

The Effect of Soluble Maillard Reaction Products on Oxidation State of Butter Fat Stored at 60 °C

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The oxidation of milk fat is one of the reasons of instability and deterioration of dairy products by storing. Thus, the use of antioxidant additives is oft unavoidable. The aim of the work was to investigate the influence of Maillard reaction intermediate compounds and final products (MRP) on butter fat oxidation properties.

Model systems of MRP were produced from glycine (0.5 mol/L) and glucose or lactose (0.5 mol/L) aqueous solutions, mixing them by proportion of volume 1:1. Mixtures were heated at their boiling temperature under reflux up to 8 and 12 hours respectively, without pH control. Butter fat was removed from butter at temperature 55-60 °C. The model MRP was added into butter fat by amount of 0, 2.5, 5.0 or 7.5 %. The oxidation of the fat was accelerated by increase of storage temperature (to 60 °C) and adding Cu (II) ions (to concentration in butter of 10 mg/kg). Oxidation degree of butter fat at storage to 8 days was tested by determination of acids and peroxides value, TBR (thiobarbituric) index and UV absorption (at 234 and 268 nm).

It was determined, that Maillard reaction products inhibited peroxidation processes and the accumulation of conjugated dienes in butter fat and compensated the amplification of formation of peroxides initiated in presence of copper ions. However the increase of the amount of conjugated dienes then copper ions is affected was not determined. The Maillard reaction products of glycine and glucose inhibit the primary oxidation processes more effectively than glycine and lactose MRP. In the case of auto oxidation and oxidation initiated of copper the accumulation of aldehyde compounds, determined as TBA value, was reduced in butter fat with both model MRP systems. The influence of MRP of glycine and lactose on formation of these secondary oxidation products was similar.

The results indicated that the compounds of the Maillard reaction obtained in glycine and glucose or lactose model systems show decided antioxidant properties. The estimation of the UV 268 nm absorption of butter fat oxidation processes with added Maillard reaction products was not rational due to the influence of some Maillard reaction compounds on these indices value.