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β-lactoglobulin isolation from WPC and evaluation of its surfactant properties

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Statement of the Problem: Although whey proteins have been widely known for their functional properties as food ingredients, their surfactant properties such as the Critical Micellar Concentration (CMC) have not been completely characterized. β-lactoglobulin (β-lg) is the most abundant of these proteins and is responsible for the functional properties of whey. Though the use of β-lg is being proposed in new food applications, there is no sufficient information to correlate CMC and functional properties for the native and denatured state. Therefore, the purpose of this study was to develop an easy and inexpensive method to isolate β-lg from a commercial whey protein concentrate (WPC) and to characterize the surfactant properties of these proteins.

Methodology & Theoretical Orientation: β-lg was isolated by a precipitation reaction based on the selective thermal precipitation method and the calcium ion complexation method. The reaction was carried out at pH 4 with phosphoric acid, 55 °C and was followed by centrifugation and microfiltration. The surfactant properties were evaluated as foaming formation and stabilization ability and surface tension variation at different protein concentrations. UV detection and capillary electrophoresis were used to identify and quantify protein concentration.

Findings: The foaming properties of purified proteins were significantly improved in comparison with commercial WPC. The foaming formation ability was 10 times greater for β-lg, whereas the foam stability was increased twenty-fold for native β-lg and thirty-fold for denatured β-lg. The CMC determined for β-lg was 5.43e-04 M (1%) with an IFT of 51.04±1.4 mN/m for the native and 55.90±0.2 mN/m for denatured protein, a rise caused by the increase in viscosity due to β-lg aggregation.

Conclusion & Significance: A simple method for β-lactoglobulin isolation from a commercial WPC is provided. This process significantly ameliorates the foaming properties of β-lg in comparison with the commercial WPC.

Biography

Lorena Espitia-Villanueva is currently a PhD student at the University of Guanajuato in Mexico. She has oriented her research experiences towards natural product isolation and application. Her current research is focused on physicochemical and functional properties of whey proteins and its derivatives.

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