

THE EFFECTS OF LACTOSE HYDROLYSIS ON THE LACTOSE-FREE YOGURT QUALITY

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Yogurt is a dairy product obtained by fermenting milk appreciated for the benefits presented to the digestive and general consumers health and for the reduction of symptoms caused by inadequate lactose digestion. Therefore, the lactose in yogurt is better digested than that in milk, as a result of the microorganisms ability to synthesize lactase. However, a low lactose content in yogurt is not suitable for people with lactose intolerance. Thus, the most reliable remedy seems to be complete enzymatic digestion of the lactose in yogurt. The aim of the study was to investigate the influence of different lactose hydrolysis processes, the contribution of the enzyme and the milk type on the characteristics of the obtained yogurt. For a systematic approach, the non-hydrolyzed yogurt (control sample), the yogurt that was hydrolyzed before fermentation, and the co-hydrolyzed yogurt (concomitant addition of β -galactosidase and starter culture) were performed simultaneously.

The degree of lactose hydrolysis was determined in accordance with the method for the measurement of lactose in low-lactose and lactose-free products under Standard Method Performance Requirement (SMPRVR) 2018.009. The pH was measured with a digital pH-meter at 20°C. Viscosity was determined with a Brookfield DV-III Ultra rotational viscometer. Chemical analyzes of yogurt samples were analyzed according to the International Dairy Federation and International Organization for Standardization.

The influence of lactose hydrolysis on the yogurt fermentation time, sensory and rheological properties was investigated using two types of β -galactosidase enzymes and two types of products (cow's milk and goat's milk yogurt). In each trial (control, pre-hydrolyzed substrate, co-hydrolyzed approach), fermentations were performed simultaneously with the same starter culture. The fermentation time of the yogurt samples to reach pH 4.60 generally varied between 5 and 7 hours. In the yogurt samples in which the prior hydrolysis of milk lactose was performed, the fermentation accelerated by 30 minutes, and in the yogurt obtained by co-hydrolysis, the fermentation time was reduced from 420 to 360 minutes, a decrease determined by the rapid lactic acid production even from the first hours of fermentation. The sensory quality of the yogurt samples obtained from hydrolyzed milk by co-hydrolysis is characterized by a better flavor than the control sample. This may be due to the availability of a greater amount of glucose for the production of aromatic compounds, a sweeter taste than natural yogurt, with a light caramel flavor, a firm clot, a porcelain appearance, without whey removal. Cow's milk yogurt showed higher viscosity values compared to goat's milk yogurt for both hydrolyzed and co-hydrolyzed milk. Lactose hydrolysis determined the reduction of the syneresis index of the yogurt compared to the control samples.

Lactose hydrolysis in milk influences fermentation time, textural properties and sensory attributes of yogurt. In yogurt samples obtained from pre-hydrolyzed and co-hydrolyzed milk accelerated the fermentation compared to the references, suggesting that lactose hydrolysis improves the fermentation process. Sensory and textural properties of lactose-free yogurt are superior to those of natural yogurts.

Keywords: hydrolysis, fermentation, yogurt, lactose, lactase

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