

Researches in regards to the influence of raw material quality on the nutritional value and consumption properties of butter creams for confectionery products

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Relevance of the work: In the State Policies on Healthy Eating of many countries and in the Strategies for increasing the quality of food products, great attention is paid to satisfying the physiological needs of citizens from the perspective of developing quality and harmless diets for health. The food ration of many categories of consumers also includes confectionery products based on butter creams. Butter creams with different additives are mostly used in confectionery due to their high sensory properties, despite high energy values (average of 500 Kcal) and average nutritional value (between 6.5 and 11.5 units).

The aim of the paper: to study the influence of the quality of raw materials on the quality of butter creams.

Research methods: standardized and non-standardized, adopted in commodity science, namely: organoleptic, physical, physico-chemical, calculation and registration methods.

Results: Fourteen types of butter creams with egg white and additives of vegetable origin in different proportions were developed and researched, namely with added: coffee extract, cocoa extract, mint extract, green tea extract. Were made calculations regarding the nutritional value (VN10) and the energy value for some of these recipes of butter creams that we propose for implementation in production. Following the processing of the data, we found that the creams with additions of raw materials of vegetable origin such as: coffee extract, cocoa extract and mint extract did not increase, but conversely significantly decreased the nutritional value of the creams from 11, 8 to 10,6 units. At the same time, it should be mentioned that the calculation formulas for the nutritional value are not perfect. They do not include the essential substances present in these raw materials, with antioxidant and antimicrobial role, stimulating nervous and cardiac system, which contribute to increasing the biological and sensory value of the product, as well as to the widely assimilation of nutrients.

Key words: raw material, butter, confectionery creams, nutritional value, vegetable fats, food additives

JEL CLASSIFICATION: Q02

Introduction

In the State Policies regarding Healthy Food of many countries and in the Strategies for increasing the quality of food products, a great attention is paid to satisfying the physiological needs of the citizens from the perspective of elaborating qualitative and harmless diets for health. Confectionery is also included in the food ration of many categories of consumers. Currently, the food industry widely uses various categories of creams - a component of confectionery products. Confectionery creams are mixtures of fats, eggs, cream, milk, sugar, flavors, food colors and other raw materials that are especially appreciated by consumers for their high energy value, provided by lipids from the fat that are used (64-74% of butter, 82% of margarine) and supplemented with carbohydrates in the form of sucrose, lactose or starch. The nutritional value and digestibility of creams are influenced by the nature of the raw materials that are part of them.

Therefore, under these conditions, studies on the improvement of recipes and technologies for obtaining confectionery products based on butter creams, by enriching them with essential nutrients, reducing the caloric load and diversifying the range of butter creams are relevant. Confectionery products obtained based on designed recipes, by calculating the nutritional and energy value and which will present high organoleptic indices, could also serve as products for general consumption and as functional confectionery products, recommended to certain categories of consumers with various health problems.

Butter cream is a semi-manufactured product for filling and glazing confectionery products. Most of the confectionery products containing butter creams are highly calorific products, due to the high content of fat and sugar, which can cause obesity, tooth decay, general metabolic disorders, atherosclerosis, etc. At the same time, these products are practically free of biologically active substances such as: vitamins, minerals, dietary fiber, polyphenolic substances, essential acids and others. In addition, nowadays producers, in order to attract

consumers and extend the selling terms of these products that are perishable, sometimes use excessively various substances for improving the organoleptical properties, for preserving and stabilising the product and for reducing the costs, by substituting natural raw materials with cheap synthetic raw materials. Many of these substances, which are simultaneously added in the same product, have a negative synergistic effect on human health, being suspected in triggering chain reactions at the cellular level in the human body, leading to cancer, stomach and duodenal ulcers, gastritis, food allergies and other diseases.

At the international level, the assortment of butter creams is constantly diversifying, by using new ingredients with a vegetable origin in a powder form obtained from fruits, berries, roots, tubers, as well as in the form of liquid extracts obtained from green tea, mint, melissa, citrus peels, trees peels, seeds, etc. The modern and trained consumer, who has a habit of reading the information declared by the manufacturer on the product label, refuses to buy confectionery with synthetic ingredients and is ready to buy a slightly more expensive, but natural product. Already, such a consumer can no longer be flattered by the bright color and pronounced aroma of the products and asks for confirmation of the nutritional value through the nutritional label of the product.

The aim of our work was to study the influence of raw materials on the quality of the butter creams.

To achieve this goal, the following objectives have been developed:

- studying the factors that influence the quality of the basic raw materials used in the manufacture of butter creams;
- checking the quality of the basic raw materials used in the manufacture of butter creams;
- checking the quality of butter creams obtained from different raw materials according to quality indices;
- calculation of the energy and nutritional value of our subject to research - butter creams;

- the development of new recipes for butter creams, balanced in terms of nutritional and energy value.

Materials and research methods

As butter is the main raw material used to obtain butter creams, it is obvious that its quality will influence to a greater extent, than other raw materials, the quality of the finished products. Based on these considerations, we decided to research in more detail this raw material than the rest of the ingredients that are used according to the recipe to obtain these creams.

Cow butter ranks first among animal fats in terms of digestibility, which is over 95%. This is due to the special chemical composition, including the high content of vitamins A and D, which usually are in sufficient quantities in butter to meet the physiological needs of the body. Butter is one of the most common dairy products on the market. Currently, unfortunately, in the pursuit of profit, manufacturers deviate from the rules of quality and innocuousness and fool their customers by substituting natural products with cheap ingredients, ultimately being to the detriment of human health.

According to experts from the Food Fraud Database, over 10% of all sold food in developed countries is counterfeit. According to the European counterfeiting quota, nine foods are permanently blacklisted, namely: ground coffee, honey, olive oil, sausages, butter, Parmesan cheese, rice, flour, salmon.

The Rosstandard agency in Russia, after the researches during the "Quality Test" Project, mentioned that the priority in counterfeiting, among all the tested products, is butter (38% of the tested production contained non-dairy origin fats). Another Russian organization "Roscontrol" published in "Express Gazeta" (December, 2019) that 75% of the researched butter is counterfeit. The situation is also deplorable in neighboring countries: in Ukraine (2016-2019) during various controls it was found that 30-50% of the analyzed samples had milk fat substitutions from 20 to 100%. Also, in Romania, butter is in the group of the nine top counterfeit foods.

Based on the above, as a research object, we used the following products:

- cream butter - raw material;
- chicken eggs - raw material;
- 14 various confectionery creams made by us.

Butter - object of research: was studied the following assortment of butter, marketed in the consumer market of the Republic of Moldova (domestic and imported) and which, respectively, could be used as a raw material in the confectionery industry:

8 types of butter from the foreign producers:

- Prezident, "LACRALIS INTEMATIONAL", Franța, fat content - 82%, weight - 200g, energy value - 743 kcal, price - 38.5 lei;
- Valio, Joint Stock company "VALIO Seiniaoki", Finlanda, fat content - 82%, weight - 200g, energy value - 740 kcal, price - 44 lei;
- Lurpak DANISH BUTTER, Aria Foods amb. 8260 viby J, Denmark, fat content - 82%, weight - 200g, energy value - 747 kcal, price - 44 lei;
- Homemade butter, LACRALIS INTEMATIONAL, Franța, fat content - 82.5%, weight - 200g, energy value - 740 kcal, price - 50 lei;
- Butter, Classic "Kaufland" SRL, Germania, fat content - 82%, weight - 250g, energy value - 749 kcal, price - 45 lei;
- Butter Novgorod Siverschii, Ucraina, Novgorod-Severschii city, Cernigov, fat content - 82.5%, weight - 200g, energy value - 748 kcal, price - 40 lei;
- Peasant Butter, IAFFI, Ucraina, fat content - 73%, weight - 200g, energy value - 666 kcal, price - 40 lei;
- Extra Farm, STL "FOOD DEVELOPMENT". Ucraina, Vinița, Tulicin, fat content - 82.5%, weight - 200g, energy value - 748 kcal, price - 31 lei.

2 types from local producers:

- Magnifico, "INCOMLAC" S.A., R. of Moldova, fat content - 82.5%, weight -

- 200g, energy value - 748 kcal, price - 29 lei;
- Casuța mea, "LAPMOL", R. Of Moldova, fat content - 72.5%, weight - 200g, energy value 661 kcal, price - 31 lei.

Research methodology of the butter quality

The determination of the butter quality was performed according to the recognized scientific knowledge methods in the science of goods: organoleptic, physical and chemical analysis.

The organoleptic analysis - was performed according to the Quality Requirements for Milk and Dairy Products [1, GD, No. 158 of 07-03-2019]. The following indicators were assessed: aspect (on the surface and in section), consistency at $12\pm 2^{\circ}\text{C}$, smell and taste.

The average score for assessing the quality of butter was determined according to the standardized requirements [5, GOST 32261-2013].

The butter freshness was checked by microscopy. The method is based on investigating the butter under a microscope and observing the presence and size of the water bubbles (the presence of large bubbles indicates that the butter is fresh, and the lack of them - that the sample is of suspicious freshness). The saponification index was determined using the titration method. The essence of the method consists in saponifying free fatty acids, glycerides and other esters that react with a base [4, GOST ISO 3657-2016], [6, Calmăș V., 2016]. The saponification index is the amount (in mg) of basic solution needed to saponify free and bound fatty acids, which are contained in 1 gram of fat. The saponification index depends on: the composition of fatty acids, molecular weight, content of unsaponified substances, the presence of free acids, mono- and diglycerides and of other complex esters.

The refractive index was determined applying the refractometry method that allows the identification of fats, indicates the origin (provenance), the degree of purity and oxidation [3, GOST ISO 6320-2018], [6, Calmăș V., 2016]. The essence of the method is that fat differently reflects light according

on its composition and structure. The determination is performed using a refractometer which directly shows the refractive index. The reading is done through the eyepiece, observing the gradation, in front of which is the demarcation line between the light and the dark field.

Checking the presence of the cow milk's tallow in butter. The method is based on the fat solubility of cow's butter in a 3: 4 acetic-ethanol mixture at 30°C for 30 minutes.

Detection of butter counterfeiting by precipitation the beef tallow. The determination consists in dissolving 1 g of molten fat in 3 ml of ether (or neutralized and dry acetic acid of CaCl_2), after which are added 4 ml of 93% ethyl alcohol at 30°C and the mixture is kept at 30°C for 30 minutes in the steam of an water bath. Interpretation of results: the fat in the cow's butter remains clear, but if 5g of beef tallow or 12% hydrogenated oil has been added, a precipitate is obtained. Eggs - object of research. Were used poultry eggs. The degree of freshness ranged from 1 to 10 days. Eggs are the second raw material after butter, which will have a greater influence on the quality of butter creams. The production and marketing of eggs for consumption in the Republic of Moldova is carried out in compliance with the provisions of the Regulation of the Sanitary-Veterinary Norm approval on the marketing of eggs for human consumption [2, GOVERNMENT DECISION No. 120 of 27-10-2008]. The basic principle for determining the influence of egg freshness is the property of the egg white to retain gas and to be beaten. The fresher the egg, the better the egg whites are beaten and the more gas they retain, which leads to a greater stability.

Confectionery creams - as a research object. 14 recipes were developed based on butter creams with egg white with the following additions: 2 creams with 10% green tea extract (based on salted butter and unsalted butter); 2 creams with the addition of 9% coffee (based on salted butter and unsalted butter); 2 creams with the addition of 9% cocoa (salted butter; unsalted butter); 4 creams of butter with the addition of salted butter in different proportions (5, 10; 25;

50%); 4 creams of butter with the addition of 9 and 50% mint extract (2 creams with salted butter and 2 creams with unsalted butter). The creams were researched in terms of energy value, nutritional value and consumption properties.

Results and discussions

The organoleptic research of the butter demonstrate some non-conformities regarding the indicator of Aspect (on the surface and in section). Thus, for three types of products: Butter Novgorod Severschii, Ukraine; Extra Farm, Ukraine and Lurpak Danish Butter were identified visible water droplets. Otherwise, the other assortments of analyzed butter correspond to the requirements of GD No. 611 from 05.07.2010 regarding the approval of the Technical Regulation "Milk and dairy products". However, we also checked the average score of the analyzed butter. According to the requirements [5, ГОСТ 32261-2013] the maximum possible grade is 20 points. It is not allowed to sell butter with an overall score of less than 11 points, including: less than five points for taste and smell; less than three points for consistency; less than one point for color; less than two points for packaging and labels. At the same time, according to the requirements of this document, the marketing of butter with the following characteristics is not allowed:

- taste and smell - foreign, bitter, rancid, moldy, oleic, oxidized, metallic, of chemical and petroleum products, feed, burnt, sour, excessively salty and other uncharacteristic tastes and odors of butter;
- consistency - sticky, crumbly, heterogeneous, weak, too soft, with heat resistance less than 0.70;
- color - uneven
- packaging and marking - insufficiently clear marking, immersion on the surface of the monolithic packaging, defects in the sealing of the packaging material, deformed and damaged packaging.

None of these non-conformities were identified, and the average score of the analyzed butter assortments is within the limit of 18-20 points, which confirms that all these

products can be marketed on the consumer market.

The highest score (20 points) was recorded at:

- the President, << Lacralis International >>, France,
- Valio, SA "VALIO Seiniaoki", Finland;
- Peasant Butter, Ukraine;
- Magnifico, "INCOMLAC" S.A., R.of Moldova.

The results of the physical-chemical examination show that 7 out of 10 types of butter contain non-lactating animal fats. Butter President, << Lacralis International >>, France; Valio, SA "VALIO Seiniaoki", Finland; Lurpak Danish Butter (Denmark) does not contain these fats. The presence of beef tallow was identified in all types of butter except Novgorod Butter Severschii, Ukraine. At the same time, we mention that six types of butter contain margarine. In the samples of homemade butter, << Lacralis International >>, France; Butter Novgorod Severschii, Ukraine; Peasant Butter, Ukraine and My House, Republic of Moldova, the presence of margarine was not identified. The microscopic analysis proved the freshness of 9 types of butter out of 10, except for Peasant butter, Ukraine which according to the results of research is attributed to the category of aged butter.

The refractive index for natural / non-counterfeit butter with other types of fat is in the range of 1.452 to 1.461. Following the examination, we found that all types of analyzed butter fall within the permissible ranges. But these limits include more fats, both of vegetable and animal origin. Based on these considerations, we came to the conclusion that the value of the refractive index does not provide reliable results regarding the naturalness of the butter.

One of the most relevant indicator that attests the butter naturalness is the saponification index, with values between 218 and 235. Our results show that 8 out of 10 types of butter recorded these values. Two types of butter: Peasant Butter and Extra Farm, both made in Ukraine, do not meet these conditions, with much lower saponification index (197.75 and 185.13).

The main butter counterfeiting is the substitution of milk fat with other lower quality fats of animal or vegetable origin. Those that imitate the butter very well are hydrogenated fats and palm butter (oil). By substituting butter with margarine, it is found that the saponification index is below the value of 218, in the case of partial substitution, and below 200 in the case of total substitution, compared to the index of natural butter which has values between 218 and 235.

Butter or oil obtained from the core of the palm fruit has a saponification index equal to 190-209, and the oil obtained from palm kernels has an index of 230-254 (the average of these values overlaps with those of butter). It follows that only after a single index we can't draw conclusions about the substitution of milk fat.

The qualitative methods for detecting the presence of added foreign fats are in principle less accurate methods. That's why we decided to check how sensitive these methods are on a sample of butter obtained in the laboratory from 40% cream, as well as on a sample of spread and a sample of vegetable margarine, manufactured in enterprises. Following the experiments we found that the methods are quite sensitive and can be used to detect counterfeits.

The results of the physico-chemical examination show that all the types of butter examined are of dubious quality and all the products checked have at least one mismatch.

The characteristic of eggs as a raw material for butter creams

To determine the influence of egg white on butter cream, were prepared egg creams from eggs with 1,2,5,10 days. When the egg white was beaten, the one-day egg had a foam with smaller and more stable gas bubbles and the older the egg (10 days) the gas bubbles were larger and less stable compared to the one containing eggs with 1 day. When the egg white was introduced into the butter cream, it had practically no influence on the organoleptic quality.

From here we can conclude that the freshness of the eggs between 1 and 10 days does not influence the appearance, taste and consistency of the prepared creams.




Checking the influence of butter quality on the quality of butter creams










For research, were taken four types of butter from the analyzed assortment: President, << Lacralis Intemational >>, France; Valio, SA "VALIO Seiniaoki", Finland; Peasant Butter, Ukraine; Magnificent, "INCOMLAC" S.A., RM.

We choosed these 4 types of butter as raw material for obtaining creams, because they accumulated the maximum grade in the organoleptic determination using the scoring method. Three cream recipes were prepared based on them and the egg white (Table 1, fig. 1-12):

- Basic butter cream,
- Butter cream with milk,
- Butter cream with egg white

Table 1. Assortment of prepared creams from the analyzed butter

Creams prepared based on butter President, <<Lacralis Intemational>>		
		
Figura 1. Butter cream with egg white	Figura 2. Butter cream with milk	Figura 3. Basic butter cream
Creams prepared based on Valio butter, SA "VALIO Seiniaoki", Finlanda		

		
Figure 4. Butter cream with egg white	Figure 5. Butter cream with milk	Figure 6. Basic butter cream
Creams prepared on the basis of Peasant butter, Ucraina		
		
Figure 7. Butter cream with egg white	Figure 8. Butter cream with milk	Figure 9. Basic butter cream
Creams prepared based on Magnifico butter, "INCOMLAC" S.A., RM		
		
Figure 10. Butter cream with egg white	Figure 11. Butter cream with milk	Figure 12. Basic butter cream

The characteristic of the obtained creams organoleptic indices is presented in table 2.

Table 2. The results of the organoleptical research of butter creams

Type of cream		Exterior aspect:	Color:	Consistency:	Taste:	Smell:
Cream No.: 1. Butter cream with egg white	Magnifico	Attractive and uniform	White	Unctuous, compact, homogeneous, unbreakable mass	Pleasant, fresh butter and fermented cream with highlighted flavor	Pleasant with a well-highlighted butter flavor
	Valio	Attractive and uniform	White	Unctuous, compact, homogeneous, unbreakable mass	Pleasant butter with a slightly pronounced flavor	Pleasant with a slight emphasis on butter
	Prezident	Attractive and uniform	White	Unctuous, compact, homogeneous, unbreakable mass	Pleasant, fresh butter and fermented cream with highlighted flavor	Pleasant with a well-highlighted butter flavor

	Peasant butter	Attractive and uniform	White	Unctuous, compact, homogeneous, unbreakable mass	Pleasant butter with a slightly pronounced flavor	Pleasant with a slight emphasis on butter
Cream No: 2. Butter cream with milk	Magnifico	Attractive and uniform	Yellow with shades of white	Fine, uniform and well formed	Of butter cream	Pleasant with a well-highlighted butter flavor
	Valio	Attractive and uniform	White	Fine, uniform and well formed	sweet	Pleasant with a slight emphasis on butter
	Prezident	Attractive and uniform	Yellow with shades of white	Fine, uniform and well formed	Of butter cream	Pleasant with a well-highlighted butter flavor
	Peasant Butter	Attractive and uniform	White	Fine, uniform and well formed	sweet	Pleasant with a slight emphasis on butter
Cream No:3 Basic butter cream	Magnifico	Attractive and uniform	White to yellow	Fine, uniform and well formed	Of butter cream	Pleasant with a well-highlighted butter flavor
	Valio	Attractive and uniform	White	Fine, uniform and well formed	sweet	Pleasant with a slight emphasis on butter
	Prezident	Attractive and uniform	White to yellow	Fine, uniform and well formed	Of butter cream	Pleasant with a well-highlighted butter flavor
	Peasant butter	Attractive and uniform	White	Fine, uniform and well formed	sweet	Pleasant with a slight emphasis on butter

The organoleptic analysis was performed by a 5-member committee. The appreciation scale was 20 points [7, Purici I., 2016]. Each member of the tasting committee completed the individual sensory analysis sheet. Then, the quality evaluation of the analyzed product was made by comparing the total average score with the score scale according to the table 5. The total average score at which the product can be marketed is 10.1 points. The results of the organoleptic examination of the butter creams are presented in Table 3.

Table 3. Centralization sheet of the sensory analysis results

Product name	Butter	Average number of points awarded (Pi)				Total average score (Pnt)
		Appearance and shape	Smell	Taste	Consistency	
Butter cream with egg white	Butter Valio	3,2	3,2	3,4	3,8	13,6
	Butter Magnifico	5	4,4	4,4	4,4	18,2
	Butter Prezident	4	3,8	4	4,2	16
	Peasant Butter	4,2	4	4,2	5	17,4
Butter cream with milk	Butter Valio	3,6	3	4	3	13,6
	Butter Magnifico	4,8	4,6	4,4	4,8	18,6
	Butter Prezident	4	3,2	4	4,6	15,8
	Peasant Butter	4	4	4	4	16
Basic butter cream	Butter Valio	3,6	3,2	3,8	3	13,6
	Butter	4,8	4,4	5	4	18,2

	Magnifico					
	Butter President	4,2	3	3,6	4	14,8
	Peasant Butter	4,2	4	4	3,2	15,4

Analyzing the data presented in table 3 we can see that the creams obtained from Magnifico butter accumulated more than 18 points, occupying the first place among the investigated creams. At the same time, we mention the fact that this type of butter was the cheapest of all the samples of butter that were used to prepare the creams (145 lei / kg \approx 7.6 euros) compared to the rest of the samples that were purchased at the price of 152 and 200 lei / kg (respectively \approx 8 and 10.5 euros). From this we conclude that the price does not always correlate with the quality of the butter. The basic principle of the Balanced Nutrition Concept is to respect the balance between the body's need for nutrients and the amount of nutrients consumed daily.

For this purpose, we studied the nutritional and energetic value of the obtained creams, based on the butter assortments examined organoleptically and physico-chemically.

The nutritional value (VN 10) is determined based on the food chemical composition (in our case - butter) which meets the needs of the human body in macro- and micronutrients. The nutritional value of a food is considered to be higher as it assures to a greater extent the body's needs for nutrients. The required information to calculate the nutritional value of the creams is presented in Table 6, and the calculations are presented below.

Calculation of the nutritional value for 100g of cream obtained from "Valio" butter:

$$\text{Butter cream with milk} = 6,4637 + 0,4468 + 0,844 = 7,75$$

$$\text{Butter cream with egg white} = 4,7530 + 5,818 + 0,676 = 11,531$$

$$\text{Basic butter cream} = 1,0989 + 5,45 = 6,5489$$

Calculation of the nutritional value for 100g of cream obtained from "Magnifico" butter:

$$\text{Butter cream with milk} = 7,005 + 0,4468 + 0,844 = 8,2958$$

$$\text{Butter cream with egg white} = 4,7530 + 6,35 + 0,676 = 11,779$$

$$\text{Basic butter cream} = 1,0989 + 5,9005 = 6,9994$$

Calculation of the nutritional value for 100g of cream obtained from "President" butter:

$$\text{Butter cream with milk} = 6,4637 + 0,4468 + 0,844 = 7,7545$$

$$\text{Butter cream with egg white} = 4,7530 + 5,818 + 0,676 = 11,247$$

$$\text{Basic butter cream} = 1,0989 + 5,45 = 6,45$$

Calculation of the nutritional value for 100g of cream obtained from "Peasant" butter:

$$\text{Butter cream with milk} = 6,4637 + 0,4468 + 0,844 = 7,75$$

$$\text{Butter cream with egg white} = 4,7530 + 5,818 + 0,676 = 11,531$$

$$\text{Basic butter cream} = 1,0989 + 5,45 = 6,5489$$

Calculations show that egg white butter creams have a higher nutritional value because of the nutritional value per 100 grams of egg, which is 30.90 and for 100g milk, which is much lower-4,153.

Energy value is an integral part of the nutritional value and is expressed by the amount of energy formed in the human body as a result of biological oxidation of macronutrients. Biological oxidation consists in the enzymatic decomposition of carbohydrates, proteins, lipids and other nutrients with energy elimination. The energy formed as a result of biochemical reactions is used to cover the physiological functions of the body in the physical and intellectual activity.

Calculations of the energy value of creams obtained from different types of butter are as follows:

- From butter Valio:

$$\begin{aligned} \text{Butter cream with milk} &= (43,007 + 0,75) \times 9 + 4 \times (0,35 + 0,670) + 4 \times (0,16 + 0,95 + 20,30) \\ &= 43,757 \times 9 + 4,08 \times 4 + 21,41 \times 4 = 393,813 + 101,96 = 495,773 \end{aligned}$$

$$\begin{aligned} \text{Butter cream with egg white} &= 4 \times (2,15 + 0,32) + 9 \times (1,84 + 39,03) + 4 \times (0,08 + 0,43 + 30,76) = \\ &= 2,47 \times 4 + 9 \times 40,78 + 31,27 \times 4 = 9,88 + 367,02 + 125,08 = 501,98 \text{ kcal} \end{aligned}$$

$$\text{Basic butter cream} = (49,95+0,4) \times 4 + 36,25 \times 9 + 0,3 \times 4 = 201,4 + 326,25 + 1,2 = 528,85 \text{ kcal}$$

- From butter Magnifico:

$$\text{Butter cream with milk} = (48,93+0,75) \times 9 + 4 \times (0,35+0,670) + 4 \times (0,16+0,95+20,30) = 446,85 + 4,08 + 85,64 = 536,57 \text{ kcal}$$

$$\text{Butter cream with egg white} = 4 \times (2,15+0,32) + 9 \times (1,84+44,41) + 4 \times (0,08+0,43+30,76) = 547,97 \text{ kcal}$$

$$\text{Basic butter cream} = (49,95+0,4) \times 4 + 41,25 \times 9 + 0,3 \times 4 = 573,85 \text{ kcal}$$

- From butter Prezident:

$$\text{Butter cream with milk} = (48,64+0,75) \times 9 + 4 \times (0,35+0,670) + 4 \times (0,16+0,95+20,30) = 444,51 + 4,08 + 85,64 = 534,15 \text{ kcal}$$

$$\text{Butter cream with egg white} = 4 \times (2,15+0,32) + 9 \times (1,84+44,14) + 4 \times (0,08+0,43+30,76) =$$

$$9,88 + 413,82 + 124,76 = 548,46 \text{ kcal}$$

$$\text{Basic butter cream} = (49,95+0,4) \times 4 + 41 \times 9 + 0,3 \times 4 = 201,4 + 369 + 1,2 = 571,6 \text{ kcal}$$

- From Peasant Butter:

$$\text{Butter cream with milk} = (43,007+0,75) \times 9 + 4 \times (0,35+0,670) + 4 \times (0,16+0,95+20,30) =$$

$$43,757 \times 9 + 4,08 \times 4 + 21,41 \times 4 = 393,813 + 101,96 = 495,773$$

$$\text{Butter cream with egg white} = 4 \times (2,15+0,32) + 9 \times (1,84+39,03) + 4 \times (0,08+0,43+30,76) =$$

$$2,47 \times 4 + 9 \times 40,78 + 31,27 \times 4 = 9,88 + 367,02 + 125,08 = 501,98 \text{ kcal}$$

$$\text{Basic butter cream} = (49,95+0,4) \times 4 + 36,25 \times 9 + 0,3 \times 4 = 201,4 + 326,25 + 1,2 = 528,85 \text{ kcal}$$

The results of the research on the nutritional value and energy value of the obtained creams are presented in Table 4.

Table 4. The results of calculating the nutritional and energy value of butter creams

Butter cream	Type of butter	Nutritional value	Energy value
Butter cream with milk	Butter Valio	7,75	495,77
	Butter Magnifico	8,29	536,57
	Butter Prezident	7,75	534,15
	Peasant Butter	7,75	495,77
Butter cream with egg white	Butter Valio	11,531	501,98
	Butter Magnifico	11,77	547,397
	Butter Prezident	11,24	548,46
	Peasant Butter	11,53	501,98
Basic butter cream	Butter Valio	6,54	528,85
	Butter Magnifico	6,99	573,85
	Butter Prezident	6,45	571,6
	Peasant Butter	6,54	528,85

The data in the Table 4 shows that the butter cream with egg white is the cream with the highest nutritional value.

In order to improve the nutritional value and to decrease the energy value of the creams, was made an attempt to develop new assortments based on butter cream with egg white and additions of vegetable origin products, namely:

- butter cream with egg white and green tea;
- butter cream with egg white and coffee, 5%;
- butter cream with egg white and cocoa, 5%;
- butter cream with egg white and mint extract of 10% and 50%.

At the same time, was made an attempt to replace a part of unsalted butter with the salted one in proportions of 5, 10, 15, 25 and 50 (%) The insignificant amount of salt found in the butter contributes to the taste and aroma intensification of the product.

The quality characteristics of butter creams with different additives is presented in table 5.

Table 5. The organoleptic characteristic of butter creams with different additives

The type of cream	Exterior aspect:	Color:	Consistency:	Taste:	Smell:
Butter cream with egg white and the addition of green tea extract	It is attractive and uniform	White-green	Unctuous, compact, homogeneous mass, it is not crumbly	Pleasant, fresh butter and fermented cream	Green tea and butter
Butter cream with egg white and added coffee	Attractive and uniform	White	Unctuous, compact, homogeneous mass, it is not crumbly	Pleasant of butter	Pleasant, with a slight aroma of butter and milk
Butter cream with egg white and added cocoa	Attractive and uniform	White	Unctuous, compact, homogeneous mass, it is not crumbly	Pleasant, fresh butter and fermented cream	Pleasant, with a well-highlighted aroma of butter and milk
Butter cream with egg white and 10% mint extract	Attractive and uniform	Light green	Unctuous, compact, homogeneous mass, it is not crumbly	Pleasant	Pleasant, with a slight aroma of butter and milk
Butter cream with egg white and 50% mint extract	Attractive and uniform	Green	Fine, uniform and well formed	sweet	Pleasant, with a well-highlighted aroma of butter
Butter cream with egg white and the addition of 5% salted butter	Attractive and uniform	Yellow with shades of white	Fine, uniform and well formed	Butter cream	Pleasant, with a well-highlighted aroma of butter
Butter cream with egg white and the addition of 10% salted butter	Attractive and uniform	White	Fine, uniform and well formed	sweet	Pleasant, with a slight aroma of butter, eggs and milk
Butter cream with egg white and the addition of 50% salted butter	Attractive and uniform	White	Fine, uniform and well formed	of butter cream, overly salty	Pleasant, with a well-highlighted aroma of butter
Butter cream with egg white and the addition of 25% salted butter	Attractive and uniform	White	Fine, uniform and well formed	of butter cream, overly salty	Pleasant, with a well-highlighted aroma of butter
Butter cream with egg white and the addition of 15% salted butter	Attractive and uniform	White	Fine, uniform and well formed	of butter cream, overly salty	Pleasant, with a well-highlighted aroma of butter
Cremă de unt cu albuș de ou și adaos de cafea 5% și unt sărat 10%	Attractive and uniform	White	Unctuous, compact, homogeneous mass, it is not crumbly	Pleasant, buttery with a slight hint	Pleasant, with a slight aroma of butter and milk
Butter cream with egg white and 5% added cocoa and 10% salted butter	Attractive and uniform	White	Unctuous, compact, homogeneous mass, it is not crumbly	Pleasant, fresh butter and fermented cream with highlighted flavor	Pleasant, with a well-highlighted aroma of butter and milk
Butter cream with egg white and 10% mint extract and 10% salted butter	Attractive and uniform	Light green	Unctuous, compact, homogeneous mass, it is not crumbly	Pleasant, buttery with a slight hint	Pleasant, with a slight aroma of butter and milk
Butter cream with egg white and 50% mint extract and 10% salted butter	Attractive and uniform	Green	Unctuous, compact, homogeneous mass, it is not crumbly	Pleasant, buttery with a slight hint	Pleasant, with a slight aroma of butter and milk

The results of the sensory analysis based on the scoring method of the prepared creams are presented in table 6.

Table 6. Centralization sheet of sensory analysis results

Product name	Average number of points awarded (Pi)				Total score (Pnt)
	Aspectul și forma	Mirosul	Gustul	Consistența	
Butter cream with egg white and the addition of green tea extract	4	3	3	4	14
Butter cream with egg white and added coffee	4	5	4	5	18
Butter cream with egg white and added cocoa	3	3	3	5	14
Butter cream with egg white and 10% mint extract	4	5	5	5	19
Butter cream with egg white and 50% mint extract	4	4	5	5	18
Butter cream with egg white and the addition of 5% salted butter	4	4	5	4	17
Butter cream with egg white and the addition of 10% salted butter	5	5	5	5	20
Butter cream with egg white and the addition of 50% salted butter	4	5	4	5	18
Butter cream with egg white and the addition of 25% salted butter	5	4	5	5	19
Butter cream with egg white and the addition of 15% salted butter	4	5	4	5	18
Butter cream with egg white and 5% of added coffee and 10% of salted butter	5	5	4	5	19
Butter cream with egg white and 5% cocoa and 10% salted butter	5	5	5	5	20
Butter cream with egg white and 10% mint extract and 10% salted butter	4	4	5	5	18
Butter cream with egg white and added 50% mint extract and 10% salted butter	5	5	5	4	19

Following the organoleptic examinations, 9 creams obtained a score of 18-20 points (out of a maximum of 20 points). The rest of the creams obtained from 14 to 17 points, which correspond, according to the scoring scale, with the satisfactory and good quality products. The 9 top samples represent butter creams with egg whites to which was added 5-15% of coffee; 5-15% cocoa; 10% and 50% mint. Half of the samples analyzed were prepared on the basis of regular butter (unsalted), and for the rest of the samples, 10% of the regular butter was substituted with salted butter. The

addition of salted butter gave positive results, because table salt in small quantities intensifies the taste and aroma of the ingredients present in the product.

From the obtained results from the research of the psychosensory, nutritional properties and the energetic value of the butter creams, it results that only 9 creams out of 14 elaborated, can be recommended to be used in production. Their recipes are shown in Table 7.

Table 7. Top cream recipes - recommended

Type of cream	Raw materials, %							
	Butter	Egg white	Suggar	Dry white wine	Salted butter	Coffee	Cocoa	Mint extract
Butter cream with egg white and coffee	42	22	26	2		8		
Butter cream with egg white and cocoa	42	22	26	2			8	
Butter cream with egg white and mint extract, 10%	42	22	26	2				8
Butter cream with egg white and mint extract, 50%	23	12	14	1				50
Butter cream with egg white and salted butter	36	24	28	2	10			
Butter cream with egg white, coffee and salted butter	33	22	26	2	8	9		
Butter cream with egg white, cocoa and salted butter	33	22	26	2	8		9	
Butter cream with egg white, salted butter and mint extract, 10%	33	22	26	2	8			9
Butter cream with egg white, salted butter and mint extract, 50%	18	12	14	1	5			50

Conclusions:

1. None of the 10 butter cream varieties analyzed passed the test for a natural butter. All samples contain, to a greater or lesser extent, both animal and non-dairy fat and vegetable fat other than butter.

2. Following the microscopic examination of the butter freshness, it was found that nine of the ten analyzed butter samples were fresh, and the sample of "Peasant Butter" with 83% fat, made in Ukraine, proved to be unfresh, although, as indicated on the label, it was passed only halfway of the guaranteed shelf life.

3. It was found that the freshness of the eggs from 1 to 10 days after laying did

not influence the quality of the prepared creams.

4. In this research were made calculations regarding the energy and nutritional value (VN10). Following the calculations, it was found that from the all creams subjected to the research, the one with the addition of egg white has a nutritional value almost twice higher (11.24-11.71) than the basic cream (6.54-4.99) which has the energy value approximately equal (501-546 kcal) compared to the basic one (528-573kcal). Creams with added milk have a lower energy value (495-534kcal) while the nutritional value (7.75-8.29) is lower than with added egg white.

5. 14 types of butter creams with egg white and additives of vegetable origin in

different proportions were developed and researched, namely with added: coffee extract, cocoa extract, mint extract, green tea extract.

6. Following the organoleptic examinations, 8 creams obtained a score of 18-20 points (out of a maximum of 20 points). The rest of the creams obtained 14-17 points, which correspond to the scoring scale products of satisfactory and good quality products.

7. The 8 top samples represent butter creams with egg whites to which was added 5-15% ; 5-15% cocoa; 10% and 50% mint.

8. Half of the samples analyzed were prepared on the basis of regular butter (unsalted), meanwhile for the remaining samples, 10% of the regular butter was replaced with salted butter. The addition of salted butter gave positive results, because table salt, in small quantities, intensifies the taste and aroma of the contained ingredients in the product.

9. Were made calculations regarding the nutritional value (VN10) and the energy value for all the eight recipes of butter creams that we propose for implementation in production.

10. Following the processing of the data, we found that the creams with additions of raw materials of vegetable origin such as: coffee extract, cocoa extract and mint extract did not increase, but conversely significantly decreased the nutritional value of the creams from 11, 8 to 10,6 units. At the same time, it should be mentioned that the calculation formulas for the nutritional value are not perfect. They do

not include the essential substances present in these raw materials, with antioxidant and antimicrobial role, stimulating nervous and cardiac system, which contribute to increasing the biological and sensory value of the product, as well as to the widely assimilation of nutrients.

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