Dokumenttyp: Zeitschriftenaufsatz

Autor(en) des Beitrags: Lindenmeier, Michael; Hofmann, Thomas

Titel des Beitrags: Influence of baking conditions and precursor supplementation on the amounts of the antioxidant pronyl-L-lysine in bakery products

Abstract: The influence of baking conditions and dough supplements on the amounts of the antioxidant and Phase II-Enzyme modulating, protein-bound 2,4-dihydroxy-2,5-dimethyl-1-(5-acetamino-5-methoxycarbonyl-pentyl)-3-oxo-2H-pyrrol (pronyl-L-lysine) in bakery products was investigated in quantitative studies. These studies revealed high amounts of the antioxidant in bread crust, only low amounts in the crumb, and the absence of this compound in untreated flour. The amounts of pronyl-L-lysine were found to be strongly influenced by the intensity of the thermal treatment. For example, increasing the baking time from 70 to 210 min or increasing the baking temperature from 220 to 260 degrees C led to a 5- or 3-fold increase in the concentrations of this antioxidant in the crust, respectively. In addition, modifications in the recipe showed to have a major impact on pronyl-L-lysine formation. For example, substituting 5% of the flour with the lysine-rich protein casein or with 10% of glucose increased the amounts of the antioxidant by more than 200%. Quantitative analyses of commercial bread samples collected from German bakeries revealed the highest amount of 43 mg/kg for a full grain bread, followed by a rye/wheat bread, both of which have been sourdough fermented. A mixed-grain bread as well as pale wheat bread, both prepared without sourdough fermentation, contained significantly
lower amounts of pronyl-L-lysine, and German pretzels, which are treated with a dilute sodium hydroxide solution prior to baking, contained only trace amounts of pronyl-L-lysine (e.g., less than 5 mg/kg were detectable in pretzels). Systematic studies revealed that the decrease of the pH value induced by microbial acid formation during sourdough fermentation is the clue for producing high amounts of pronyl-L-lysine in baking products. These data clearly demonstrate for the first time that the amounts of the antioxidant and chemopreventive compound pronyl-L-lysine in bakery products is strongly dependent on the manufacturing conditions as well as the recipe.