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STUDY OF THE QUALITATIVE COMPOSITION OF COMBINED MILK

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The article presents the results of a study of combined milk. According to the organoleptic evaluation, combinations of cow's and mare's milk were selected in the ratio of 50:50 and 80:20, according to the revealed physico-chemical indicator, a positive evaluation of the combination of 80:20 was given. When determining the combined milk in a scanning electron microscope, an improvement in the mineral composition was observed. It was found that in the composition of combined milk, the sodium content increased by 7.38%; potassium 3.41%; chlorine 15.12% compared to natural milk.

Key words: cow's milk, mare's milk, combined milk, organoleptic assessment, physicochemical properties, mineral composition of combined milk.

АРАЛАС СҮТТІҢ САПАЛЫҚ ҚҰРАМЫН ЗЕРТТЕУ

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Мақалада құрамдас сүтті зерттеу нәтижелері келтірілген. Органолептикалық бағалау бойынша сиыр мен бие сүтінен 50:50 және 80:20 қатынасында комбинациялар таңдалды, анықталған физикалық-химиялық көрсеткіш бойынша 80:20 комбинациясына оң баға берілді. Аралас сүтті растрлық электронды микроскопта анықтау кезінде минералды құрамның жақсаруы байқалды. Аралас сүттің құрамында натрий мөлшері табиғи сүтпен салыстырғанда 7,38% - ға; калий 3,41% - ға; хлор 15,12% - ға артқаны анықталды.

Негізгі сөздер: сиыр сүті, бие сүті, құрамдас сүт, органолептикалық баға, физика-химиялық қасиеті, құрамдас сүттің минералды құрамы.

ИССЛЕДОВАНИЕ КАЧЕСТВЕННОГО СОСТАВА КОМБИНИРОВАННОГО МОЛОКА

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В статье приведены результаты исследования комбинированного молока. По органолептической оценке выбраны комбинации из коровьего и кобыльего молока в соотношении 50:50 и 80:20, по выявленным физико-химическим свойствам дана положительная оценка комбинации 80:20. При определении комбинированного молока в растровом электронном микроскопе наблюдалось улучшение минерального состава. Установлено, что в составе комбинированного молока содержание натрия повысилось на 7,38%; калия 3,41 %; хлора 15,12% по сравнению с натуральным молоком.

Ключевые слова: коровье молоко, кобылье молоко, комбинированное молоко, органолептическая оценка, физико-химические свойства, минеральный состав комбинированного молока.

Introduction

Currently, milk and dairy products are in stable demand among the population of not only Kazakhstan, but also foreign countries. All over the world, cow's milk is used as a raw material for fermented milk products [1]. Along with cow's milk, mare's milk is also consumed, which is not inferior in nutritional value to other types of milk. Mare's milk is a highly valuable food product for people of all ages. It has a high biological value and digestibility [2].

Due to the fact that cow's milk contains casein, usage of it in a daily diet is contraindicated for many consumers. Nowadays scientists have developed combined milk obtained from different farm animals. A common combination of cow's milk with goat's and cow's milk with mare's milk became favorite for some people. When milk combined, each of their useful properties enrich general mineral composition of the product [3].

In recent years, interest has increased in the use of mare's milk in the production of consumer products. Technologies of yoghurts, several fermented milk products of mass consumption in a therapeutic and prophylactic purposes, as well as curd paste for baby food based on mare's milk have been developed [4].

Due to the unique properties of mare's milk, high biological value, low fat content and

easy digestibility, mare's milk can be used as raw material to produce fermented milk product of functional orientation [5].

The aim of this work is to study the qualitative composition of combined milk.

The object of the study was samples of cow's milk with a fat content of 2.5%, and mare's milk purchased from FE "Dikhankol".

Materials and Research Methods

Studies of the acidity and density of milk were carried out using standard methods, according to GOST R 54669–2011 and GOST R 54758–2011.

Physicochemical properties of milk were determined using a milk analyzer Laktan-4.

The organoleptic assessment of the combined milk was carried out in accordance with GOST ISO 8589.

The mineral composition of the combined milk was studied using a scanning electron microscope (SEM).

Main part

Results and their Discussion

The results of the study of the organoleptic evaluation of combined milk are presented in the Table 1.

Table 1- Results of organoleptic evaluation of combined milk

Feature	Combination options for cow and mare's milk				
	50: 50	60: 40	70 :30	80: 20	90 :10
Consistence	Liquid, homogeneous	Liquid, homogeneous	Liquid, homogeneous	Liquid, homogeneous	Liquid, homogeneous
Taste and smell	Tastes like milk and mare's milk, smells slightly of mare's milk. Has a sweet taste	Tastes like milk and mare's milk, smells slightly of milk	Has a taste close to milk, with a slight smell of mare's milk. Feels the distinct taste of cow's milk	Has a characteristic milky taste, slightly mare's milk smell. Milk taste	Has a characteristic milky taste, slightly mare's milk smell. The taste of real milk
Color	With a blue shade	Slightly creamy shade	Creamy shade	Creamy shade	Creamy shade

Analysis of the tabular data of organoleptic indicators indicates that of the considered combination options, the greatest preference was given to the options for the combination of cow and mare's milk 80:20 and 50:50.

The results of the study of the physicochemical parameters of the combined milk variants of the combination of cow and mare's milk 80:20 and 50:50 are presented in Table 2.

Table 2. Comparative indicators of physical and chemical indicators of combined milk of the studied objects.

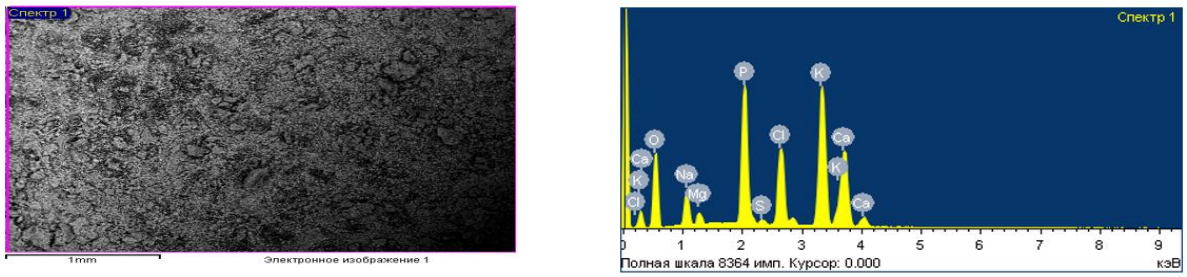
Indicators	Cow's milk [9].	Mare's milk [10].	Combined milk (cow's and mare's)	
			50:50	80:20
Mass fraction of fat, %	3,5-3,8	1,6–1,9	3,1	2,5
Mass fraction of protein, %	3,0-3,3	1,8–2,0	3,4	3,8
Density kg/м^3	1029–1,030	1030–1032	1029,74	1024,74
Acidity ^{0}T	16–18	6–7	14	16
(SOMO), %	8,9–9,0	8,5–9,0	8	8,5

Comparative analysis of the physicochemical properties of the studied types of milk shows that of the most acceptable combination option is the 80:20 ratio, which is confirmed by the conclusions made on organoleptic indicators.

Mare's milk has easily digestible albumin, finely dispersed fractions of casein and globulin, since in cow's milk there are 85% casein and 15% albumin in 100 parts of proteins, casein and albumin are equally in mare's milk, therefore it is considered albumin and easily digestible [9].

The results of studying the mineral composition of combined milk ash and its spectrum obtained using SEM are shown in Fig. 1.

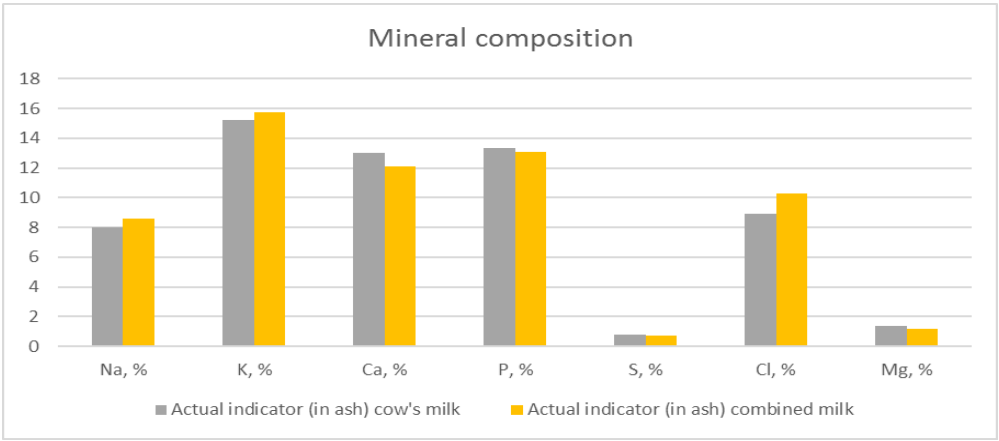
Fig. 1 Ash structure (a) and milk spectrum (b)



(a) (b)

The results of processing the spectral analysis of combined milk in the form of a diagram are presented in Fig. 2.

Fig 2**.** Diagram of the mineral composition of cow and combined milk



Comparative analysis of the data shows that as a result of the combination, the mineral composition of the new type of milk has changed: for example, in the composition of the combined milk, the sodium content increased by 7.38%; potassium 3.41%; chlorine 15.12% compared to natural milk, but at the same time it can be seen that there was a decrease in calcium by 7.29%; phosphorus by 1.65%; sulfur by 13.75%; magnesium by 15.21%.

Conclusions

Based on the research conducted, the following conclusions were drawn:

- from the point of view of organoleptic characteristics and physicochemical properties, the most acceptable variant of the combined composition of cow's milk with mare's milk is their ratio 80:20;

- as a result of the combined composition of cow's milk with mare's milk, the mineral composition of the product improves. At the same time, it can be noticed that the sodium content has increased, which allows to improve the acid-base balance of the body, an increase in potassium helps to supply the brain with oxygen and raise immunity, and a slight decrease in trace elements such as potassium, phosphorus, magnesium depends on the fodder base.

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ФЕРМЕНТТІК ПРЕПАРАТТАР ЖӘНЕ ОЛАРДЫҢ АСТЫҚТЫ ӨҢДЕУДЕГІ РӨЛІ

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Мақалада астықты өңдеу кезінде ферменттік препараттарды қолдану саласындағы және құрамында ксиланаза ферменті бар NovoNordisk фирмасының Pentopan 500 BG және FungamylSuper AX ферментті препараттары, құрамына ксиланаза және α-амилаза, Penicilliumcanescens, яғни фитаза негізіндегі penicilliumcanescens ферментті препараттары және құрамына гемицеллюлаза ферменттерінің жиынтығы кіретін Quest фирмасының Biobake-721 және құрамында целлюлаза, β-глюканаза, ксиланазу ферменттер кешені бар Целловиридин Г20х ферментті препараттар түрлері қарастырылған ғылыми жұмыстарға шолу берілген. Тұтас астықтан дайын өнім алу кезінде екі негізгі мәселені бөліп көрсетуге болады: органолептикалық және физика-химиялық қасиеттерін жақсарту және нанның микробиологиялық қауіпсіздігін арттыру. Осыған байланысты астықты өңдеу барысында астық шикізатының қауіпсіздігін арттыру мақсатында астық шикізатындағы ауыр металдардың құрамын төмендету, нан сапасының биологиялық құндылығын арттыру, физика-химиялық және органолептикалық көрсеткіштерді жақсарту үшін ферменттік препараттарды қолдану көзделеді.

Негізгі сөздер: ферменттік препараттар, бидай, нан, радионуклидтер, ауыр металлдар.

ФЕРМЕНТНЫЕ ПРЕПАРАТЫ И ИХ РОЛЬ В ПЕРЕРАБОТКЕ ЗЕРНА

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В статье представлены ферментные препараты Pentopan 500 BG и FungamylSuper AX фирмы NovoNordisk в области применения ферментных препаратов при обработке зерна и содержащие