

## Effect of Salt on the Structure and Function of Bovine Casein Micelles

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### Summary

Bovine milk and milk proteins are important materials for food processing in recent food industry. Considerable amount of salt is added to cheese and salt is essential in food processing. Accordingly, it is important to investigate the effect of salt on the structure and function of milk and milk proteins. Recently the effect of sodium chloride on the properties of acid casein was examined. However, casein occurs in colloidal particles of 20-600 nm diameter called casein micelles, and acid casein and casein micelles differ greatly from one another in their characteristics. In the present study, at first we examined the effect of sodium chloride on the characteristics of bovine casein micelles, and then the effect of sodium chloride on the physical properties of the fresh cheese made from skim milk concentrated by ultrafiltration.

Addition of 0.1-0.3 M sodium chloride to skim milk and casein micelle dispersion (CMD) decreased their heat stability and ethanol stability. The soluble calcium and inorganic phosphate concentrations increased slightly and the content of casein aggregates cross-linked by micellar calcium phosphate decreased from 54.2 to 47.8% when 0.3 M sodium chloride was added to CMD. Addition of sodium chloride to CMD markedly increased the formation of soluble casein on heating CMD at 140°C. The increase in formation of soluble casein was considered to be one of the reasons for destabilization of casein micelles because  $\kappa$ -casein is stabilizer of casein micelles and the main component of the soluble casein formed on heating.

Addition of sodium chloride to CMD retarded rennet coagulation of CMD, and inhibited the release of macropeptide from casein micelles. Addition of 2% sodium chloride to the fresh cheese lowered hardness, breaking energy and elastic modulus. The fine structure of the fresh cheese was observed by scanning electron microscopy. Casein particles in sodium chloride-added fresh cheese were smaller than those in the fresh cheese without added sodium chloride, and formed clusters as well as fibrous network.