

HYGIENE OF HOMEMADE FROZEN CHEESE, PROCESSED CHEESES USING SPICES AND PLANT BIOADDITIONAL SUPPLEMENTS

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Analysis of the current situation in Ukraine shows that the use of plant-based components in dairy production, improving the structure and assortment by increasing the quality, biological value and taste characteristics of products remains an extremely urgent problem. A particularly important direction in this regard is the enrichment of food products with vitamins, minerals and immunostimulants, especially on a natural basis. The purpose of the article is to analyze the key aspects of the most promising and useful direction of using natural plant biological additives that contain a sufficient amount of deficient macro- and microelements and other biologically active substances in the technology of production of fermented milk and processed cheeses. Recipes for fermented milk cheese "Domashniy" salty and processed cheese with the addition of Ukrainian plant biological additives and spices are proposed. An extremely useful combination of biological additives to the "milk" base in terms of quality has great prospects in technological production, both in biological and social areas and play a positive role for both adults and children. The article proves the importance of the components of the combination of raw materials of plant and animal origin, which in turn makes it possible to adjust the composition and properties of dairy food products to the maximum extent. The author's vision of the method of using such additives is proposed, as a result of which the deficiency of essential nutrients is replenished, which in turn increases the nonspecific resistance of the body to the effects of environmental factors. The practical and production possibilities of using herbal additives of domestic production of spices, namely the spice mixture "12-vegetables and herbs" and the spice mixture "Vegetable universal" in the production technology of fermented milk and processed cheeses are substantiated. Product hygiene included the study of organoleptic, physicochemical and technological characteristics.

Key words: hygiene, impact, fermented milk and processed cheeses, recipe, spices, herbal supplements, production technology, organoleptic and technological characteristics.

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Introduction. Modern complex environmental conditions, the urgent need to improve the structure of the population's nutrition require a significant increase in the quality, biological value and taste characteristics of products. An important direction in this regard is their enrichment with vitamins, minerals and proteins, other essential food components. Dairy products are no exception.

A wide range of dairy products has been developed, taking into account the need to select new types of products from natural ingredients.

This research topic seems promising to us not only from the point of view of creating new domestic therapeutic and preventive products, but also expanding the traditional range of basic enterprises that produce similar dairy products.

Thus, the choice of these universal, specialized food additives for this is a promising and rational solution. At the

same time, the therapeutic and prophylactic properties of fermented milk and processed cheese in combination with spices and herbal supplements have significantly increased. The valuable chemical composition, high nutritional and biological value, along with effective therapeutic and prophylactic properties, added additives, combined with various factors, are used not only in medicine, but also in the food industry.

This problem is observed in our prospective work not only in terms of creating new food and preventive products, but also in expanding the traditional range of major enterprises producing similar dairy products.

Material and methods of research. The research was conducted in the conditions of scientific laboratories of the departments of veterinary and sanitary inspection and technology of milk and dairy products of Lviv National

University of Veterinary Medicine and Biotechnology named after S.Z. Gzhytsky and in the conditions of enterprises of the corresponding specialization.

The purpose of the 1st series of experiments was to develop recipes for sour-milk cheese "Domashniy" salty and processed cheese with the addition of Ukrainian herbal bioadditives and spices.

The next stages of the research included veterinary and sanitary inspection of the studied samples of fermented milk cheese "Domashny" of various fat contents, processed and rennet cheeses with spice mixtures and herbal bioadditives.

The following spices are used in the herbal supplements of the domestic producer for the cheese "Domashniy", namely the spice mixture "12-vegetables and herbs" and the spice mixture "Vegetable universal".

Spice mixture "12 vegetables and dishes" – a domestic biological additive to dishes and meals (TUU 15.8-32923016-003-2004).

The additive used enhances the taste and emphasizes the pleasant aroma of all dishes: soups, gravies, various meat, fish and vegetable dishes.

The supplement contains numerous fragrant dried vegetables (carrots, onions, parsnip root, celery root, parsley root), turmeric, leek, dried herbs (dill, parsley, marjoram, basil, thyme, oregano), as well as monosodium glutamate, natural dye riboflavin, vegetable fat, salt, sugar.

Universal seasoning "Vegetable universal" (DSTU 2717:2006) – seasoning for first courses and dishes. Contains the following list of ingredients: turmeric, dried onion, dried parsley, dried celery, dried garlic, ground black pepper, sweet paprika.

The studied and proposed mixtures have therapeutic, aromatic, therapeutic and prophylactic properties, which are stipulated by the individual characteristics and properties of the ingredients themselves. The evaluation of experimental samples of Domashny cheese of different fat content with 2 types of spice mixtures was carried out according to generally accepted methods in selected samples of medium samples.

Research results. Numerous dairy therapeutic and prophylactic products with medicinal properties have proven to be extremely popular today. The process of manufacturing a wide range of dairy products, including Domashny cheese, shows the need to search for new traditional and natural sources of raw materials. The most original, promising and rational in this direction is the use of various spices for this purpose. Over the next few years, the influence of spices and herbs as herbal additives in the production of a wide range of dairy products has been growing very rapidly. As a result of research, the therapeutic and prophylactic effect of fermented milk cheese in a complex combination with spices is significantly increasing. A wide range of medicinal properties of food spices and herbs are due to the presence of biologically active substances in them, including various vitamins, micro-, macroelements and various enzymes. These compounds and ingredients are contained in plants in relatively small quantities, but, as a rule, have a diverse effect on the human body. Scientific hypotheses in this area find both scientific and practical confirmation in production.

Along this vector, domestic scientists have developed numerous milk-protein compositions of curd pastes, drinks enriched with phytonutrients, vitamins, and microelements.

Scientific research by developed recipes for new functional processed cheeses with an increased content of protein-active additives (spice extracts, powdered garlic),(Pavlyuk R.Yu. et al. 2009).

Proposed the technology of "Domashniy" cheese with cumin, parsley and dill. In this direction, the research of studied the possibility of producing "Domashniy" cheese with spices "Hop-suneli" and "Italian herbs" (Domnyuk O., Hachak Y. 2008; Hachak Y.R., Sadykova 2011).

There is available literature data on the testing and possible use of other interesting bioadditives of plant origin as prescription ingredients for various dairy products with a clearly targeted therapeutic and prophylactic purpose.

Confirmed the beneficial properties of the "Immune" syrup in the production of fermented milk cheese (Hachak Y.R., Tytseyko N.I. 2014). The phytosyrup contains a complex of biologically active compounds that provide antiseptic, detoxifying and immunostimulating effects.

Reports on the use of cryopowders began to appear in the scientific literature. For example, Hachak Y.R., Yatsenko I.V., Binkevych V.Ya. (2016) conducted a veterinary and sanitary inspection and prepared recipes for sweet and salty curd masses with cryopowder "Pumpkin" with original specific organoleptic and physicochemical characteristics, and therapeutic and prophylactic properties.

Developed a method for making processed cheeses, the main ingredients of which are "Dutch" cheese and low-fat cheese, "Selyanske" butter, cow's milk powder, and as a filler of plant origin, the phytoseasoning "10 vegetables" is used (Hachak Y.R., Yatsenko I.V., Binkevych V.Ya. 2016).

Developed a manufacturing recipe and conducted a veterinary and sanitary inspection, including studying the organoleptic and physicochemical indicators of curd masses (low-fat and with 5% fat content), using a unified therapeutic and prophylactic biologically active additive – cryopowder "Seaweed"(Hachak Y.R., Yatsenko I.V., Binkevych V.Ya. 2016).

The most important role in obtaining the technical result of the claimed method belongs to the cryopowder "Raspberry". When using cryopowder, the chemical composition of the food product is significantly improved and its biological value increases. The properties of the cryopowder "Raspberry" contribute to increasing the nutritional value of processed cheese, this is due to the fact that the seasoning contains numerous components that positively affect the immune and digestive systems of the human body, enrich the diet with a naturally balanced set of macro- and microelements, vitamins, provide original taste, culinary properties of the product; have no side effects (Hachak Y.R., Yatsenko I.V., Binkevych V.Ya. 2021).

The production of Domashny cheese was carried out using the following production technology and includes the following operations:

- receiving and preparing raw materials and basic materials;
- heating and separating cream

- normalizing milk
- pasteurizing normalized milk
- cooling skimmed milk;
- fermenting skimmed milk in baths;
- fermenting with bacterial starter
- adding 3% Ca Cl₂ and rennet
- processing and cutting the curd;
- washing and dehydrating cheese grains;
- mixing grains with cream, salt and vegetable additives.
- packaging, cooling and storage of the product.

Spice additives and seasonings "12 Vegetables and Dishes" and "Universal Vegetable" are available in the retail chain in the form of finely ground powder, which is added to the milk base of the appropriate fat content.

Digital recipes for using the proposed spices as additives to homemade cheese are given in the following table (see Table 1).

The results of the analysis of the quantitative composition of the used bioadditives showed that the amount of "Vegetable Universal" spices in the recipe was slightly greater than the recipe values of the "12-vegetables and herbs" spice. This is obviously, in our opinion, due to the natural organoleptic properties of the spices themselves and their quantitative composition in the complex recipe.

The development of new dairy product formulations should include the necessary comprehensive and full-fledged research, primarily organoleptic properties. The characteristics of organoleptic indicators of fermented milk

cheese, as is known, are included in the quality criteria of the cheese itself and products used for normalization and as bioadditives.

Traditionally, the main range of fermented milk cheese is produced in its natural form (with different fat contents) and with the use of various food additives (phytoadditives, soy protein, cream, buttermilk, whey, fruit and berry, salt, sugar, spices, vanillin, flavorings and dyes, pectin, raisins, cocoa, butter, sweetener – aspartame, vitamins), which form additional to the natural organoleptic properties of the product.

After analyzing the data in the table, we can conclude that we did not detect any significant fluctuations in the mass fraction of moisture, titrated and active acidity when adding the above-listed additives, with the exception of the energy value, which was slightly increased in the samples, especially with the spices of the spice mixture "12-vegetables and herbs" (112.2 kcal). At the same time, it should be noted that the tasting evaluation of the experimental samples of cheese "Domashny" with the spices of the spice mixture "12-vegetables and herbs" and the spice mixture "Ovocheva universalna" confirmed compliance with the regulatory requirements for product characteristics.

In parallel, a series of studies were conducted on the use of spirulina bioadditives in the technology of processed cheeses and basil in the technology of rennet cheese "Holandsky". The experimental products had positive organoleptic properties, had an attractive presentation and high biological characteristics.

Table 1

Recipes for homemade cheese of different fat content with spices "12-vegetables and herbs" and "Vegetable universal"

Recipe ingredients	Traditional homemade cheese	Homemade cheese with spices "Vegetable universal"	Homemade cheese with spices "12-vegetables and herbs"
	7% fat content	7% fat content	7% fat content
Raw grain with moisture content 80%	640,0	636	638
Cream 20% fat	350	350	349
"Vegetable universal"	-	4,0	-
"12-vegetables and herbs"	-	-	3,0
Salt	10	10	10
Total	1000	1000	1000

Table 2

Organoleptic characteristics of cheese "Domashniy" with spices "12-vegetables and herbs" and "Vegetable universal"

Indicator name	Traditional homemade cheese	Homemade cheese with spices "Vegetable universal"	Homemade cheese with spices "12-vegetables and herbs"
	7% fat content	7% fat content	7% fat content
Consistency and appearance	Soft cheese mass with clearly defined grains covered with cream	Soft cheese mass with clearly defined grains and spice grains, covered with cream (in a fatty mass)	Soft cheese mass with clearly defined grains and pieces of spice, greenish in color, covered with cream
Taste and smell	Clean, sour milk, without foreign flavors and odors	Clean, sour milk, with a barely perceptible taste and smell of added spice	Clean, salty, sour milky, with a slight hint of spice
Color	White or with a hint of spice	White with a slight green tint	Slightly white, yellow tint, uniform throughout the mass

Physico-chemical characteristics of cheese "Domashny" with spices "12-vegetables and herbs" and "Vegetable universal"

Indicator name	Traditional homemade cheese	Homemade cheese with spices "12-vegetables and herbs"	Homemade cheese with spices "Vegetable universal"
	7%	7%	7%
Mass fraction of fat, %, not less	4,0	4,0	4,0
Mass fraction of moisture, %, not more	80	76	78
Mass fraction of table salt, %, not more	1,0	1,0	1,0
Acidity, T°, not more	150	to 150	to 146
Temperature at the outlet from the enterprise, °C, not more	8	8	8
Phosphatase	-	-	-
Active acidity, pH, within	3,6-4,4	3,60	4,20
Energy value (kcal per 100 g of product)	108	112,2	110

Discussion. The results of our experiments on the evaluation of organoleptic indicators of the experimental samples of homemade cheese and the spice mixture "12-vegetables and herbs" and the spice mixture "Vegetable universal" are given in the following table. Our experiments confirmed (Table 2) that the experimental samples of "Domashny" cheese with spices retained a soft, tender mass with clearly defined grains, covered with cream and small pieces of the spices themselves. The taste and smell remained consistently clean, sour-milk with a slight aftertaste of the added spice, more pronounced in the case of using the spice mixture of spices "Vegetable universal". The color of the experimental samples was also unchanged – white, slightly yellowish or light green (depending on the type of spice), uniform throughout the mass.

Characteristics of the main technological indicators, energy value of traditional cheese "Domashny", as well as this product with spices of the spice mixture "12-vegetables and herbs" and the spice mixture "Vegetable universal" are given in Table 3. The results of the analysis of the digital material of this table show that the mass fraction of moisture in this traditional product should be 80%, acidity – 150°T, active acidity – 3.6-4.4, and the energy value is 72, 90 and 108 kcal/100 g of product, respectively.

Thus, as a result of the experiments, a recipe for homemade cheese of 7th fat content with spices of the

spice mixture "12-vegetables and herbs" and the spice mixture "Vegetable universal" was developed. With positive interest from producers, there is an opportunity to expand the range of this basic product, and the potential consumer will receive new types of dairy products of a therapeutic nature.

Conclusions.

1. Based on research, the feasibility of using bioadditives of plant components was substantiated and a production recipe for salty homemade cheese with 7% fat content with spices of spices "12-vegetables and herbs" and a mixture of spices "Vegetable universal" was developed.

2. Unified domestic mixtures of "12 vegetables and herbs" and a mixture of spices "Vegetable universal" were used as spices.

3. A veterinary and sanitary inspection was conducted: the organoleptic and physicochemical characteristics of experimental samples of homemade salted cheese with domestic plant polymixtures were studied, and an improvement in the structure and assortment was noted due to an increase in the quality, biological value, and taste characteristics of the products.

4. The possibility of using individual plant bioadditives spirulina and basil in the technology of processed and rennet cheeses was studied. These dairy products were characterized by a pleasant, original presentation and met the regulatory physicochemical parameters.

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Гігієна кисломолочного сиру «Домашній», плавлених сирів при використанні спецій та рослинних біодобавок

Аналіз сучасної ситуації в Україні показує, що надзвичайно актуальною проблемою залишається використання у молочному виробництві компонентів рослинного походження, покращення структури та асортименту за рахунок підвищення якості, біологічної цінності і смакових характеристик продуктів. Особливо важливим напрямком у цьому відношенні є збагачення продуктів харчування вітамінами, мінеральними речовинами та імуностимуляторами, особливо на натуральній основі. Метою статті є аналіз ключових аспектів найбільш перспективного та корисного напрямку використання натуральних рослинних біологічних добавок, які містять достатню кількість дефіцитних макро та мікроелементів і інших біологічно активних речовин в технології виробництва кисломолочних та плавлених сирів. Запропоновано рецептури кисломолочного сиру «Домашній» солений та плавленого сиру із додаванням українських рослинних біодобавок та спецій. Надзвичайно корисне поєднання щодо якості біодобавок до «молочної» основи має в технологічному виробництві великі перспективи, як у біологічному, так і соціальному напрямках та відіграють позитивну роль як для дорослих, так і для дітей. У статті доведено важливе значення компонентів поєднання сировини рослинного і тваринного походження, яке в свою чергу дає можливість у максимальних розмірах провести корегування складу та властивостей молочних харчових продуктів. Запропоновано авторське бачення методу використання таких добавок, в результаті якого поповнюється дефіцит есенціальних харчових речовин, що в свою чергу підвищує неспецифічну резистентність організму до дії факторів зовнішнього середовища. Обґрунтовано практична та виробнича можливість застосування рослинних добавок вітчизняного виробництва спецій, а саме суміші прянощів «12-овочів і трав» та суміші прянощів «Овочева універсальна» в технології виробництва кисломолочних та плавлених сирів. Гігієна продукції включала вивчення органолептичних, фізико-хімічних і технологічних характеристик.

Ключові слова: гігієна, вплив, кисломолочний та плавлені сири, рецептура, спеції, рослинні біодобавки, технологія виробництва, органолептичні та технологічні характеристики.

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