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Synthesis of galactooligosaccharides with prebiotic potential during hydrolysis of lactose by Lactozym 3000 L HP G

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Galactooligosaccharides (GOS) are non-digestible oligosaccharides consisting of two to twenty-20 molecules of galactose and glucose that are recognized as prebiotics because they can stimulate the proliferation of lactic bacteria and bifidobacteria in the human intestine⁽¹⁾. The stimulation of the immune system is among the possible benefits of prebiotics that are being investigated⁽²⁾. Although no definitive conclusions have been reached, the possibility that prebiotic oligosaccharides could influence the immune response would make prebiotic dietary intervention a more attractive choice than probiotics in the reduction of atopic diseases in infants⁽³⁾ and the chronic inflammatory bowel disease in human subjects⁽⁴⁾.

The role of human milk in the stimulation of the immune response in newborn babies during the first months of life is well known. One of the carbohydrates in human milk for which the immune effect has been established is 6'-galactosyl lactose. This trisaccharide and other carbohydrates have potential use as ingredients in the development of different infant formulas. Recently, considerable attention has been paid to improving GOS production; enzymic transgalactosylation from lactose being one of the most promising alternatives. Lactozym 3000 L HP G is a commercial preparation in which β -galactosidase from *Kluyveromyces lactis* is the most active enzyme, although transgalactosylation can also occur at the same time; the transferase: β -galactosidase activity depends on the different reaction conditions used. The present study is an exhaustive investigation of the optimal conditions for GOS (6'-galactosyl lactose, galactobiose and allolactose) formation during the hydrolysis of lactose with Lactozym 3000 L HP G. The effect of the reaction conditions (temperature, pH, time, substrate and enzyme concentrations) was different for the formation of di- and trisaccharides. Thus, the best conditions for producing galactobiose and allolactose were 50°C, pH 6.5, 250 mg lactose/ml, 3 U enzyme/ml and 300 min, while the optimal conditions for the synthesis of 6'-galactosyl lactose were 40°C, pH 7.5, 250 mg lactose/ml, 3 U enzyme/ml and 120 min.

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