

Characterization of buffalo micellar casein concentrate

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Introduction

Casein (CN) Micelles are naturally occurring nano-delivery system for calcium, phosphate and protein for the neonate, synthesized in the udder of animal. Variation in pH, presence of solvents, and level of different salts affects the stability & physicochemical properties of CN micelles.

Aim

Present study was intended to harvest casein micelles in their native state and hence produce micellar casein concentrate. The study of various physicochemical parameters was also done.

Methods

CN Micelles were harvested by microfiltration (MF). The variation in physicochemical properties of skim milk and MCC was studied using particle size analysis, zeta potential (ZP) analysis and transmission electron microscopy (TEM).

Results

Buffalo skim milk of Murrah (Indian) breed was concentrated by MF (0.1µm membrane) to obtain MCC. The average particle size of Buffalo Skim Milk (211.3667 ± 0.89 nm) and that of buffalo MCC (210.366 ± 1.27 nm), indicated that the diameter of CN micelles remains unaltered during process of MF which was verified by TEM analysis. The Buffalo MCC became transparent at 11.48 pH. The magnitude of ZP increased towards negative side during increase of pH. The Effect was more pronounced in MCC than skim milk. Sodium Hexa Meta Phosphate, Tri sodium citrate, Di sodium Hydrogen Phosphate and Sodium Di Hydrogen Phosphate had dissociating effect on CN micelles which followed the order SHMP>TSC>Na₂HPO₄>NaH₂PO₄. The magnitude of zeta potential increased towards negative side as the concentration of these salts was varied from 0 to 2 %. Alcohol (strength varying from 10 to 80 %) caused disintegration as well as aggregation.

Conclusion

This study would be helpful in using MCC as protein source and as a functional ingredient in different food systems. This would also help in predicting stability of MCC at variations in environmental conditions occurring in different food systems.