Kokumi-active glutamyl peptides in cheeses and their biogeneration by Penicillium roquefortii

Abstract:
Recently, a group of gamma-glutamyl dipeptides, but not the alpha-glutamyl dipeptides, were found to induce the attractive kokumi flavor of matured Gouda cheese. In the present investigation, the spatial distribution of alpha- and gamma-glutamyl dipeptides in Gouda cheese wheels and the concentration of these peptides in other cheese types were determined by means of HPLC-MS/MS. Among all cheeses investigated, by far the highest gamma-glutamyl peptide concentration (3590 mumol/kg) was found for Blue Shropshire, a blue-veined cheese. To check whether the gamma-glutamyl transferase (GGT) from Penicillium roquefortii is involved in gamma-glutamyl peptide production in this cheese, the GGT activity was measured and gamma-glutamyl peptides were analyzed in liquid cultures of mold isolated from Blue Shropshire as well as single P. roquefortii strains incubated with the gamma-glutamyl donor l-glutamine and the candidate substrates l-glutamic acid, l-histidine, l-leucine, and l-methionine. Being well in line with the GGT activity found in Blue Shropshire, P. roquefortii was found for the first time to produce and secrete gamma-glutamyl peptides. Among the amino acids tested, l-methionine was found as a preferred gamma-glutamyl acceptor; for example, gamma-Glu-Met was produced in yields of about 50 mmol/mol and...
[(2)H(3)]-gamma-Glu-Met was obtained when [(2)H(3)]-l-methionine was used as substrate amino acid.