

# BIOLOGICAL SCIENCES

## MORPHOLOGICAL AND CULTURAL PROPERTIES OF KOUMISS DRINKS FOR PREPARATION

*Kazhybekova A.,  
Mantai M.,  
Berdaman A.,  
Ramazan K.,  
students*

*L.N. Gumilyov Eurasian National University  
Sagyndykov U.*

*L.N. Gumilyov Eurasian National University, candidate of biological sciences, acting associate professor supervisor*

### Abstract

This article presents the results of research to determine the morphological and cultural properties of lactic acid bacteria for the production of koumiss drink with probiotic properties from isolated microorganisms.

**Keywords:** lactic acid bacteria, yeasts, colonies, nutrient medium, koumiss, probiotic properties.

In recent years, various viral diseases that have spread around the world, the sharp deterioration of the ecological situation in the country and the lack of movement have led to greater attention to public health. The society pays special attention to the health of each person and its strengthening. This is one of the most essential issues for every state. The key to good health lies in proper and nourishing nutrition.

Mostly, the population of the city lacks useful biological substances (vitamins, proteins, etc.), which are found only in natural dairy products. In order to prevent this deficiency, it is enough to use natural dairy products in the daily diet. A special place is given to koumiss, a national, nutritious product obtained by fermenting mare's milk. This drink has therapeutic-prophylactic and probiotic properties.

Koumiss plays an important role in replenishing the balance of vitamins in the human body. Especially, it is very rich in vitamin C in formation of the human immune system. In addition, there are vitamins of groups A, B, E and D. These vitamins help to stimulate the appetite, stimulate the body's metabolism and increase the body's ability to withstand various diseases.

In addition to vitamins, koumiss is rich in minerals and organic substances. Each of them has a specific function in the human body. Due to its special composition, koumiss is absorbed faster than cow's milk and is quickly digested by the organism.

Currently, the procedure for the treatment of chronic diseases with koumiss is developing rapidly. The treatment with koumiss is given in a certain dose depending on the condition of each patient. People who

regularly consume koumiss have normal cardiovascular, pulmonary and gastrointestinal functions. In addition, koumiss has a positive effect on the central nervous system. [1-4]

However, one of the modern issues is the need to improve the technology of making koumiss, by extracting the microflora of this koumiss and making a passage in cow's milk.

### Materials and methods

Objects of research are local koumiss samples from the regions of the Republic of Kazakhstan including Nur-Sultan (Urker microdistrict) and East Kazakhstan (Katon-Karagay district, Kyzylzhuldyz village and Ulan district, Mamai batyr village) and lactic acid bacteria isolated from koumiss.

Research methods are well-known in the field of microbiology and biotechnology [5, 6].

### Results

Morphological and cultural properties of microorganisms isolated from koumiss.

Morphological and cultural properties of lactic acid bacteria isolated from koumiss samples, that are typical of Nur-Sultan (Urker microdistrict) and East Kazakhstan (Katonkaragai district, Kyzylzhuldyz village and Ulan district, Mamai batyr village) were studied. The isolated koumiss strains were grown in MRS and Saburo nutrient mediums.

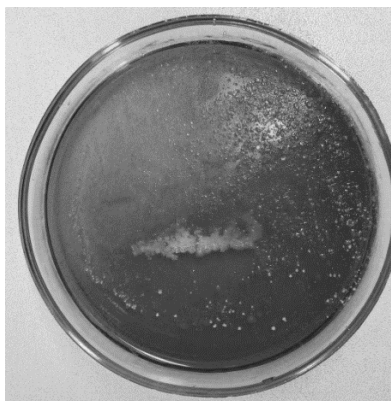
Lactic acid bacteria grown in solid nutrient medium (MRS) formed spherical, light-colored colonies. Koumiss yeasts grow in Saburo's nutrient medium. The colonies of koumiss yeasts are slightly larger than lactic acid bacteria colonies.

Table 1

## Cultural properties of lactic acid bacteria isolated from koumiss

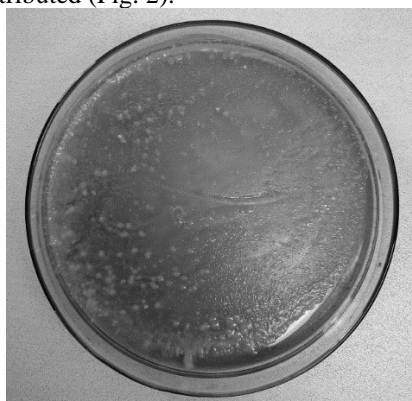
№	Samples	Nutrient medium	Number of colonies	Colony dimensions, mm	Colony color	Description of the surface and edge of the colony
1	Koumiss №1 (Urker microdistrict)	MRS	8-10	1-1,2	Pale	The surface is smooth, the edges are wavy
2	Koumiss №2 (Katonkaragay district, Kyzylzhuldyz village)	MRS	12-14	0,9-1,4	White	The surface is slightly convex, the edges are smooth
3	Koumiss №3 (Ulan district, Mamai batyr village)	MRS	6-8	1-1,3	White	The surface is smooth, the edges are smooth

As shown in the table above, about 8-10 colonies grew in sample №1, with an average size of 1-1.2 mm. The color of the colony was light, the surface was smooth and the edges were wavy (Fig. 1).



*Figure 1 - Sample №1 grown in MRS culture medium*

In №2 samples 12-14 colonies grew, their size was 0.9-1.4 mm. The surface of the colony is slightly convex, and the edges are evenly distributed (Fig. 2).



*Figure 2 - Sample №2 grown in Saburo medium*

6-8 colonies grew in 3 samples. The size of the colony is about 1-1.3 mm. Its surface is smooth, the edges are smooth (Fig. 3).

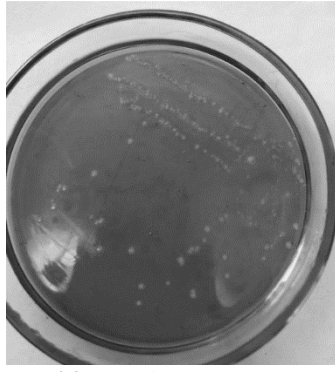


Figure 3 - №3 Sample grown in MRS medium

As a result of the study, 5 lactic acid strains were isolated from koumiss samples. According to Berge's definition, the isolated strains belonged to the group *Lactococcus* and *Lactobacillus*.

In addition, koumiss strains were sown by the stroke method (Fig. 4).



Figure 4 - Lactic acid bacteria inoculated according to the streak culture method

As a result of the study, it was found that the strains isolated from koumiss are immobile, Gram-positive and do not form spores. For these reasons, they are lactic acid bacteria. According to Berge's definition, lactic acid bacteria isolated from koumiss belong to the group *Lactococcus*.

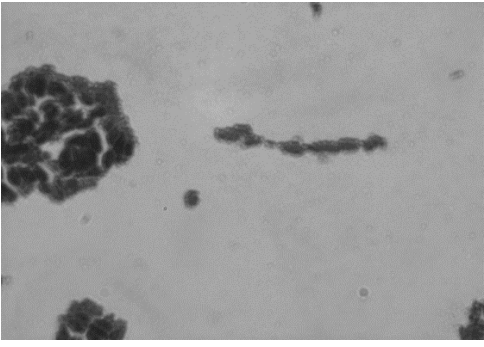
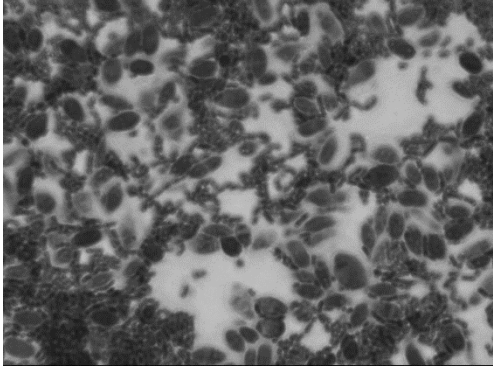
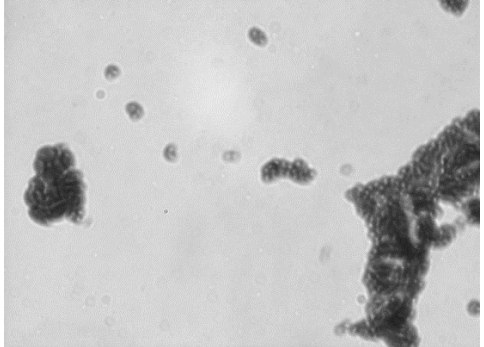
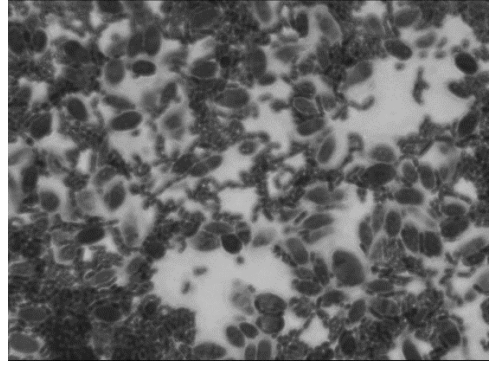
5 different strains were isolated from koumiss samples: *Lactococcus lactis* 1, *Lactobacillus delbruekii* 1, *Torulopsis* 1, *Lactococcus lactis* 2, *Torulopsis* 2.

The table below (Table 2) shows images and morphological characteristics of lactic acid bacteria isolated from koumiss.

Table 2

Morphological characteristics of lactic acid bacteria isolated from koumiss

№	Lactic acid bacteria	Morphological characteristics	Picture
1	<i>Lactococcus lactis</i> 1	Spherical in shape, 0,5-1,2 microns in size, arranged in pairs. Still, Gram positive. The optimum growth temperature is 30°C.	A black and white microscopic image showing several dark, spherical bacterial cells. Some cells are arranged in pairs, while others are single. The background is light and slightly grainy.

2	<i>Lactobacillus delbruekii 1</i>	It is long and short, rod-shaped, 0,8-1,0 microns in size. The optimum growth temperature is 30-40°C.	
3	<i>Torulopsis 1</i>	Oval shape, size 2,9-5,4 microns.	
4	<i>Lactococcus lactis 2</i>	It is oval in shape, 0,5-1,5 microns in size, arranged in a short bead.	
5	<i>Torulopsis 2</i>	Oval shape, size 2,9-6,3 microns.	

Morphological properties of koumiss strains were determined. Strains isolated from koumiss were grown in MRS and Saburo nutrient media. As a result of the study, the microorganisms cocci and rod-shaped, immobile, gram-positive, measuring (0,5-1,2) × (1,2-1,7) microns. The colonies were white, the surface was smooth and the edges were wavy.

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