

Development of Antioxidant Rich Bakery Products by Applying Lysine and Maillard Reaction Products

Authors : Attila Kiss, Erzsébet Némédi, Zoltán Naár

Abstract : Due to the rapidly growing number of conscious customers in the recent years, more and more people look for products with positive physiological effects which may contribute to the preservation of their health. In response to these demands Food Science Research Institute of Budapest develops and introduces into the market new functional foods of guaranteed positive effect that contain bioactive agents. New, efficient technologies are also elaborated in order to preserve the maximum biological effect of the produced foods. The main objective of our work was the development of new functional biscuits fortified with physiologically beneficial ingredients. Bakery products constitute the base of the food nutrients' pyramid, thus they might be regarded as foodstuffs of the largest consumed quantity. In addition to the well-known and certified physiological benefits of lysine, as an essential amino acid, a series of antioxidant type compounds is formed as a consequence of the occurring Maillard-reaction. Progress of the evoked Maillard-reaction was studied by applying diverse sugars (glucose, fructose, saccharose, isosugar) and lysine at several temperatures (120-170°C). Interval of thermal treatment was also varied (10-30 min). The composition and production technologies were tailored in order to reach the maximum of the possible biological benefits, so as to the highest antioxidant capacity in the biscuits. Out of the examined sugar components, the extent of the Maillard-reaction-driven transformation of glucose was the most pronounced at both applied temperatures. For the precise assessment of the antioxidant activity of the products FRAP and DPPH methods were adapted and optimised. To acquire an authentic and extensive mechanism of the occurring transformations, Maillard-reaction products were identified, and relevant reaction pathways were revealed. GC-MS and HPLC-MS techniques were applied for the analysis of the 60 generated MRPs and characterisation of actual transformation processes. 3 plausible major transformation routes might have been suggested based on the analytical result and the deductive sequence of possible occurring conversions between lysine and the sugars.

Keywords : Maillard-reaction, lysine, antioxidant activity, GC-MS and HPLC-MS techniques

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