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COMPARISON OF BACTERIOCINS PRODUCTION FROM *Enterococcus faecium* STRAINS IN CHEESE WHEY AND OPTIMISED COMMERCIAL MRS MEDIUM

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Abstract

Bacteriocins production from cheap substrates could be effective for many food industrial applications. This study aimed at determining the conditions needed for the optimal production of enterocin SD1, enterocin SD2, enterocin SD3 and enterocin SD4 secreted by *E. faecium* strains SD1, SD2, SD3 and SD4, respectively, isolated from Sardinian goat´s milk. Cheese whey, low-cost milk by-product, was selected to be used as substrate for bacteriocins production. Skimmed milk and MRS broth were studied as reference media.

Growth temperature played an important role in the bacteriocin production. Highest levels were recorded at 37°C. Growth of *E. faecium* strains in 0.2 and 10% skimmed milk or 0.2 and 10% cheese whey was similar to the growth observed in MRS broth. However, the levels of bacteriocins produced in skimmed milk and cheese whey were lower.

Optimal enterocins production was detected when strains were grown in MRS with initial pH of 6.0 and 7.0. Growth of *E. faecium* SD1 and SD2 in cheese whey adjusted to pH 6.5 produced bacteriocin levels comparable to those detected in MRS broth, whereas *E. faecium* SD3 and SD4, once grown in cheese whey instead of MRS, showed reduced bacteriocin activity.

In MRS broth, organic nitrogen sources were essential for high bacteriocin productions. Highest enterocin SD1 levels were recorded in the presence of tryptone, or with a combination of meat and yeast extract. For enterocins SD2, SD3 and SD4 the combination of meat extract, yeast extract and tryptone resulted in the highest antimicrobial activities. The growth of *E. faecium* strains in the presence of glucose or lactose yielded optimal bacteriocins levels while the addition of mannose in MRS supported growth and bacteriocin production only for *E. faecium* SD2 and SD4. Optimal bacteriocins levels were produced in the presence of K_2HPO_4, Tween 80 and ammonium acetate whereas the secretion of all the bacteriocins was reduced in the absence of magnesium sulphate, manganese sulphate or tri-ammonium citrate.

This study showed that cheese whey, a major world-wide disposal and pollution problem for the dairy industry, could be an interesting low-cost substrate for the production of bacteriocins. However, the optimisation of MRS components seems to be more crucial towards the cost-effective production of high bacteriocins levels to be used in the food processing industry. As alternative, supplementing cheese whey with some of the MRS components may be an interesting strategy for the optimisation of bacteriocins productions from *E. faecium* strains.