сладких блюд специализированного назначения, определяющие технологические этапы внесения компонентов и основные операции, а также технологические параметры; представлены их описание и технологические схемы. Разработана балльная шкала оценки органолептических показателей качества сладких блюд специализированного назначения; в соответствии с данной шкалой проведена оценка качества новых видов желе и крема в сравнении с соответствующими контрольными образцами, приготовленными по стандартной рецептуре. Результаты органолептической оценки показывают высокий уровень качества разработанной продукции. Установлено, что добавление экстракта стевии и стевииозида существенно не влияет на потребительские характеристики готовой продукции.

Introduction

The product development of treatment-and-prophylactic purposes to prevent the various diseases and strengthen the man protection function as well as to reduce the hazardous substance exposure is burning issue nowadays [1].

According to the Federal State Statistics Service (Census Bureau), 40% of men and 54% of women suffer from diseases related to malnutrition, high blood pressure, diabetes, high cholesterol, anemia, gastrointestinal tract diseases¹.

Over the last decade the amount of highly allergic individuals has increased by 20% in Russia. The most common is gluten and lactose intolerance. The excess weight problem becomes more acute [2–3; 7].

In 2013 the Russian Federation Chief State Sanitary Officer signed the decree "On the precautions against diseases caused by the micronutrients deficiency, the foodstuff development of functional and specialized purposes". The Russian food security doctrine also reveals the development need "for the fundamental and applied researches on the medical and biological safety assessment of the new food sources and ingredients, innovative technologies implementation including bio and nanotechnologies, organic foodstuff and food raw materials production technologies, production capacity of the new enriched, functional and dietary food"².

For the purpose of the food safety consumption by the certain categories of people suffering from various diseases scientists develop the specialized foodstuff with the treatment and (or) preventive properties. There is a growth of foodstuff production related to the diet and diabetic category in Russia [6].

However, public catering enterprises face the lack of such products. A consumer has to choose from an available dishes assortment that will largely meet his needs associated with the health status (if there are some diseases). In some cases, the catering enterprise customer will cancel the order due to certain precautions due to the health status.

Particularly this category includes sweet dishes with a number of advantages, however containing sugar, lactose, dairy components and protein. So, its consumption is counter-indicative for those suffering from diseases such as diabetes or dairy protein and sugar intolerance.

Stevia is a good substitute for sugar especially in dishes that are intended for children, pregnant women and obese people. Besides sweet qualities the stevia leaves contain ingredients that provide its unique medical and health properties [5].

The development of the public catering products to prevent chronic diseases and maintain the nor-

¹RF Government Decree № 707-PP dated 12.10.2016 on the Report «On the health state of the nationals established in the Sverdlovsk region in 2015» Access mode: <http://www.ural-region.net/079722/2> [Electronic resource].

²RF Chief State Sanitary Doctor Decree № 31 dated 14.05.2013 «On measures to prevent diseases caused by micronutrient deficiency, to develop functional and specialized foodstuff

production» Access mode: <http://24.rospotrebnadzor.ru/links/NormObesp/99947> [Electronic resource].

Government Decree of the Sverdlovsk region № 557-PP dated 20.05.2009 «On the concept of the healthy lifestyle formation and disease prevention in the Sverdlovsk region for the period until 2020» Access mode: <http://ekb4.info/pravo7/postanovlenie206.htm> [Electronic resource].

mal body state is currently a **Relevant Objective**. The **Study Purpose** is the formulation and technologies development of the sweet dishes for people suffering from such common diseases as diabetes and dairy intolerance.

Materials and Methods

The study objects are the natural sweetener (stevia leaves and stevioside), laboratory and production samples of the orange, lemon and coconut jelly, and berries cream; organoleptic jelly samples characteristics (layout, color, taste and smell, texture).

The authors used theoretical, calculation, organoleptic and metrical methods to solve the set problem.

The Study Results and Its Discussion

The study objective at this stage was to create the new types of jelly with 100 % sugar replacement. The main criterion in the formulation process was the condition that the product must not substantially differ in organoleptic characteristics from the existing traditional jelly.

The authors selected recipe "Orange Jelly № 891"; "Lemon Jelly № 891"; "Milk Jelly No. 897" by the 2nd column including the main stages of the overall jelly production concept as the basis for the stevia leaf essence and stevioside placement [4]. They determined the optimal ratio of the main components empirically.

The stevioside "Svita" was used as a sweetener, the sweetness ratio is 200. The researchers applied the essence to eject the sweet compounds from the plants leaf mass and used water as the essenceant to ensure effective essenceion of the stevia components. The aqueous solutions unique feature is that the raw materials infused on the heated bath absorb a certain amount of water that is retained in it even after squeezing. Therefore, to prepare 100 ml of infusion the researchers calculated the necessary

amount of water using the average water absorption coefficient equal to 1.1.

The scientists crushed pre-cleaned and dried stevia leaves, poured it with hot water (temperature 80–85 °C) in the ratio of the solid and liquid phases, respectively, and infused the solution on the heated bath for 15 minutes. Then the infusion was cooled and filtered. The researchers injected the aqueous stevia essence and stevioside for each 100 g of the product.

Developed jelly recipes are presented in the table 1.

The authors proposed the technological production schemes of the developed jelly (figures 1–3) taking into account the features of the ingredients preparing. According to the figure 1 the orange jelly production technology includes the following steps. Prior to using gelatin, the researchers poured it of the eight portions of the cooled stevia essence (stevioside with water) and maintained for swelling at room temperature for 15–30 minutes, stirring occasionally. They washed oranges, carefully removed the orange peel and squeezed the juice. Further, the researchers put the orange peel to the boiling water, injected prepared gelatin, heated to a temperature of 80–85 °C, added citric acid, then mixed and injected the orange juice essenceed, bottled and cooled.

The lemon jelly production processes consisted of the following stages. Prior to using gelatin, the researchers poured it of the eight portions of the cool water and maintained for swelling at room temperature for 15–30 minutes. They washed the lemons, removed carefully the citron peel and squeezed juice, added the stevia essence (stevioside) to water and boiled. Then the lemon peel and prepared gelatin were injected to the solution and heated to a temperature of 80–85 °C, then mixed with the squeezed lemon juice. The mixture was bottled and

Table 1
The Jelly Recipe of the Special Use, %

Unit	Orange Jelly with stevioside	Orange Jelly with stevia essence	Lemon Jelly with stevioside	Lemon Jelly with stevia essence	Coconut Milk Jelly
Orange	29,00	29,00	–	–	–
Lemon			10,00	10,00	–
Coconut Milk, 8% fat					72,90
Aqueous Essence of Stevia	–	24,00	–	14,00	–
Stevioside	0,12	–	0,14	–	0,10
Citric Acid	0,10	0,10	–	–	–
Water	67,78	43,90	86,86	73,00	24,00
Gelatin	3,00	3,00	3,00	3,00	3,00
Output	100,00	100,00	100,00	100,00	100,00

Figure 1. The Technology of the Orange Jelly with Stevia Essence / Stevioside

cooled. The technological scheme of the lemon jelly production is shown on the figure 2.

According to the figure 3 the production technology of coconut milk jelly includes the following stages. Man poured gelatin with boiled and cooled water and left for 15–30 minutes until it swelled. The researchers mixed hot coconut milk (80–85 °C) with stevioside stirring continuously, injected prepared gelatin, strained, bottled and cooled.

On the second stage the researchers developed the recipe and technology of the berry cream with stevia and stevioside. As reference, they used the control sample cooked in accordance with the recipes collection for public catering. It was berry cream (the second cooking method), No. 909 at the 1 column that includes the overall concept main stages of the berry cream production process (without eggs). The recipe of the cream is presented in the table 2.

Figure 2. The Technology of the Orange Jelly with Stevia Essence / Stevioside

Figure 3. The Technology of The Coconut Milk Jelly with Stevioside

Table 2
The Berry Cream Recipe of the Special Use

Unit	Berry Cream with Stevia Essence, %	Berry Cream with Stevioside, %	Berry Cream with Coconut Milk and Stevia Essence, %
Raspberry	35,00	35,00	35,00
Dairy Cream, 35%	47,00	46,92	–
Coconut Milk	–	–	47,00
Stevia Essence	16,00	–	16,00
Stevioside	–	0,08	–
Gelatin	2,00	2,00	2,00
Water	–	16,00	–
Output	100,00	100,00	100,00

The cooking technology of the berry cream with stevia essence consists of the following stages. A man poured gelatin with eight portions of stevia essence and kept it at room temperature for 15-30 min. to swell before using it. Raspberries were rubbed and mixed with the whipped dairy cream. While stirring continuously, a man added a thin

trickle of the slightly cooled gelatin mixture, then bottled and cooled. The berry cream with coconut milk technology is similar to the berry cream with stevia essence technology. You can find the technological scheme on the figure 4.

According to the figure 5, the technology of the berry cream with stevioside involves stages that are

Figure 4. The Technology of the Berry Cream with Stevia and Berry Cream with Coconut Milk and Stevia

Figure 5. The Technology of the Berry Cream with Stevioside

similar to the technology of this cream with stevia essence. The difference was in the fact that the gelatin was poured with the eight portions of cold water and allowed to swell at room temperature for 15–30 minutes before the usage. A man infused the stevioside powder in the puree, heated the mass for better sweetener melting.

The researchers determined the new sweet dishes quality using organoleptic analysis. They developed the five-grade scale for the organoleptic quality evaluation and applied weighting factors to control and analyze quality of the food products. This scale is easy to use: 5 points – excellent, 4 – good, 3 – satisfactory, 2 – bad (defective food product), 1 – very poor (technical drawbacks). Five points correspond to the description of the reference sample characteristics that represent the highest level of the product quality. The grade 4 evaluates the product with slight defects. 3 points are given if a product has noticeable defects or flaws.

The developed five-grade scale for sweet dishes is on the table 3. The main criteria are the taste and the flavor. The natural sweetener injecting does not

change the color, appearance and texture of food significantly.

According to the developed grade scale the authors assessed the sweet dishes quality of the special use by the organoleptic indicators. The organoleptic evaluation results are presented on the figure 6.

The finished orange jelly samples have good appearance, pleasant and well-determined orange color and flavor without foreign off-flavors and off-aroma. The lemon jelly has smooth surface without liquid drops, bright yellow color, sweet taste with sour aftertaste, equable and dense enough texture. The coconut milk jelly is white with equable and dense texture, smooth surface without drops and separation. The taste is sweet with the distinctive coconut flavor. The berry cream has smooth surface without drops, bright pink color, sweet taste, homogeneous, cellular, airy texture.

In terms of “Appearance and texture” the berry cream with coconut milk has a denser texture, retains its shape and clear-cut face when cutting with a knife. The samples color has a rich dark red color

Table 3

The Grade Organoleptic Evaluation Scale of the Sweet Dishes Quality of the Special Use

Unit	Grade				
	5 (Excellent)	4 (Good)	3 (Satisfactory)	2 (Bad)	1 (Very poor)
Appearance	The surface is smooth without drops and foam	The surface is smooth, homogeneous with slight condensate and no foam	The surface is matte and homogeneous with some foam and liquid drops	The structure is heterogeneous, jellyfied, with foam and bubbles	The structure is heterogeneous, jellyfied, with foam, bubbles and suspensions on the surface
Texture	The mass is jelly that retains its shape on the horizontal surface, clear-cut face when cutting with a knife	The mass is jelly but of the weak texture, that retains its shape on the horizontal surface, clear-cut face when cutting with a knife	The mass is equable and jelly of the weak texture, that retain its shape on the horizontal surface partially	The mass is equable and jelly of the weak texture, that does not retain its shape on the horizontal surface entirely	The mass is unequable and jelly of the weak texture, slowly spreading on the surface
Color	The color is equable and common to the raw materials color	The color is equable and similar to the raw materials color	The color is equable but is not common to the raw materials color	The color is unequable and darker than the raw materials color	The color is unequable and much darker than the raw materials color
Taste	The taste is pleasant, sweet, typical without off-flavor	The taste is sweet with slight aftertaste	The taste is pleasant, sweet, typical with subtle off-flavor	The taste is unpleasant, not sweet with bitter off-flavor	The taste is unpleasant, bitter with extraneous off-flavor
Flavor	The flavor is pleasant, well-defined	The flavor is pleasant and mild	The flavor is mild	The flavor is irrelevant, off-aroma	The flavor is unpleasant and irrelevant

Control Sample
Orange Jelly with Stevia Essence
Orange Jelly with Stevioside

Control Sample
Lemon Jelly with Stevia Essence
Lemon Jelly with Stevioside

Control Sample
Coconut Milk Jelly with Stevioside

Control Sample
Berry Cream with Stevia Essence
Berry Cream with Stevioside

Control Sample
Berry Cream with Stevia Essence and Coconut Milk

Figure 6. The Organoleptic Profile of the Developed Sweet Dishes of the Special Use

because of the berry coulis use. The finished product has a slightly sour aftertaste, but sweet taste with coconut flavor.

Findings

Taking into account the raw materials characteristics the authors developed the assortment of the sweet jelly dishes of the special use for people suffering from such common diseases as diabetes and lactose intolerance (table 4).

The experiment revealed that the stevia essence and stevioside had different effects on the desserts

taste. The research results showed that the stevia essence dose depended on the raw materials used. The authors established the stevia essence and stevioside dose depending on the raw materials used and determined the optimal technological steps for its infusing. The sweet dishes with stevia and stevioside corresponded to the control samples organoleptic characteristics. It retained good appearance, stable jelly structure, elastic and transparent texture, smooth surface without drops, pleasant harmonious taste with a strong aftertaste typical of make raw material. The natural vegetable juice and milk use allows to enhance the finished product nutrition value.

Conclusion

During the conducted study, the authors theoretically justified and experimentally confirmed the applicability of the stevia leaf powder and stevioside in the sweet dishes production with a full sugar replacement. They determined the optimal sweetener concentration of the plant origin and developed the jelly and cream recipes that contained the optimal amount of sugar substitutes.

The stevia essence, stevioside, and coconut milk use in the sweet dishes allows to create a new product with wider consumer properties. The researchers developed the sweet dishes recipes and technologies of the special use with stevioside or stevia essence. On the conducted research basis, the complete sugar replacement with the natural sweetener is to be applicable for preventive and dietary products. The research expanded the sweet dishes assortment including new jelly and cream units.

Table 4

The Developed Sweet Dishes Assortment

№	Unit
Orange Jelly	
1	with stevia essence
2	with stevioside
Lemon Jelly	
1	with stevia essence
2	with stevioside
Coconut Milk Jelly	
1	with stevioside and coconut milk
Berry Cream	
1	with stevia essence
2	with stevioside
3	with stevia essence and coconut milk

Bibliography

1. Gluhova E.A., Feofilaktova O.V. Razrabotka sladkih bljud s ponizhenym soderzhanijem sahara // Perspektivy proizvodstva produktov pitaniya novogo pokoleniya: materialy Vseros. nauch.-prakt. konf. s mezhdunar. uchastiem, posvjashhennoj pamjati professora G.P. Saprygina (g. Omsk, 13–14 aprelja 2017 g.). Omsk, 2017. S. 306–309.
2. Davydova R. Neperenosimost' pishlevykh produktov i markirovka allergenov v stranah ES // Mjasnye tehnologii. 2013. № 3 (123). S. 34–37.
3. Dedov I.I., Shestakova M.V., Vikulova O.K. Jepidemiologija saharnogo diabeta v Rossijskoj Federacii: kliniko-statisticheskij analiz po dannym Federal'nogo registra saharnogo diabeta // Saharnyj diabet. 2017. T. 20. № 1. S. 13–41.
4. Zdobnov A.I., Cyganenko V.A. Sbornik receptur bljud i kulinarных izdelij. Kiev: Arij, 2013. 680 s.

Библиографический список

1. Глухова Е.А., Феофилактова О.В. Разработка сладких блюд с пониженным содержанием сахара // Перспективы производства продуктов питания нового поколения: материалы Всерос. науч.-практ. конф. с междунар. участием, посвященной памяти профессора Г.П. Сапрыгина (г. Омск, 13–14 апреля 2017 г.). Омск, 2017. С. 306–309.
2. Давыдова Р. Непереносимость пищевых продуктов и маркировка аллергенов в странах ЕС // Мясные технологии. 2013. № 3 (123). С. 34–37.
3. Дедов И.И., Шестакова М.В., Викулова О.К. Эпидемиология сахарного диабета в Российской Федерации: клиничко-статистический анализ по данным Федерального регистра сахарного диабета // Сахарный диабет. 2017. Т. 20. № 1. С. 13–41.
4. Здобнов А.И., Цыганенко В.А. Сборник рецептур блюд и кулинарных изделий. Киев: Арий, 2013. 680 с.

5. Macejchik I.V., Lomovskij I.O., Sigina E.A. Ispol'zovanie stevii v proizvodstve konditerskih zhelirovannyh mass funkcional'nogo naznachenija // *Tehnologija pererabotki*. 2014. № 10. S. 206–212.
6. Pastushkova E.V., Zavorohina N.V., Chugunova O.V., Feofilaktova O.V. Formirovanie assortimenta produktov s zadannymi potrebitel'skimi svojstvami // *Sovremennye problemy nauki i obrazovanija*. 2014. № 6. S. 287.
7. Chugunova O.V., Mysakov D.S. Teoreticheskoe i prakticheskoe obosnovanie ingredientnogo sostava dlja proizvodstva bezglutenovogo biskvitnogo polufabrikata // *Industrija pitaniya*. 2016. № 1. S. 25–32.
5. Мацейчик И.В., Ломовский И.О., Сигина Е.А. Использование стевии в производстве кондитерских желированных масс функционального назначения // *Технология переработки*. 2014. № 10. С. 206–212.
6. Пастушкова Е.В., Заворохина Н.В., Чугунова О.В., Феофилактова О.В. Формирование ассортимента продуктов с заданными потребительскими свойствами // *Современные проблемы науки и образования*. 2014. № 6. С. 287.
7. Чугунова О.В., Мысаков Д.С. Теоретическое и практическое обоснование ингредиентного состава для производства безглютенового бисквитного полуфабриката // *Индустрия питания*. 2016. № 1. С. 25–32.

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