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1 Improvement of rheological and functional properties of Milk 2 Protein Concentrate by hydrodynamic cavitation

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11 Abstract

12 Spray drying at higher solids concentrations improves drying efficiency, and reduces the
13 overall energy cost of milk powder production. As the performance of the evaporator prior to
14 spray drying is limited by viscosity, several methods can be employed to reduce feed
15 viscosity such as thermal pre-treatment or ultrasound. The method employed in this study
16 was hydrodynamic cavitation (HC) on milk protein concentrate (MPC80). Rheological
17 properties of the protein milk were observed to improve, with a reduction in viscosity by 20 %
18 and 56 % upon the application of a cavitation rotor speed of 25 Hz and 50 Hz, respectively,
19 due to the breakdown in protein gel structure and hence a decrease in the elastic modulus of
20 the proteins. While HC did not adversely affect solubility, with the powders having on
21 average a solubility of 97.5 % at a reconstitution temperature of 50 °C, both bulk and tapped
22 density increased when the emulsion was subjected to HC, owing to a reduction in particle
23 size. This study therefore suggests the potential of using HC for a more efficient drying of
24 high solids milk, while maintaining and/or improving the physicochemical properties of
25 powders.

26

27 **Keywords:** Milk protein concentrate, hydrodynamic cavitation, high solids, spray drying

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