

Study on the Efficiency of Some Antioxidants on Reduction of Maillard Reaction in Low Lactose Milk

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Abstract : In low-lactose milk, due to lactose hydrolysis and its conversion to monosaccharides like glucose and galactose, the Maillard reaction (non-enzymatic browning) occurs more readily compared to non-hydrolyzed milk. This reaction incurs off-flavor and dark color, as well as a decrease in the nutritional value of milk. The target of this research was to evaluate the effect of natural antioxidants in diminishing the browning in low-lactose milk. In this research, three antioxidants, namely ascorbic acid, gallic acid, and pantothenic acid in the concentration range of 0-1 mM/L, either in combination with each other or separately, were added to low-lactose milk. After heat treatment (120 °C for 3 min.), milk samples incubated at 55 °C for one day and then stored at 4 °C for 9 days. Quality indices, including total phenol content, antioxidant activity, color indices, and sensory characters, were measured during intervals of 0, 2, 5, 7, and 9 days. Results of this research showed that the effect of storage time and adding antioxidants were significant on pH, antioxidant activity, total phenolic compounds either before or after heating, index L*, color change, and sensational characteristics ($p < 0.05$); however, acidity, a* and b* indices, chroma, and hue angle showed no significant changes ($p > 0.05$). The findings showed that the simultaneous application of gallic acid and ascorbic in the diminishing of non-enzymatic browning and color change, increasing pH, longevity, and antioxidant activity after heat treatment, and augmenting phenolic compounds before heat treatment was better than that of pantothenic acid.

Keywords : Maillard, low-lactose milk, non-enzymatic browning, natural antioxidant

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