TITLE: Production of bacteriocin like inhibitory substances by *Lactococcus lactis* QMF 11 in a broth model containing whey.

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Abstract

The antagonistic activity of protective cultures used in biopreservation processes is influenced by the foodstuff and thus, the process tends to be more efficient when the bioprotective strains are isolated from the product in which they are intended to be used. Lactic acid bacteria (LAB) are the major candidates for use in biopreservation, as they are considered safe to consume and naturally dominate the microbiota of many foods, including dairy products, during storage. *Lactococcus lactis* QMF 11, isolated from fresh Minas cheese, is a LAB that produces bacteriocin-like inhibitory substances (BLIS) in laboratory culture media. The present study aimed to verify if *L. lactis* QMF 11 could produce BLIS in a model broth containing whey. Also, the antilisterial activity of the LAB in the model broth was evaluated. Whey was collected during the preparation of Minas fresh cheese, sterilized by filtration through membranes with low protein binding capacity and mixed whit BHI broth in the proportion 1:1 (v/v). Then, the broths were inoculated with *L. lactis* QMF11 solely or in the presence of *Listeria monocytogenes* ATCC 7644 and stored at 8^{o}C for up to 10 days. Detection of BLIS activity was done by the critical dilution assay using the supernatant from the culture broths containing *L. lactis* QMF11 and using *L. monocytogenes* as the indicator microorganism. pH measurement of the broth systems, as well as colony counts in selective agar media, were performed at times zero, five and 10 days. Experiments were performed as independent duplicates. BLIS was detected after five days of incubation (400 UA/mL) only in the model broths containing the LAB in presence of *L. monocytogenes.* At measurement times, the pH of the broths containing *L. lactis* QMF11, isolated or co-inoculated with the pathogen, were lower than the pH of the broths with only *L. monocytogenes*. After 10 days at 8^{o}C, monocultures of *L. monocytogenes* increased by 5.0 log CFU mL^{-1}, while in the presence of *L. lactis* QMF 11, the pathogen population increased by 3.7 log CFU mL^{-1}. These results indicate that not only the constitution of the model culture broth, but also the presence of the pathogen, influenced the BLIS production by *L. lactis* QMF 11. The association of BLIS presence and low pH must have contributed to the inhibition of *L. monocytogenes* growth at the end of the experiment.

Keywords: Biopreservation, Lactic acid bacteria, Bacteriocins, Dairy Products, *Listeria monocytogenes.*

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