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RESEARCHES CONCERNING MICROBIOLOGICAL EVOLUTION OF LACTIC ACID BACTERIA TO YOGHURT STORAGE DURING SHELF-LIFE

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Abstract

Lactic acid bacteria evolution (Lactobacilus delbrueckii ssp bulgaricus and Streptococcus termophilus) was followed in tree stages of storage: in first day of storage after processing; in the middle of storage during shelf-life; in the last day of storage during shelf-life. An important decrease of lactic acid bacteria was observed to storage during shelf-life. This indicates a low stability of starter culture, viable germs being inhibited by other micro-organisms development (first Enterobacteriaceae then yeast and molds).
Keywords: *Lactic acid bacteria, storage, yoghurt, quality, yeast and molds*

Introduction

Lactic acid bacteria have been used to ferment or culture foods for at least 4000 years. They are used in particular in fermented milk products from all over the world, including yoghurt, cheese, butter, buttermilk, kefir and koumiss. The manufacture involves a microbial process by which the milk sugar, lactose is converted to lactic acid. As the acid accumulates the structure of the milk protein changes (curdling) and thus the texture of the product is modified. Other variables such as temperature and the composition of the milk, also contribute to the particular features of different products. Lactic acid also gives fermented milks their slightly tart taste. Additional characteristic flavours and aromas are often the result of other products of lactic acid bacteria. For yoghurt, the manufacture depends on a symbiotic relationship between two bacteria, *Streptococcus*

thermophilus and *Lactobacillus bulgaricus,* where each species of bacterium stimulates the growth of the other. This interaction results in a shortened fermentation time and a product with different characteristics than one fermented with a single species.
(http://www.eufic.org/article/en/page/FTARCHIVE/artid/lactic-acid-bacteria/)

Numerous studies of fermented dairy products (especially yoghurt) demonstrate that them consumption can be favorable for health. Microbial cells ingested and maintained a life, have a good influence in intestinal medium, contributing to body health maintenance.

It seems obvious that any presumed effect depends on the ability of probiotic organisms to survive and multiply in the gastrointestinal tract and persist at high levels in the intestine (Holzapfel et all. cited by Rel Campo, 2005).

The aim of this study was to research in which way lactic acid bacteria evolved (concentration of viable cells) to storage during shelf-life.

Experimental

The method for determination of lactic acid bacteria was conforming Romanian standard SR ISO 13437/1999 and was used enrich and isolation microbial mediums (Apostu, 2006). Also, from the same samples was determined and total yeast and molds. 5 samples of yoghurt were taken in study and determination was made at storage, during shelf-life. Samples from first day of storage after processing was codified with $Y_{1a,}$ $Y_{1b,}$ $Y_{1c,}$ $Y_{1d,}Y_{1e}$, from the middle of storage during shelf-life with $Y_{2a,}$ $Y_{2b,}$ $Y_{2c,}$ $Y_{2d,}Y_{2e}$ and at the last day of storage during shelf-life with $Y_{3a,}$ $Y_{3b,}$ $Y_{3c,}$ $Y_{3d,}Y_{3e}$.

Results and Discussions

A decrease of concentration of lactic acid bacteria was observed to storage, especially in the last decade of shelf-life to all samples taken in study. Concentration of lactic acid bacteria witch should be from 10^7 ufc/gram until the end of shelf-life is registered only in the first day of product storage. This indicates a low stability of starter culture in fermented dairy, viable germs being inhibited by development of other

micro-organisms (first enterobacteriaceae, then yeast and molds). At the beginning, the concentration of lactic acid bacteria was between 10^6 – 10^7 ufc/gram (concentration consider good for the yoghurt to fortify his nutritive value to consumers), and to the end of shelf-life the concentration was very low, by 10^4 ufc/gram (witch is consider inadequate).

A yoghurt sample at the middle of storage during shelf-life is presented in figure 1 and a yoghurt sample at the final of storage during shelf-life in figure 2.

Figure 1. Yoghurt sample at the middle of storage during shelf-life

Figure 2. Yoghurt sample at the final of storage during shelf-life

Also, in 15% from total samples taken in study, were observed that in the last decade of storage, lactic acid bacteria are inhibited by yeast and molds (figure 2).

Evolution of lactic acid bacteria to storage during shelf-life is presented in table 1. Y_{1a}…Y_{1e} are the 5 samples in the first day of storage after processing, Y_{2a}….Y_{2e} at the middle of storage during

shelf-life and samples $Y_{3a}…Y_{3e}$ at the last day of storage during shelf-life.

Table 1. Evolution of lactic acid bacteria to storage during shelf-life

Sample	Lactic acid bacteria (CFU/g)
Y_{1a}	$4.10 \cdot 10^7$
Y_{1b}	$7.8 \cdot 10^7$
Y_{1c}	$6.7 \cdot 10^7$
Y_{1d}	$3.1 \cdot 10^7$
Y_{1e}	$3.0 \cdot 10^7$
Y_{2a}	$3.3 \cdot 10^6$
Y_{2b}	$7.5 \cdot 10^6$
Y_{2c}	$6.1 \cdot 10^6$
Y_{2d}	$2.1 \cdot 10^6$
Y_{2e}	$1.5 \cdot 10^6$
Y_{3a}	$2.6 \cdot 10^4$
Y_{3b}	$4.5 \cdot 10^3$
Y_{3c}	$3.9 \cdot 10^3$
Y_{3d}	-
Y_{3e}	-

Conclusions

Considering that to storage during shelf-life, concentration of lactic acid bacteria decrease considerable, it is necessary to take all the measure to maintain this concentration at least at 10^6/gram. This concentration is sufficient for the product to contribute to body health and to have a therapeutic effect.

References

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STAS SR ISO 13437