

STABILITY OF GLUTATHIONE PEROXIDASE ACTIVITY DURING STORAGE AND HEAT TREATMENT OF WHEY

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Antioxidant enzymes may have important roles for the oxidative stability of foods. Recently it has been discovered that the family of the selenium-containing glutathione peroxidases (GSHPx) contain at least four members in mammalian tissue but their role in foods is not well known. To some extent this is due to a lack of suitable assays since activity measurements only cannot distinguish between all enzymes and only few specific immunochemical methods are available. In this study a modified version of the coupled enzymatic assay for GSHPx using glutathione reductase was applied to whey. Moreover the stability of GSHPx activity was followed at storage and heat treatments simulating those used in the food industry.

Whey was prepared by treatment of milk with lactic acid and then stored frozen. GSHPx activity was assayed using tert.butylhydroperoxide and glutathione as substrates. As blanks enzyme-free incubations or incubations containing mercaptosuccinate (4 mmol/l) were used. In acid whey (pH 4.5) stored at +8° and at room temperature (approx. 22°) GSHPx was more stable than in whey adjusted to pH 6.7. After 9 days in the cold 89% of the starting activity remained at pH 4.5 and 65% at pH 6.7. After storage for 9 days at room temperature 49% of the activity remained at pH 4.5 and 35% at pH 6.7.

On the contrary when whey with different pH was heated the stability of GSHPx was higher at pH 6.7 than at pH 4.5. After heat treatment at 63° for 30 min which simulates pasteurization, 79% of GSHPx activity remained at pH 6.7 but only 9% at pH 4.5. As expected heating at higher temperatures resulted in more rapid loss of GSHPx activity. After heating at 72° for 5 min 75% of GSHPx activity remained at pH 6.7 and 5% at pH 4.5. After heating at 80° for 5 min most of the activity was lost but after 2 min 81% of GSHPx activity remained in whey at pH 6.7 and 44% in whey maintained at pH 4.5. These results indicate that GSHPx in whey is stable to several treatments used in the dairy industry suggesting that it has importance for food stability and quality.