

Effect of chelators on functionality of milk protein concentrates obtained by ultrafiltration at  
a constant pH and temperature

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Short Title: Chelators and MPC functionality

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## **Abstract**

Modulating conditions during ultrafiltration of skim milk appears as a feasible strategy to obtain milk protein concentrates (MPC) with tailored functionalities. Adjustment of pH and process temperature attenuated properties of casein micelle resulting in enhanced emulsification capacity. Additional pre-treatment options such as addition of calcium chelators can further impact on the functionality of MPC by modifying the calcium distribution and casein micelle integrity. The objective of the project was to establish effects of pre-treating skim milk with calcium chelators (EDTA or citrate) in concentrations between 10 to 30 mM prior to UF on the physical properties of the feed, corresponding retentates and dried MPC, including particle size, zeta potential and calcium distribution in skim milk and the corresponding retentates, as well as the physical functionalities such as solubility, heat stability and emulsifying properties. Addition of calcium chelators (EDTA or citrate), at levels 20 – 30 mM concentrations reduced casein micelle size as well as total, soluble and ionic calcium contents that resulted in MPC with enhanced solubility and heat stability. The emulsion capacity was, however, improved only with EDTA at 10mM concentration. The enhanced functionality is attributed to the reduced particle size resulting from the removal of calcium from the retentate that could modify micellar casein to an extent sufficient to cause such improvements.