OC09 - 25001 - ASSESSMENT OF ELECTRICAL EFFECTS OF OHMIC HEATING ON STRUCTURAL AND IMMUNOREACTIVITY PROPERTIES OF BOVINE BETA-LACTOGLOBULIN

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Abstract

Whey proteins are used as novel structures for the delivery of bioactives due to their excellent functional and nutritional properties; however they are also recognized as a major food allergen. Several studies have been struggling to evaluate the effects of heat on the allergenic potential of whey proteins, but to our knowledge none of them addressed the impact of Ohmic Heating (OH) – an emergent electro-thermal processing technology in food industry - on the function of these molecules. Therefore, this work aimed at establishing an integrated assessment of the effects of OH on physicochemical properties and immunoreactivity of beta-lactoglobulin (b-LG). OH treatments were performed on pure b-LG using different time-temperature binomials – i.e. 65 °C /30 min, 72.5 °C /15 s and 90 °C /1 s. Different OH electrical variables – electric field (20 to 90 V/cm) and frequency (50 to 25000 Hz) - were combined and further assessed. Results from immunoblotting in native page conditions have shown that OH does not change antibody affinity, but drastically changes the pattern of protein aggregation, depending on heating kinetics and electrical variables applied. Fast heating seems to have the ability to reduce protein unfolding (analysed by tryptophan fluorescence) and to preserve more native secondary protein structure (assessed by circular dichroism) thus favouring the appearance of aggregates of low high molecular weight (< 75 kDa). OH performed with a thermal profile similar to that of a conventional heating in concomitance with low frequency (50 Hz) and high electric field (> 60 V/cm) resulted in the formation of large protein aggregates (> 250 kDa). Therefore OH can be used to modulate molecular unfolding and aggregation of b-LG. These different outcomes can in turn change the path of allergic sensitization and allergic response via the intestinal mucosa, depending upon the resistance of these aggregates to gastrointestinal digestion.

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