

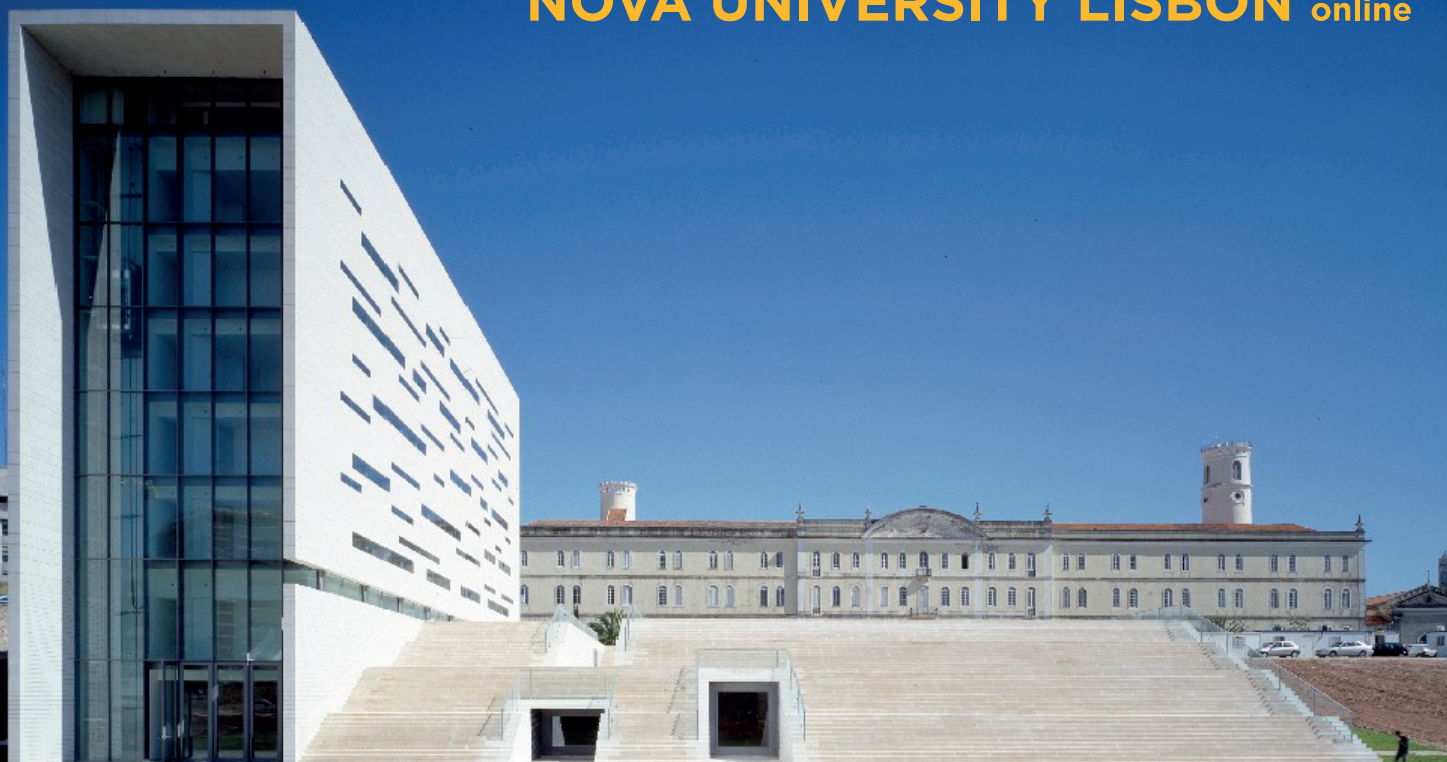
MICROBIOTECH 21

Webconference

CONGRESS OF MICROBIOLOGY AND BIOTECHNOLOGY 2021

November 23rd - 26th | 2021

NOVA UNIVERSITY LISBON online



Abstracts Book

www.microbiotec21.organideia.pt



O.451. Perspectives on the development of CLA/CLNA-enriched milk through *in situ* microbial production

Ana Luiza Fontes^{1,2}, Lígia Pimentel¹, Javier Calzada³, Ana Sofia Salsinha^{1,4}, Juan Miguel Rodríguez⁵, Juan Arqués³, Maria do Rosário Domingues², Ana Maria Gomes¹ and Luis Miguel Rodríguez-Alcalá¹

¹Universidade Católica Portuguesa, Porto, Portugal; ²Universidade de Aveiro, Aveiro, Portugal; ³Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria (INIA), Madrid, Spain; ⁴Universidade do Porto, Porto, Portugal; ⁵Complutense University of Madrid, Madrid, Spain

Over the past decade several food-derived lipids with potential bioactive properties to be used in the development of innovative functional foods have been identified. These include conjugated linoleic (CLA) and conjugated linolenic (CLNA) acids with well described anti-inflammatory, anti-obesity and anticarcinogenic properties. Limited availability in their natural sources (e.g. ruminants' milk and meat or vegetable oils) has driven studies on *in situ* microbial production in dairy products to improve CLA/CLNA daily intake. Several probiotic strains have been reported to produce CLA/CLNA isomers using linoleic (LA) and alpha-linolenic (α -LNA) acids as precursor substrates, respectively. This research work aimed to evaluate the viability of developing a CLA/CLNA-enriched milk through *in situ* microbial production at a laboratory scale.

A combination of genetic screening, substrate tolerance and production assays, identified three CLA/CLNA-producing candidates from a pool of 85 probiotic bacteria. Since *Bifidobacterium breve* DSM 20091 stood out from the others with CLA/CLNA production yields around 0.3 mg/mL, it was selected to proceed with milk CLA/CLNA-enrichment. Seeking to explore industrial viability, edible vegetable oils were applied as substrate sources instead, namely soybean (SBO; rich in LA) and flaxseed (FSO; rich in α -LNA) oils, which had been previously hydrolyzed with *Candida rugosa* lipase. Microbial CLA/CLNA-enrichment of pasteurized bovine milk was tested with each hydrolyzed oil, individually or in combination, to provide 0.5 mg/mL of LA and/or α -LNA. Viable cell numbers of *B. breve* achieved 9 log cycles upon 24 h fermentation. Highest CLA/CLNA-enrichment was achieved using FSO alone (~0.4 mg/g), where CLNA isomers were those mainly produced. Surprisingly, only traces of CLA were found, either with SBO alone or in combination. Milk enrichment was further assayed with FSO alone to concentrations up to 10 mg/mL α -LNA, where at 2 mg/mL the maximum yield of ~1 mg/g CLA+CLNA was obtained.

In conclusion, the development of a CLA/CLNA-enriched bovine milk through *in situ* microbial production remains challenging, given the limited number of strains able to produce CLA/CLNA at considerable levels, and because it is difficult to develop a dairy product simultaneously enriched in CLA and CLNA.

An *in situ* strategy has its limitations; nevertheless, this study demonstrates that *B. breve* DSM 20091 has potential for the development of CLNA-enriched dairy products.