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Co-production of conjugated linoleic acids, exopolysaccharides and bacteriocins by *Lactobacillus acidophilus* LA5 and *Bifidobacterium animalis* subsp. lactis BB12 in supplemented dairy effluents

Saber Amiri [a*], Mahmoud Rezazadeh Bari [a], Mohammad Alizadeh Khaledabad [a], Reza Rezaei Mokarram [b], Mahmoud Sowti Khiabani [b]

[a] *Department of Food Science and Technology, Faculty of Agriculture and Natural Resources, Urmia University, P.O. Box 57561-51818, Urmia, Iran*

[b] *Department of Food Science and Technology, Faculty of Agriculture, University of Tabriz, Tabriz, Iran*

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ABSTRACT

In this study, the effects of initial pH (5 − 7), temperature (30 − 38 ◦C) and incubation time (12 − 48 h), as well as yeast extract and free linoleic acid concentrations, respectively (0 – 4 %) and (0 − 400 µL), on the co-production of conjugated linoleic acid (CLA), exopolysaccharides (EPSs) and bacteriocins (BACs) by *Lactobacillus acidophilus* LA5 and *Bifidobacterium animalis* subsp. lactis BB12 and their biomass in cheese whey and milk permeate were evaluated. The results showed that biomass, CLA, EPSs and BACs activity ranged Log 0.80 - Log 8.67 $g.L^{-1}$, 3.08-107.95 $\mu g.mL^{-1}$, 107.75-351.92 $mg.L^{-1}$ and 9.29-14.62 mm, respectively. Yeast extract concentration was the only factor with the positive significant effect on biomass and postbiotic metabolites i.e. its increasing caused to an increase in both of them ($p<0.05$). The temperature significantly affected the production of biomass and CLA; its increasing resulted in increasing both ($p<0.05$). The initial pH had significant, but different, effects on EPSs and BACs production ($p<0.05$) i.e. EPSs and BACs production decreased and increased, respectively, as a result of increased initial pH. Increasing free linoleic acid concentration from 0 up to 400 µL led to increased CLA biosynthesis. Higher biomass, EPSs and BACs are produced in cheese whey, compared with milk permeate, but CLA produced in milk permeate was higher than that obtained in cheese whey. *B. animalis* BB12 produced more biomass, CLA and EPSs in comparison to *L. acidophilus* LA5. However, these probiotics had no statistical difference in terms of producing BACs. This work successfully demonstrated the co-production potential of CLA, EPSs and BACs by two commercial probiotics in dairy effluents.

1. Introduction

In the recent decades, due to consumers' interest in the functional and safe food, the incorporation of probiotic cells in different foodstuffs is progressively increasing [1-8]. In the food industry, especially in dairy products the most commonly-used genera of probiotic bacteria are *Lactobacilli* and *Bifidobacteria*, the main populations of microbiota in the humans' small and large intestine, respectively. In addition, generally used probiotic bacteria in the food industry are in the form of direct vat set, freeze dried culture concentrates. According to the most accepted definitions, probiotics are live microorganisms with health benefits to host when consumed in adequate amounts and considered as GRAS (Generally Recognized as Safe) [9-13].

Enhancing the functionality of intestinal barrier and regulating the immune system as well as improving certain gastrointestinal disorders, such as irritable bowel syndrome, inflammatory bowel disease, and the defense system by competing against pathogens are examples of health effects of probiotics on the host [13].

* Corresponding author: Saber Amiri; e-mail address: St_sa.amiri@urmia.ac.ir