

Postbiotic effects of *Enterococcus faecium* BGZLM1-5 on reduction of *Listeria monocytogenes* ATCC19111 in milk

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INTRODUCTION

The genus *Enterococcus* belongs to lactic acid bacteria and inhabits various habitats such as soil, water, plant, and gastrointestinal tracts of a wide variety of animals, and are well adapted to living and surviving in adverse conditions. Enterococci can be found in a variety of fermented foods contributing to the ripening and aroma development of certain cheeses, as well as probiotics to improve human or animal health. In addition, enterococci have the ability to produce various antimicrobial compounds such as lactic acid, hydrogen peroxide, and bacteriocins with broad-spectrum activity against spoilage and pathogenic microorganisms and might be useful as natural preservatives in food products. Many strains of *Enterococcus faecium* produce bacteriocins inhibiting the growth of *Listeria monocytogenes*, one of the most important foodborne pathogens in public health.

RESULTS

Bacteriocin-producing *Enterococcus faecium* BGZLM1-5 was isolated from raw cow milk sampled in a rural household at the Zlatar Mountain in the Republic of Serbia. Since live cells of BGZLM1-5 possess strong antilisterial effects (Figure 1A), we examined the possibility of BGZLM1-5 postbiotic as a safe and controllable replacement for live bacteria to reduce *Listeria monocytogenes* ATCC19111. The results showed that the bacteriocin produced by BGZLM1-5 had a good temperature (in the range of 50°C to 100°C) (Figure 1B) and acid and alkali (stable at pH 3 to 11) resistance (Figure 1C). After 40% ammonium sulfate precipitation and desalination, the size of the bacteriocin is approximately 3.5 kDa (Figure 1D). In addition, we showed that 5% (v/v) of the cell-free supernatant (Figure 2A) and 0.5% (v/v) of the partially purified bacteriocin (Figure 2B) reduced the viable number of *L. monocytogenes* ATCC19111 after three days of milk storage from 7.6×10^5 CFU/ml to 2.7×10^5 CFU/ml and from 7.6×10^5 CFU/ml to 3.7×10^5 CFU/ml, respectively.

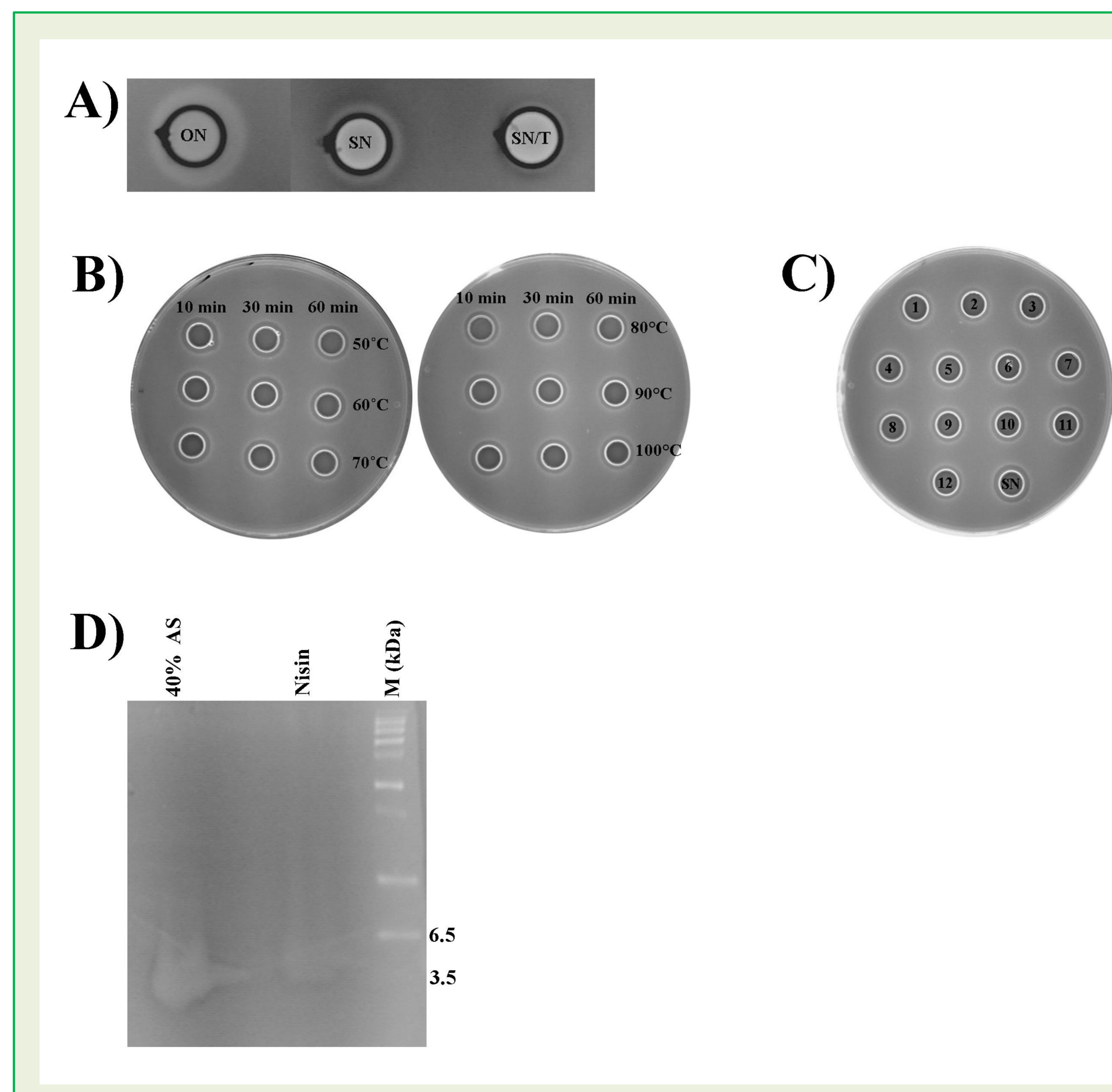


Figure 1. Antimicrobial activity and partial purification of bacteriocin produced by *Enterococcus faecium* BGZLM1-5

Note: ON- overnight; SN- supernatant; SN/T- supernatant treated 30 min with 100°C; numbers from 1 to 12 represent pH; AS- ammonium sulfate.

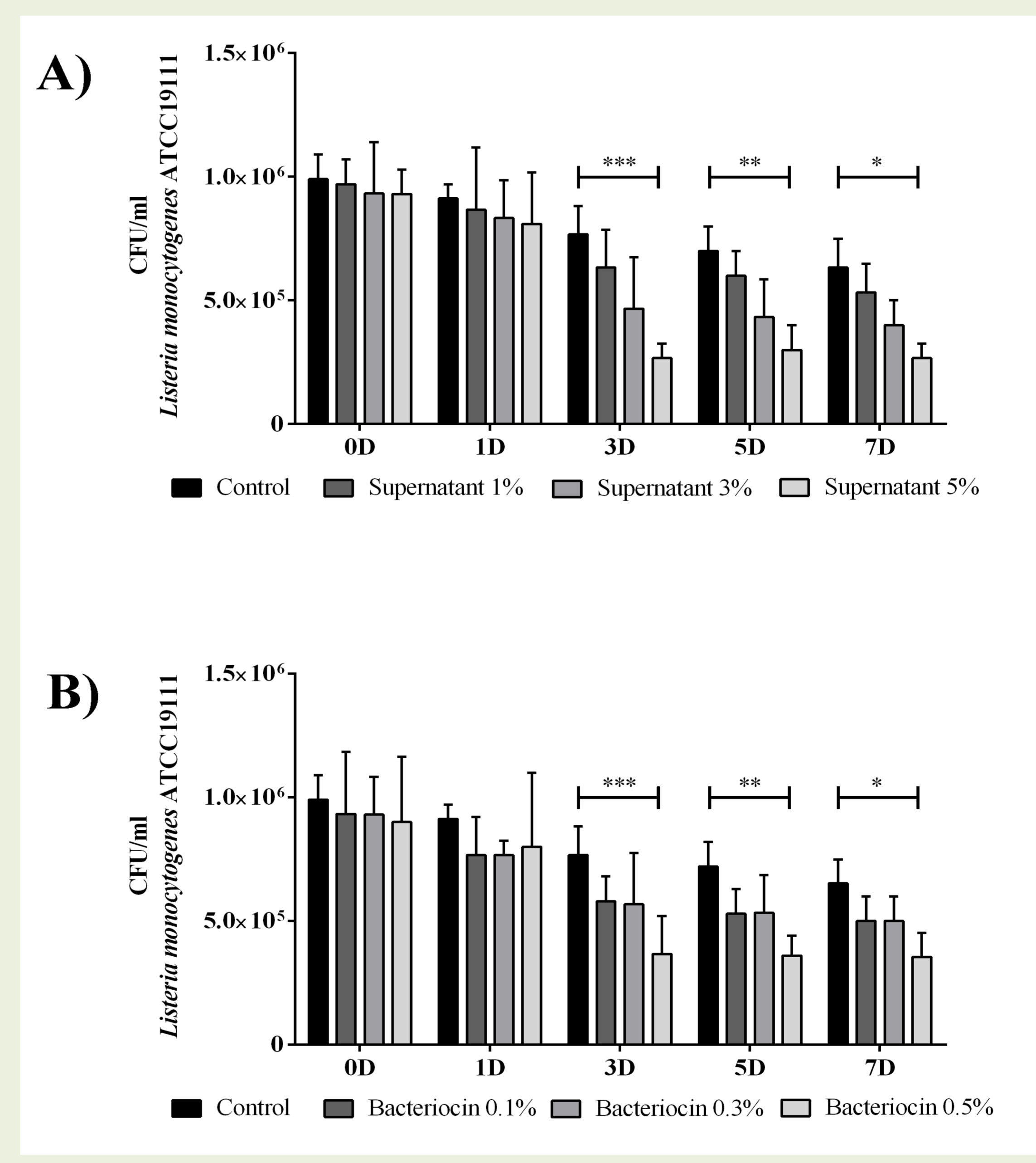


Figure 2. Reduction of *Listeria monocytogenes* ATCC19111 in milk with supernatant and bacteriocin produced by *Enterococcus faecium* BGZLM1-5

CONCLUSION

According to these results, *Enterococcus faecium* BGZLM1-5 has the potential to reduce the number of *Listeria monocytogenes* ATCC19111 and could be used as a food preservative.