Research Article

The Development of a Special Purpose Drink Based on Nut Raw Materials

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Abstract. To support health, efficiency and active longevity, a person needs to provide the body with the micronutrients necessary for metabolic processes. They must consume food in quantities that correspond to the physiological needs of the individual. Analyses of consumer demand have found that the human diet throughout life often includes dairy products.However, whole milk is often poorly tolerated by both the elderly and people with lactose intolerance (hypolactasia).This article examined the selection of alternative energy sources, focusing on the example of a drink that uses plant raw materials.Thus, the recipe of a new fermented drink based on nut raw materials was developed. The optimization of the hydromodule for the drink preparation from peanuts and hazelnuts, according to the content of the main food components and organoleptic quality indicators, was carried out. The chemical composition of the developed drink was established, a portion of which met 20% of the daily recommended value of vitamin B1, 16.8% of the daily value of niacin, and 15% and 19% of the daily value of iron and magnesium, respectively. The possibility of producing a fermented drink with nut raw materials as a complete replacement of cow's milk was therefore shown to be justified.

Keywords: specialized food, probiotic, vegetable raw materials, fermented drink, nuts

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1. Introduction

The main factor affecting human health is nutrition.The results of many studies confirm that preventive and specialized nutrition, which contains a complex of macro - and micronutrients necessary for body, including biologically active substances, can slow down the aging of the body and reduce the risk of developing various diseases by up to 30 % [7].

Nutritional correction of the lack of macro - and micronutrients can be carried out with the help of specialized food products with increased nutritional value and content of biologically active substances.Taking into account the connection of nutrition with human diseases, scientists classify several groups, representatives of one which suffer from diseases caused by food intolerance (intestinal fermentopathy, food Allergy, food pseudo-Allergy that does not have an immune stage of development, psychogenic food

intolerance, and others).In the diet of people in this group, the ratio between plant and animal proteins should be observed in the proportion of 1:1. in this case, one of the animal protein sources is poultry, fish [4].

However, there is a group of people who refuse to eat animal products, including milk, for ethical or religious reasons.Therefore, both in the first and in the second cases, alternative foods containing animal proteins or analogs close to them in their biological value are necessary for a full diet [2, 3].

Accordingto technical regulations of the customs Union 021/2011 'About food safety', specialty beverages are beverages that have established requirements for the content and ratio of individual substances and components, and/or that have changed the content or ratio of individual substances relative to their natural content [9].

The segment of the specialty drinks market is developing dynamically. There are known fortified beverages based on juice, milk, pectin-containing and other bases [8].

Taking into account the nutritional characteristics of various population groups, namely: reduced tolerance to simple carbohydrates, preference for products that normalize the intestinal microflora and are rich in fiber, refusal to use animal products, and consumers' enthusiasm for experimenting with new ingredients and new tastes, also was decided to develop a specialized drink based on nuts using probiotic cultures.

The inclusion of probiotic products in the various age groups diet of the population with their regular use provides a significant improvement in digestion, stimulating immune processes, reducing the allergic mood of the body, contributes to the correct formation of microflora[5].

Based on the analysis of the chemical composition of nut raw materials presented in table 1, it was found that the largest amount of biologically active substances is contained in peanuts, hazelnuts and almonds. They are rich in phosphorus, potassium, iron, vitamins b and E, contain few carbohydrates, and more than 50% of carbohydrates are represented by fiber (Table 1).

Drinks based on almonds are quite widespread (the most famous brands are: Altro, Milk, Fresh, 365 DETOX, JUMI), so the authors' interest was to develop a specialized drink based on hazelnuts and peanuts.

The purpose of this study was to study the possibility of using nut raw materials in the production technology of a specialized beverage based on vegetable raw materials with high consumer properties and quality indicators.

Table 1: The chemical composition comparative analysis of nuts.

Indicator	Content in 100 g of nuts				
	peanut	walnut	hazelnut	cashew	almond
Humidity, %	6,50	4,07	5,31	5,20	4,41
Energy value, kcal	567	654	628	553	579
Proteins, g.	25,80	15,23	14,95	18,22	21,15
Fat, g.	49,24	65,21	60,75	43,85	49,93
Carbohydrates, g.	16,13	13,71	16,7	30,19	21,55
Fiber, g.	8,50	6,70	9,70	3,30	12,50
Vitamins					
Vitamin B1, mg	0,640	0,341	0,643	0,423	0,205
Vitamin B2, mg	0,135	0,150	0,113	0,058	1,138
Vitamin B6, mg	0,348	0,537	0,563	0,417	3,618
Niacin, mg	12,070	1,125	1,800	1,062	3,618
Vitamin E, mg	8,33	-	15,03	0,90	25,63
Mineral substance					
Magnesium, mg	168	158	163	292	270
Potassium, mg	705	441	680	660	733
Iron, mg	4,58	2,91	4,70	6,68	3,71

2. Materials and methods.

All types of raw materials used in the work meet the requirements of current regulatory documents: Interstate standard, Technical conditions, Sanitary-hygienic rulesandwere acceptable in the preparation of beverages. The following raw materials were used for research:a peanutbyInterstate standard 31784-2012 (ISO 6478:1990); a hazelnutby-Interstate standard 16834-81; sugarbyInterstate standard 33222-2015; probiotic Bifidum Backdraw– Interstate standardP 56139-2014 (TY 9229-025-51070597-2007).

For the experimental part of the work we used generally accepted methods of research of quality indicators.

Hazelnut– the fruit of a large hazelnut, belongs to the order bucotsvetnykh, family Corylaceae (hazelnut), and is intended for fresh consumption and industrial processing. Hazelnuts are rich in nutrients. Nut kernels contain vitamins B1, B2, E, minerals: iron, potassium, phosphorus, calcium, zinc.Hazelnuts, like many nuts, are high in protein. The amino acid composition of hazelnuts differs in the total level of the total amount up to 35%. It should be noted that hazelnuts exceed soy proteins by 20% in terms of threonine, leucine, isoleucine, valine and phenylalanine content. Carbohydrates are represented by starch, polysaccharides, the proportion of soluble sugars is much lower than carbohydrates.

Peanuts are the seed of a herbaceous plant in the legume family. Peanuts are very nutritious and full of various minerals and vitamins. Peanuts contain macronutrients such as potassium, phosphorus, magnesium, and trace elements such as iron, zinc, manganese, copper and selenium, vitamins E, B1, B2, B4, B5, B6, B9 and PP. Peanuts are also a source of phenolic compounds with high antioxidant activity.

3. Results and their discussion

Creation of beverage recipes based on raw nut materials is based on the study of changes in quality indicators depending on the ratio of the components of nuts to water. The best indicators of nutritional value were observed in the mixture with a 1to 2 hydronic module, while the mixture of this hydronic module had a pronounced nutty flavor, while with a hydronic module of 1to 3 it was softer, and the content of fat and protein was only slightly lower. However, an increase in the hydromodule in a ratio of 1 to 4 significantly impairs the organoleptic characteristics in terms of taste. Taking these indicators into account, a 1 to 3 hydromodule was used to develop the beverage recipe.

To prepare a drink from a mixture of nuts, weighed portions of peanuts and hazelnuts were taken in the ratios of 40 to 60, 50 to 50, and 60 to 40, then the drink was prepared with a 1 to 3 hydromodule. The indicators of cow's milk were used as a control sample. The resulting mixtures were evaluated in terms of food and energy values. The closest to the control in terms of protein content was a mixture consisting of 60% peanuts and 40% hazelnuts. At the same time, the ash content was significantly higher than that of cow, which indicates a high content of minerals in the mixture.

In order to enrich the experimental sample and give it a functional orientation, it was decided to introduce the probiotic Bifidum Bakzdrav (TU 9229-025-51070597-2007) into the recipe, the active substances of which are probiotic cultures: Streptococcus thermophilus, Bifidobacterium adolescentis, Bifidobacterium bifidium, Bifidobacterium breve, Bifidobacterium animails, Bifidobacterium longum, Bifidobacterium parvolorum, Bifidobacterium infantis, Lactobacillus reuteri, Lactobacillus delbrueckii subsp. bulgaricus, Lactobacillus rhamnosus, Lactobacillus sasei, Lactobacillus gasseri, Lactobacillus salivarius. In fact, these are natural symbiotic bacteria that inhabit the gastrointestinal tract and have a normalizing effect on the quantitative and qualitative composition of the human intestinal microflora. [1]

The technology of preparing a specialized drink based on nuts consisted of the following technological operations:

Table 2: Chemical composition of the drink

Indicators	Daily rate	Content in 100 ml	Contents in 1 serving (200 ml)	% of daily rate per serving
Protein, g.	68	2,96	5,92	8,7%
Fats, g.	77	4,79	9,58	12,4%
Carbohydrates, g.	335	8,41	16,82	5,0%
vitamin B_1, mg	1,5	0,210	0,420	28,0%
vitamin B_2, mg	1,8	0,048	0,096	5,3%
vitamin B_6, mg	2,0	0,130	0,260	13,0%
Niacin, mg	20,00	1,68	3,36	16,8%
Potassium, mg	2500	178,70	357,40	14,3%
Magnesium, mg	400	38,55	77,10	19,3%
Iron, mg	12	0,91	1,82	15,2%

1. the Nuts were washed until the turbid or brown color disappeared; soaked in water (hazelnuts - for 12 hours; peanuts - for 6 hours); crushed for 3-5 minutes.

2. The resulting mixture was heated to 40 °C, filtered, separating the solid phase.

3. the Mixture was transferred to a glass sterilized container and added probiotic; then placed in a thermostat at 40 °C for 10-12 hours.

4. after fermentation, the product was placed in a refrigerator for cooling.

Studies to determine the optimal recipe composition of a specialized drink with high organoleptic quality indicators have confirmed that the amount of probiotic added to the recipe should not exceed 0.2%. The resulting sample had an attractive appearance, a harmonious nutty taste with a light delicate sourness, and a pleasant aroma.

Regulated quality indicators were studied in the resulting sample. The content of the main food substances in the finished drink was determined by standard methods. The results are shown in table 2 [6, 10].

It has been experimentally determined that a serving of the developed nut drink satisfies 8% of the daily value of protein, 12% of fat and 5% of carbohydrates. As can be seen from the results, the finished product contains 20% of the daily value of vitamin B1, 16.8% of the daily value of niacin, 15 and 19% of the daily value of iron and magnesium, respectively.

To determine the shelf life, in accordance with SanPiN 2.3.2.1324-03 and MUK 4.2.1847-04, the drink was stored in a refrigerator at a temperature of + 2- + 4 ° C for 8 days. The biological safety of the taken samples was monitored on the 3rd, 5th and 8th days of storage and inoculated. The results are shown in Table 3.

When storing a specialized drink on the 5th day, 3 colonies of yeast and 1 colony of molds were found, on the 8th day - 15 and 8 colonies, respectively. Coliformsand

Table 3: Microbiological indicators of the drink during storage.

Defined indicators	Kesearch results			The value of the permissible level
	3^{rd} day	5^{th} day	8^{th} day	
QMA&OAMO	Not found	Not found	Not found	$5x10^4$
Coliforms	Not found	Not found	Not found	Not allowed in 1.0 g
Yeast	Not found	3	15	No more than 10 CFU/g
Molds	Not found	1	8	No more than 10 CFU/g

QMA&OAMO bacteria were not detected. The organoleptic characteristics of the drink deteriorated on the fourth day, when a pronounced sour smell and taste were noticed that were not typical for this type of product. Thus, it is allowed to store a specialized drink for 3 days at a temperature of 4 $\pm$ 2 ° C.

4. Conclusion

According to the results of the research, it is concluded that hazelnuts and peanuts can be used in the production of a specialized drink from vegetable raw materials intended for feeding people with food intolerance to cow's milk. The developed drink is characterized not only by high organoleptic quality indicators, but also by a balanced physical and chemical composition, the presence of biologically active components.

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