

**Title** Microbiological and physicochemical quality of fresh-cut apple enriched with the probiotic strain *Lactobacillus rhamnosus* GG

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### Abstract

The effectiveness as protective culture of the probiotic *Lactobacillus rhamonosus* GG (*L. rham. GG*) against *Salmonella* and *Listeria monocytogenes* on minimally-processed apples throughout storage as well as its effect on apple quality and natural microflora was evaluated. Survival to subsequent exposure to gastric stress was also reported. Apples were cut into wedges and dipped in a solution containing *Salmonella* and *L. monocytogenes* ( $10^5$  cfu mL<sup>-1</sup>) and/or *L. rham. GG* ( $10^8$  cfu mL<sup>-1</sup>). Apple wedges were packed and stored at 5 and 10 °C. Periodically, microbial population, bacterial survival to gastric stress and quality of apple wedges were evaluated. Although *Salmonella* was not affected by co-inoculation with *L. rham. GG*, *L. monocytogenes* population was 1-log units lower in the presence of *L. rham. GG*. *L. rham. GG* population maintained over recommended levels for probiotic action ( $10^6$  cfu g<sup>-1</sup>) along storage, however, viable cells after gastric stress were only above this level during the first 14 days. Pathogen survival after gastric stress was <1% after 7 days at 5 °C. Moreover, apple wedges quality was not affected by *L. rham. GG* addition. Thus, *L. rham. GG* could be a suitable probiotic for minimally-processed apples capable to reduce *L. monocytogenes* growth; nevertheless shelf life should not be higher to 14 days to guarantee the probiotic effect.