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Continuous cheese whey permeate alcoholic fermentation with a flocculent recombinant *Saccharomyces cerevisiae*

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Cheese whey disposal is one of the major problems in dairy industries due to its high biochemical oxygen demand (BOD). Nowadays, protein fraction of cheese whey is removed, typically by ultrafiltration, and high quality WPC (whey protein concentrate) has been obtained. Solutions for the lactose rich fraction have to be developed, being its use as substrate for alcoholic fermentation one of the alternatives that have been considered. The success of this process depends on the development of a high productivity system for ethanol production. Continuous fermentation with flocculating yeast cells is, certainly, one of the most attractive.

In this work, the genetic construction of a flocculent *Saccharomyces cerevisiae* able of fermenting lactose (using *LAC4* and *LAC12* genes of *K. lactis*) is described. Data on yeast fermentation and growth on cheese whey permeate from a Portuguese dairy industry is presented. Permeate continuous fermentation were done at increasing dilution rates, in a 5.5 L airlift bioreactor. For this system an ethanol productivity near 10 g/L.h, corresponding to a dilution rate of 0.45 h⁻¹, with total lactose consumption, was obtained which is 6 times larger than the continuous conventional systems. The system stability was confirmed by keeping it in operation for six months.

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