Investigation and identification strains of lactic acid bacteria and yeasts isolated from camel milk and traditional fermented dairy products from Kazakhstan

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Introduction

World community research confirms the highly valuable properties of fermented dairy food based on camel milk, in particular, due to the therapeutic and prophylactic properties of its native microflora. Particular interest scientists from around the world are causing by strains of lactic acid bacteria (LAB) and yeasts isolated from camel milk and traditional fermented dairy products based on it. Raw camel milk and shubat are dairy food widely used in the diet of the people of Kazakhstan. Objects of this study were raw camel milk and fermented dairy product – shubat – prepared by spontaneous fermentation of camel's milk. The objects of the research were provided by a private farm located in the Southern region of Kazakhstan (Kyzylorda region, Kazalinsk town). MRS, M17, LB, Li, MPA, Sabouraud Medium were used as nutrient media. Based on the objects of study, the most promising probiotic strains of LAB and yeast were identified using the MALDI Biotyper methodology. In the process of the study, potential probiotic cultures were isolated from the objects of study (*Lactobacillus plantarum*, *Lactococcus lactis*, *Streptococcus thermophiles*, *Candida kefyr*, *Kazachtsania unispora*).

Material and methods

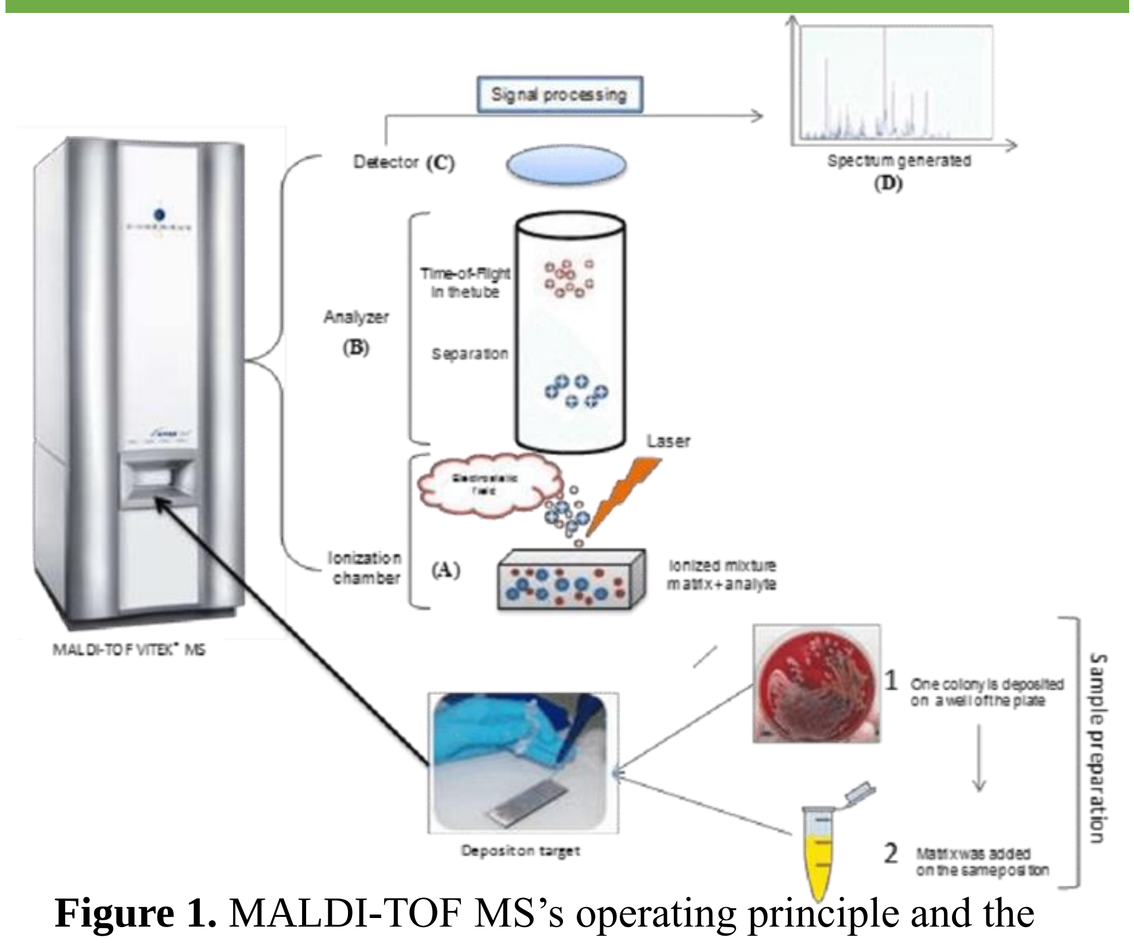

Figure 1. MALDI-TOF MS's operating principle and the sample preparation step for identification
*This figure was uploaded by Cheikh Ibrahima Lo

The identification of strains of LAB and yeast was carried out using modern MALDI Biotyper equipment, which includes a compact Microflex mass spectrometer, which quickly obtains mass spectra of proteins and peptides of microorganisms, and the unique Biotyper software identifies microorganisms using a reference database (contains more than 2500 types of microorganisms and 7500 strains). The principle of operation is shown in the figure.

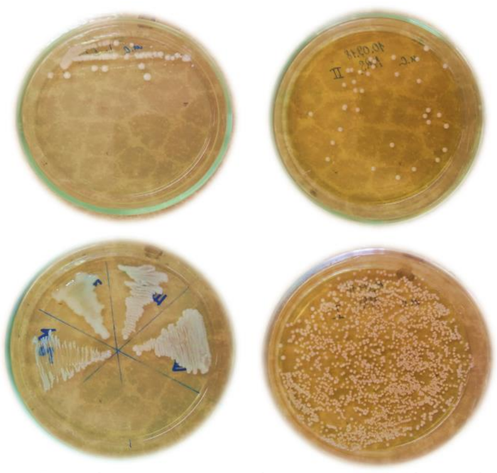

Figure 2. Preparation of the samples and microorganisms cultivation

Results and Conclusion

Table 1. Comparison of LAB and yeast isolated from camel milk and shubat

Dominant microflora kefir grains	Dominant microflora of camel milk and dairy product based on camel milk in the world	Identification by MALDI in frame of this research
Lactococcus lactis subsp. lactis biovar. diacetylactis	Lactococcus lactis Lactococcus lactis subsp diactylactis	Lactococcus lactis
Leuconostoc mesenteroides subsp. cremoris	Leuconostoc mesenteroides subsp. cremoris	-
Leuconostoc mesenteroides subsp. dextranicum	Leuconostoc mesenteroides subsp. dextranicum	-
Leuconostoc mesenteroides subsp. mesenteroides	Leuconostoc mesenteroides	Leuconostoc mesenteroides
Streptococcus thermophilus	Streptococcus thermophilus	Streptococcus thermophilus
Lactobacillus kefiri	Lactobacillus kefiri	-
Lactobacillus casei subsp. casei	Lactobacillus casei subsp. casei	-
Lactobacillus casei subsp. rhamnosus	Lactobacillus casei subsp. rhamnosus	-
Lactobacillus plantarum	Lactobacillus plantarum	Lactobacillus plantarum
Lactobacillus acidophilus	Lactbacillus acidophilus	-
Lactobacillus delbrueckii subsp. bulgaricus	Lactobacillus delbrueckii subsp. bulgaricus	-
Lactobacillus lactis	-	-
Lactobacillus helveticus	Lactobacillus helveticus	-
Candida kefyr	-	Candida kefyr
Brettanomyces anomalus	-	-
Saccharomyces unisporus	-	Kazachstania unispora (Saccharomyces unispora)

Conclusion. Isolation, identification and investigation of new types of probiotic strains of the LAB from camel milk and shubat can play a significant role in creating a wide range of fermented products with beneficial effects on the health of consumers around the world. The microbiological composition of ***starter for shubat*** contains of LAB such as *Leuconostoc mesenteroides* – 20%, *Streptococcus thermophilus* – 20%, *Lactococcus lactis* – 20%, *Lactobacillus plantarum* – 35% and Yeast (*Candida kefyr, Kazachstania unispora*) in total 5%.

Figure 3. Developed starter of pure cultures of lactic acid bacteria and yeast for production of shubat

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