

SEAE P28 RECOVERY OF AMINO ACIDS IN PROTEIN MINERAL CONCENTRATES AT ELECTROPHYSICAL PROCESSING OF WHEY AT DIFFERENT PH AND TEMPERATURE VALUES

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Whey proteins have the amino acid profile superior to that of casein, the former being similar to human milk and recommended for the formulation of humanized milk products for replacement of bovine milk in infant nutrition. In some cases, processing operations that involve the use of high pressure, shear and high temperature result in protein denaturation with adverse consequences on protein digestibility and bioavailability, properties influenced greatly by the amino acid behavior. Heat treatment could potentially affect the content of amino acids in milk. Concentration of free amino acids in milk heated by termization, pasteurization, and sterilization processes is reported to be markedly influenced by temperature or holding time during processing. Amino acid profiles showed that excessive heating of whey (121°C, 5000s) destroys a significant part of Cys (cysteine) at, Lys (lysine), and Arg (arginine) [1]. Excessive heating also decreases the availabilities of Lys (lysine), Pro (proline), Asp (asparagine), Glu (glutamine), Tre (threonine), Ala (alanine), Gly (glycine) and Ser (serine). Severe heating decreased the availabilities of Cys, Tyr (tyrosine) and Arg (arginine), probably as a result of structural modifications of the protein upon heating. Because of the excessive and prolonged heating even at the neutral pH, the nutritive value is impaired; one mechanism is believed to be cross-linking of peptide bonds by acylation of free amino groups.

The investigation of the variations in the content of amino acids in the protein-mineral concentrates (PMCs) at different processing regimes was performed. It was determined that they depend on the variations of pH and temperature. Two types of whey were the objects of study: after the manufacture of the granulated cottage cheese „Grauncior” (called whey with high protein content, or HWPC) and that after the manufacture of the “Cottage cheese”, 2% fat content (called whey with medium protein content, or MWPC), in the membrane electrolyzer EDP-4, at current density $j=10$ and 20 mA/cm^2 , at the stationary regime.

The content of free amino acids was at the same level with increasing pH and temperature during processing of both HWPC and MWPC, at current density $j=10 \text{ mA/cm}^2$. Electrophysical processing at $j=20 \text{ mA/cm}^2$, with increasing pH and temperature, more drastically affected the isolation of free amino acids in the PMCs. While processing HWPC, the highest amount of free amino acids was extracted during first 5-10 min of the process, but at increasing both the temperature and pH, the decrease of their contents was attested. While processing MWPC, the highest degree of free amino acids isolation was registered after 5min and 10 min of the process, then there was a slight decrease of their content.

The level of recovery of each essential amino acid and non-essential amino acid in the the PMCs is varying in dependence on time of electrophysical processing, current density, pH value and temperature, that can be promising investigations in the direction of PMCs obtaining with desired amino acids content and spectrum by applying various parameters (regimes) of whey electrophysical processing.

[1] T. Desrosiers, L. Savoie. *Journal of Dairy Research*, (1991), **58**, 431-441.