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Technology for the preparation of a fermented milk product with the addition of watermelon juice

Annotation

Main problem: the development of a new direction in the food industry – the so-called functional nutrition, which means the use of such products of natural origin, which, when systematically used, have a regulatory effect on the body as a whole or on its specific systems and organs, has been widely recognized all over the world: immunostimulants, biocorrectors for blood pressure, cholesterol levels, etc. When creating functional dairy products, ingredients of plant origin are increasingly included in recipes, which are sources of dietary fiber, vitamins and microelements, organic acids and other biologically active compounds, which can also serve as flavor fillers.

Purpose: to develop a technology for the preparation of a fermented milk product with the addition of an extract from gourds. To do this, it was necessary: to select the amount (dose) of the yoghurt starter introduced into the prepared milk, and also to investigate the effect of temperature on the fermentation process of the drink; to investigate the amount (dose) of the vegetable filler introduced into the mixture and its effect on the organoleptic characteristics of the drink; to investigate the organoleptic properties of the drink with the melon culture extract added to it before fermentation and after fermentation; to investigate the effect of vegetable filler on the fermentation process; to investigate the effect of the dose of vegetable filler on the process of acid formation; conduct microbiological studies of milk and vegetable yogurt; to investigate the change in the acidity of milk and vegetable yogurt during storage; to investigate the effect of the freezing process on the chemical composition and biological value of the extract.

Methods: when performing the practical part of the work, physicochemical, organoleptic and microbiological studies were used.

Results and their significance: in the course of the study, it was concluded that by adding an extract of gourds to the technology for the preparation of fermented milk products, a new fermented milk product can be obtained that meets all physicochemical, organoleptic and microbiological requirements. As a result, an original method for the production of a fermented milk drink containing an extract from a melon culture was developed.

Keywords: filler, watermelon juice, sourdough, organoleptic properties, dairy and vegetable product.

Introduction

As you know, the birthplace of watermelon is South Africa, where it is still found in the wild. The rugged Kalahari provided travelers with watermelons rich in moisture in the past. Travelers, who ran out of water, got it from wild watermelons [1-3]. In ancient Egypt, people already knew and cultivated this culture. Watermelon was often placed in the tombs of the pharaohs as a source of food in their afterlife.

This plant was brought to Western Europe in the 11th-12th centuries by crusader knights. Watermelons were brought to Russia from abroad until the end of the 17th century as an overseas delicacy. They didn't eat them raw then, but the slices were soaked for a long time, boiled with pepper and other spices. The first watermelons were sown in the south of Russia according to the royal decree (dated November 11, 1660), which ordered the fruits to be delivered to Moscow as soon as they ripened.

Only in the 19th century watermelon finally took root in the Lower Volga region and in Ukraine, and they began to eat it in its natural form. The Russian name watermelon was derived from the word "harbyuza", which in Iranian languages means melon, or "huge cucumber". For a long time, watermelons were considered as a useless delicacy. But later it was established that watermelon has no

equal in the plant world in terms of the content of a valuable product such as folic acid, which is actively involved in the processes of blood formation and affects the maintenance of a delicate balance of chemical processes occurring in a living organism. In addition, watermelon contains a lot of iron, so doctors strongly recommend including it in the menu of patients with anemia. It is very effective in diseases of the kidneys; it is an excellent diuretic with a pleasant delicate taste. At the same time, watermelon juice not only removes excess fluid, but also supplies the body with easily digestible sugars. By the way, not only the pulp of watermelon is a diuretic, but also a decoction of fresh watermelon peels. Watermelon is useful for those who suffer from diseases of the gallbladder (cholecystitis, dyskinesia), liver, kidneys, and metabolic disorders. Vitamins and trace elements, the presence of a large amount of water and easily digestible sugars give watermelon the ability to stabilize metabolic processes in the liver, improve the rheological properties of bile, and prevent stone formation in the gallbladder. For this reason, watermelon is recommended to be included in the diet of patients suffering from chronic hepatitis, cholecystitis, biliary dyskinesia, etc. In terms of iron content, watermelon is second only to lettuce and spinach. Doctors consider magnesium to be the main metal of life, as it is involved in more than 350 different major biochemical reactions of the body. In terms of magnesium content, watermelon is one of the leaders. More than in watermelon, magnesium is only in almonds.

Watermelon is useful for iron deficiency and diabetes, because its pulp contains fructose, nitrogenous substances, fiber, iron mineral salts, vitamins B1, B2, C and PP, folic acid, carotene. Watermelons help with gout, arthritis, atherosclerosis, their fiber helps to remove cholesterol from the body. Prolonged use of the pulp cures chronic gastritis. In watermelons, lycopene is most clearly represented as a substance with a powerful antioxidant effect. Like most antioxidants, it serves to prevent cancer and cardiovascular diseases.

In addition, a new phytonutrient, citrulline, has been found in watermelon.

It is converted in the body into arginine, i.e. amino acid. It is good for the heart, circulatory and immune systems. In addition, watermelon provides an opportunity to relax the blood vessels without the side effects that are characteristic of any medicine. However, citrulline is mainly found not in the pulp of a watermelon, but in its peel. Now scientists are working to develop a new variety of watermelons with a high content of citrulline.

Despite the fact that watermelon is a healthy and cheap berry, in our country it is rarely used in the food industry.

Materials and methods

For the manufacture of milk-vegetable yogurt, a large (average 6-7 kg) variety of watermelon, Astrakhan, was taken, from which juice was isolated by extraction. Further, in the process of research, the biological value of the extract was determined by studying the effect of the freezing process on the chemical composition and biological value of watermelon juice. For this purpose, watermelon juice was subjected to freezing for 8 months at a temperature of 5±2 ºC.

Results

The studies were carried out in a comparative version. The results of the experimental data are shown in the Table 1.

Table 1 – Effect of the freezing process on the chemical composition and biological value of watermelon juice

Indicators	Reference data	Experimental
Water	92,6 %	83 %
Sugar	5,8 %	6 %
Protein	0,6 %	0,4 %
Cellulose	0,4 %	0,5 %
Pectin	0,4 %	0,5 %
organic acids	0,1 %	0,1 %

Analysis of the obtained data showed that during the long-term storage of the extract in a frozen state, no significant deviations of the chemical composition and biological value from the norm were revealed. In further studies, the time was determined during which the product ripens to an acidity of 80ºT [4-8].

The studies are presented in the form of the Table 2.

Table 2 – Study of the effect of vegetable filler on the fermentation process

Souring time	Acidity	
	Titratable, Tº	Active, pH
1 hour	18	6.64
2 hours	38	5.92
3 hours	62	5.19
4 hours	86	4.44

As a result of the study, it was found that the fermentation of the milk-vegetable mixture to an acidity of 80ºT occurred in 4 hours, which is 1 hour faster than the milk mixture without vegetable filler (5 hours). This is economically beneficial for its production. Further studies were carried out to determine the effect of the dose of vegetable filler on the process of acid formation. For research, a plant composition was added to the prepared milk in the amount of 1% and 5%. Then yoghurt starter was added and after the fermentation process, the active acidity in the drink was determined in comparison with the control sample. Drinking yoghurt with filler (strawberry) of 2.5% fat content, developed at the MolKom LLP enterprise, was taken as a control sample. The results of the study are presented in the Table 3.

Table 3 – Determination of the influence of the dose of vegetable filler on the process of acid formation

Index	Samples		
	Control	1 %	5 %
Active, pH	4.46	4.44	4.34
Titratable, ºT	85	87	112

Based on the results of the study, a sample with a vegetable filler content of 1% was selected, since its acidity of 4.44 pH (87ºT) coincides with the control sample and has a positive effect on the acid formation process. The results of the microbiological study of the obtained product are presented in Table 4. Drinking yogurt with a filler (strawberry) of 2.5 % fat, produced at the MolKom LLP enterprise, was taken as a control sample; sample No. 1 – milk and vegetable drink with pasteurized vegetable filler; sample No. 2 – milk and vegetable drink with unpasteurized vegetable filler.

Table 4 – Microbiological study of milk-vegetable yogurt

Samples	Number of lactic acid microorganisms, COE/g	Product weight (g, cm³), in which are not allowed			Yeast and molds, COE/g, no more
		BGKP (coli forms)	S. aureus	PM, including salmonella	
Control	Not less than 1*10	0,01	1,0	25	50
Sample No. 1	Not less than 1*10	0,01	1,0	25	50
Sample No.2	Not less than 1*10	0,01	1,0	25	50

As a result of the research, it was found that the microbiological indicators in the unpasteurized and pasteurized filler did not change: CFU / g not less than 1*107, the mass of the drink (g, cm³), in which it is not allowed: coliforms - 0.01; S. aureus - 1.0, salmonella - 25; yeasts and molds - 50. In raw vegetables, a complex of pectin substances, up to 75% of their mass contains protopectin, which, during heat treatment, is split into its constituent parts, thereby increasing the soluble forms of pectin. Therefore, in order to prevent the ingress of pathogenic microflora into the finished drink, it is advisable to pasteurize the vegetable filler. The results of the study of changes in the acidity of milk and vegetable yogurt during storage are presented in table 5.

Table 5 – Study of changes in the acidity of milk and vegetable yogurt during storage

Product	Titratable acidity, ºT		
	24 hours	48 hours	72 hours
Yoghurt LLP "MolKom"	84-85	94-95	104-105
Milk vegetable yogurt	86-87	98-99	111-112

The results of the study showed that during storage of 24, 48, 72 hours, the titratable acidity of the drinking yogurt of MolCom LLP increased by 10-11ºT, the milk-and-vegetable drink by about 12-13ºT. Since the allowable acidity of fermented milk drinks after 36 hours of storage is 90ºT, it can be concluded that the allowable shelf life of a dairy and vegetable drink, as well as yogurt 2.5 % fat of MolKom LLP, is no more than 36 hours.

Discussion

In general, this article studied the technology of preparing a new fermented milk product with the addition of watermelon juice and an extract from gourds. The following studies have been carried out:

– selection of the amount (dose) of the yoghurt starter introduced into the prepared milk and the effect of temperature on the fermentation process of the drink; selection of the amount (dose) of the vegetable filler introduced into the mixture and its effect on the organoleptic characteristics of the drink;

– determined the organoleptic properties of the drink with watermelon juice added to it before fermentation and after fermentation; the influence of vegetable filler on the fermentation process was determined; the influence of the dose of vegetable filler on the process of acid formation; the effect of the freezing process on the chemical composition and biological value of the extract;

– microbiological studies of milk and vegetable yogurt were carried out; changes in the acidity of milk-vegetable yogurt during storage were evaluated.

Conclusion

In the course of the study, a recipe and technology for the production of dairy-vegetable yogurt were developed, and a technological scheme for production was selected. In the course of studying the composition of raw materials for the developed drink, it turned out that the resulting milk and vegetable yogurt has medicinal properties, it can be attributed to the group of functional foods. Therefore, it is recommended to use this milk and vegetable yoghurt in medical institutions for medical nutrition, in particular for diets No. 7, No. 8 and No. 9, as well as for therapeutic and preventive nutrition in diet No. 3. Ingredients that make up milk and vegetable yogurt completely natural: they do not contain stabilizers, emulsifiers, dyes that are popular today in production. This allows you to use this drink not only in medical, but also in educational institutions. Moreover, economic calculations show that the production of milk and vegetable yogurt is profitable: the net profit from 1 ton of milk and vegetable yogurt produced will be 62,035.00 tenge; net profit for one shift is 124070.00 tenge.

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Қарбыз шырынын қосып ашытылған сүт өнімін дайындау технологиясы

Тамақ өнеркәсібінде жаңа бағытты дамыту – функционалдық тамақтану деп аталады, ол жүйелі түрде пайдаланған кезде тұтастай алғанда немесе ағзаға реттеуші әсер ететін табиғи өнімдерді пайдалануды білдіреді. Оның нақты жүйелері мен мүшелері (иммуностимуляторлар, қан қысымын, холестерин деңгейін және т.б. биокорректорлар). Функционалды сүт өнімдерін жасау кезінде рецепттер тағамдық талшықтардың, витаминдер мен микроэлементтердің, органикалық қышқылдардың және басқа да биологиялық белсенді қосылыстардың көздері болып табылатын өсімдік тектес ингредиенттерді көбірек қамтиды, олар сонымен қатар дәм толтырғыштар ретінде де қызмет ете алады.

Мақаланың мақсаты – бақша мәдениеті көкөністерінің сығындысын қосып ашытылған сүт өнімін дайындау технологиясын жасау. Ол үшін мыналар қажет болды: дайындалған сүтке енгізілген йогурт стартерінің мөлшерін (дозасын) таңдау, сондай-ақ сусынның ашыту үрдісіне температураның әсерін зерттеу; қоспаға енгізілген көкөніс толтырғышының мөлшерін (дозасын) және оның сусынның органолептикалық көрсеткіштеріне әсерін зерттеу; ашығанға дейін және ашытқаннан кейін оған қауын дақылы сығындысы қосылған сусынның органолептикалық қасиеттерін зерттеу; көкөніс толтырғышының ашыту үрдісіне әсерін зерттеу; өсімдік толтырғышының дозасының қышқыл түзілу процесіне әсерін зерттеу; сүт және көкөніс йогурттарына микробиологиялық зерттеулер жүргізу; сақтау кезінде сүт және көкөніс йогурттарының қышқылдығының өзгеруін зерттеу; сығындының химиялық құрамы мен биологиялық құндылығына мұздату үрдісінің әсерін зерттеу.Жұмыстың практикалық бөлігін орындау кезінде физика-химиялық, органолептикалық және микробиологиялық зерттеулер қолданылды.

Орындалған жұмыстардың нәтижелерін талдай келе, ашытылған сүт өнімдерін дайындау технологиясына асқабақ сығындысын қосу арқылы барлық физика-химиялық көрсеткіштерге сәйкес келетін жаңа ашытылған сүт өнімін алуға болады деген қорытындыға келдік, органолептикалық және микробиологиялық талаптар.

Түйінде сөздер: толтырғыш, қарбыз шырыны, ашытқы, органолептикалық қасиеттер, сүт және көкөніс өнімдері.

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Технология приготовления кисломолочного продукта с добавлением арбузного сока

В современной промышленности активно развивается новое направление, получившее название «функциональное питание». Под ним понимается использование продуктов природного происхождения, которые при систематическом употреблении оказывают регулирующее действие на организм в целом или на ее конкретные системы и органы. Это иммуностимуляторы, биокорректоры артериального давления, уровня холестерина и др. При создании функциональных молочных продуктов в рецептуры всё чаще включают ингредиенты растительного происхождения, являющиеся источниками пищевых волокон, витаминов и микроэлементы, органические кислоты и другие биологически активные соединения, которые также могут служить наполнителями вкуса.

Цель статьи – разработать технологию приготовления кисломолочного продукта с добавлением экстракта из бахчевых культур. Для этого необходимо было подобрать количество (дозу) йогуртовой закваски, вводимой в приготовленное молоко, а также исследовать влияние температуры на процесс брожения напитка; исследовать количество (дозу) вводимого в смесь растительного наполнителя и его влияние на органолептические показатели напитка; исследовать органолептические свойства напитка с добавлением в него экстракта культуры дыни до брожения и после брожения; исследовать влияние растительного наполнителя на процесс брожения; исследовать влияние дозы растительного наполнителя на процесс кислотообразования; проводить микробиологические исследования молока и йогурта растительного происхождения; исследовать изменение кислотности молочно-растительного йогурта при хранении; исследовать влияние процесса замораживания на химический состав и биологическую ценность экстракта.

При выполнении практической части работы использовались физико-химические, органолептические и микробиологические исследования. Анализируя результаты выполненных работ, мы пришли к выводу, что при введении в технологию производства кисломолочных продуктов экстракта бахчевых культур можно получить новый кисломолочный продукт, отвечающий всем физико-химическим показателям, органолептическим и микробиологические требования. В ходе выполнения кандидатской диссертации был разработан оригинальный способ получения кисломолочного напитка с экстрактом из бахчевых культур.

Ключевые слова: наполнитель, арбузный сок, дрожжи, органолептические свойства, молочные и овощные продукты.

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