

## Essay for improving bacteriocin production by *Enterococcus faecium*

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Bacteriocinogenic *Enterococcus faecium* strains ST651ea, ST7119ea, and ST7319ea, were previously isolated from traditional Korean fermented soybean paste and identified by 16S rRNA sequencing and appropriate biochemical and physiological tests. The spectrum of the expressed bacteriocins was determined versus different test organisms, including different vancomycin-resistant enterococci, several other LAB strains, and specific pathogens associated with humans and animals. In this study, growth conditions for bacteriocin production by *E. faecium* strains ST651ea, ST7119ea, and ST7319ea were optimized regarding the inhibition of vancomycin-resistant *E. faecium* VRE19 of clinical origin, and *Listeria monocytogenes* ATCC15313 as a reference strain. When cultured in MRS broth for 24 h, *Enterococcus faecium* ST651ea, ST7119ea and ST7319ea produced 3200 AU/ml, 6400 AU/ml, and 6400 AU/ml, respectively, at 37°C, and 1600 AU/ml, 3200 AU/ml and 3200 AU/ml, respectively, at 30°C against *E. faecium* VRE19. MRS medium compositions were modified based on inclusion, exclusion, and/or replacement of components for optimizing the production of bacteriocins by these strains. These modifications included the inclusion or exclusion of sugars (sucrose, fructose, galactose, lactose, or maltose) and organic nitrogen sources (peptone, meat, or yeast extracts) in basal MRS medium. Modification of commercial MRS formulation resulted in stimulation of bacteriocin production. Bacteriocins produced by *E. faecium* ST651ea, ST7119ea, and ST7319ea showed higher activity at 37°C after 15h with 20 g/l galactose replacing D-glucose and in setups containing organic nitrogen sources of only 10 g yeast extract/l and 15 g peptone/l in modified MRS medium. The bacteriocin produced by *E. faecium* ST651ea yielded 6400 AU/ml and 25600 AU/ml activity against *E. faecium* VRE19 and *L. monocytogenes* ATCC15313, respectively. However, bacteriocin levels produced by *E. faecium* ST7119ea reached 12800 AU/ml and 51200 AU/ml versus *E. faecium* VRE19 and *L. monocytogenes* ATCC15313, respectively. Activity expressed by *E. faecium* ST7319ea yielded 12800 AU/ml and 51200 AU/ml against *E. faecium* VRE19 and *L. monocytogenes* ATCC15313, respectively. Based on the type and availability of different carbohydrates and organic nitrogen sources, production of bacteriocins by *E. faecium* ST651ea, ST7119ea, and ST7319ea was reduced by up to 50%.

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