

# Effect of Different Storage Period on Lactic Acid Bacterias from Goji Yogurt and Goji Yogurt with Honey

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## Abstract

Lactic acid bacterias (LAB: *Streptococcus thermophilus*-ST, *Lactobacillus bulgaricus*-LB) are well known in the food technology area for their ability to produce lactic acid (LA) from carbohydrates through fermentation. In case of goji yogurt the interaction between the two species of LAB has influence on the fermentation period and LA quantity. LAB's are widely used in the food industry because their growth in the dairy products lowers the carbohydrate content, they can also drop the pH values under 4.0, values where common pathogens are inhibited, and because of all these properties they are capable to prolong the shelf life. The present study aims to observe the evolution of LAB's – ST and LB, from goji yogurt (7%) (A) and goji yogurt (7%) with honey (B) during the shelf life in correlation with other physico-chemical properties such as sugar content, fat content and dry matter. The samples for the evaluation were taken in the first day of storage, at the middle of storage period and in the last day of storage.

**Keywords:** goji yogurt, lactic acid bacteria's, storage period, quality, fermented dairy products, optimal concentration

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**Introduction.** Lactic acid bacterias (LAB: *Streptococcus thermophilus*-ST, *Lactobacillus bulgaricus*-LB) are well known in the food technology area for their ability to produce lactic acid (LA) from carbohydrates through fermentation. In case of goji yogurt the interaction between the two species of LAB has influence on the fermentation period and LA quantity. LAB's are widely used in the food industry because their growth in the dairy products lowers the carbohydrate content, they can also drop the pH values under 4.0, values where common pathogens are inhibited, and because of all these properties they are capable to prolong the shelf life.

**Aim.** The present study aims to observe the evolution of LAB's – ST and LB, from goji yogurt (7%) (A) and goji yogurt (7%) with honey (B) during the shelf life in correlation with other physico-chemical properties such as sugar content, fat content and dry matter. The samples

for the evaluation were taken in the first day of storage, at the middle of storage period and in the last day of storage.

**Materials and methods.** The yogurt was obtained by fermentation and at the end of the process goji (7%) and honey was added. The yogurt samples were sevenfold diluted and then placed on MRS agar, incubated under anaerobic condition 72 h at 37°C for *Lactobacillus bulgaricus*, and on M17 agar, incubated under anaerobic condition at 37°C for 48h in case of *Streptococcus thermophilus*. After the incubation period the colonies were counted (10-300 UFC/ml) and the confirmation was made using specific tests (Gram affinity, colony aspect and catalase +).

**Results.** In the first day of storage the values for sample A were: ST=2,76 X 10<sup>8</sup> UFC/ml, LB=2,6 X 10<sup>8</sup> UFC/ml and for sample B, ST=2,0 X 10<sup>7</sup> UFC/ml and LB=1,0 X 10<sup>8</sup> UFC/ml. At the middle of the storage period the in case of sample B the

ST increased ( $1,89 \times 10^8$  UFC/ml) while LB had a significant decrease ( $1,09 \times 10^6$  UFC/ml). In case of sample A the ST decreased at half ( $1,86 \times 10^7$  UFC/ml) while LB was  $2,04 \times 10^7$  UFC/ml. It was interesting to observe that at the end of the storage in case of product A the levels of ST ( $2,02 \times 10^7$  UFC/ml) and LB ( $2,0 \times 10^7$  UFC/ml) remained approximately the same. In case of product B the levels of ST ( $2,3 \times 10^5$  UFC/ml) and LB ( $1,84 \times 10^5$  UFC/ml) registered a significant decrease.

According to Bondia-Pons *et al.*, (2014) the mainly soluble constituents of goji berries are the saccharides, phenols, organic acids and carotenoids (zeaxanthin).

These compounds are proven to selectively stimulate or suppress the bacterial population dynamics by their ability to hyperacidify the bacterial membrane, and precipitate the membrane proteins (Carolina Cueva *et al.*, (2010).

In case of product A the values of LB and ST remained approximately at the same levels as at the middle of the storage period. The phenomena can be explained by the fact that adding goji to the final product caused a stimulation of the bacterial population from yogurt. The stimulents in this case were the phenolic compounds present in goji fruits. Same observations were made by Carolina Cueva *et al.*, (2010).

Ranadheera *et al.*, (2012) also observed that the addition of fruit juices into yogurt supported the viability of LB and ST during storage period compared with in plain yogurts.

The fluctuation of ST and LB from product B can be explained by the presence of honey in the product. In this case the large quantity of saccharides and the phenolic compounds from goji inhibited the growth of LB and ST. So the saccharides affected the osmotic pressure at the membrane level, destabilizing the membrane proteins, affecting the electron transfer and inhibit the bacterial metabolism. Same results

were observed by Michael *et al.*, 2010 and Shori and Baba (2012).

Another explanation should be given by the low stability of the culture in the fermented stage of the dairy product. This behaviour can be explained by the fact that the viable germs were inhibited by the presence of other microorganisms such as *Enterobacteriaceae* or yeasts and molds.

**Conclusions.** In order to maintain the number of viable cells at a concentration of  $10^6$  UFC/ml (needed concentration in order to be qualified as a probiotic dairy product with health benefits upon the human organism).

We recommend that in order to maintain the minimum therapeutic level of LB and ST the yogurts should be enriched with fruits, but if the enrichment is done we do not recommend the addition of other products that could increase the saccharides levels of the final product.

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