

DEPENDENCY OF THE RESISTANCE OF MICROORGANISM CULTURES UNDER FROZEN STORAGE ON THE MEDIUM COMPOSITION AND STORAGE TEMPERATURE

Antanas Šarkinas

Food institute of Kaunas University of Technology, Taikos pr. 92, LT-51180 Kaunas, Lithuania,

E-mail: direktorius@lmai.lt

Summary. In assessing the impact of the protective medium composition and storage temperature on the vitality of cells, the cultures of *Lactococcus lactis subsp. lactis*, *Lactobacillus delbrueckii subsp. bulgaricus*, *Streptococcus thermophilus*, *Salmonella typhimurium* (ATCC 14028), *Staphylococcus aureus* (ATCC 25923), and *Bacillus cereus* (ATCC 10876) were studied. samples of protective medium were prepared, i.e. reconstituted dried skim milk with 20%, 30% and 40% glycerin and brain-heart infusion with 20%, 30% and 40% glycerin. The samples were tested at -18°C and -72°C .

It is more appropriate to store cultures at -72°C , however, the resistance of different microorganism species to storage conditions varies. At both temperatures major cells of *S. typhimurium* survive in all the media samples, only at -18°C more cells tend to die in the brain-heart infusion. The resistance of *S. aureus* to storage conditions is average. The resistance of *B. cereus* is the weakest: at the end of the experiment only percentiles of the culture remain in the samples. This culture is also characterized as requiring lower temperature conditions.

Results show that the skim milk based medium is more advantageous while the concentration of glycerin is less effective.

The resistance of lactic acid bacteria cultures (*S. thermophilus*, *L. bulgaricus*, and *L. lactis*) was found to be better; the vitality of the cultures was ensured by both temperatures (-18°C and -72°C) in the different samples of protective medium.

A higher resistance of lactic acid bacteria under frozen storage has been proved by the results of a longer experiment. The strains of *Lactococcus lactis subsp. lactis* and *Lactococcus lactis subsp. cremoris* frozen in reconstituted skim milk with 10% of glycerin were stored at -18°C for three years. During this period 65 strains of *Lactococcus lactis* retained their vitality, the number of cells in the defrosted medium varied between ten thousands to millions, reaching in most cases hundreds of thousands and even more. 79% of the cultures retained sufficient vitality and promoted milk fermentation within 18 hours. The activity of the strains restored immediately upon the first resowing and the entire milk fermented in 18 hours. The morphological characteristics (of the strains?) varied to a small extent retaining characteristic properties with the predominance of dyplococcus. The 55 frozen strains of *Lactococcus lactis subsp. cremoris* remained active, the number of vital cells varying from hundreds thousands to millions; only that of few strains decreased to ten thousands, but even their activity restored upon the first resowing in a sterile milk. The morphological characteristics of strains were found to be stabile, with dyplococcus predominating in microscopic preparations and longer and shorter chains, monococos.

Keywords: lactic acid bacteria, frozen storage, vitality.