

The Antioxidant Effect of the Lactose–glycine Maillard Reaction Products on Butter Fat

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During heat treatment and storage of fat-containing milk products, both the Maillard and lipid oxidation reactions take place at the same time and can influence each other. The objective of this study was to determine a possible antioxidant activity of water soluble Maillard reaction products (MRP) in butter fat medium.

The mixture of MRP was obtained from the reaction of lactose with glycine by boiling the solution (0.5 mol/l) under reflux for 12 h. The water soluble fraction of MRP was dispersed in butter fat in the range from 0–7.5 % in steps of 2.5% of weight, by 37°C. The samples of fat were kept in the dark by 40 °C and by 80 °C for 16 and 4 days, respectively. Fat stability was determined by observing the development of peroxide value and conjugated dienes and by measuring the changes in acidity.

The addition of MRP slowed down (1.5-1.9 times) the accumulation of free fatty acids in butter fat stored at both temperatures. The increase of peroxide values in the presence of MRP in butter fat was suppressed after 4 h and 1 h of storage at 40 °C and 80 °C, respectively. The corresponding inhibition of formation of conjugated dienes was also observed. However, the influence of MRP on the accumulation of the other oxidation products (indicated as absorbance at 268 nm) was different in butter fat stored by 40 °C in compare with those by 80 °C. By lower temperature – the inhibition effect and by higher temperature – the stimulating (with 5.0 and 7.5 % of MRP) or inhibiting (with 2.5 % of MRP) effect was determined.

The results support the concept that the compounds with antioxidant activity are generated by the Maillard reaction. Based on these findings one can conclude that the Maillard reaction products, formed by the thermal treatment of milk, are able to stabilize oxidative deterioration of fat-rich milk products and to extend their shelf life.