**Molecular interactions between **-casein and phenolic acids under ultra-high temperature conditions**

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The inclusion of insoluble plant fibres into functional beverage formulations remains a challenge due to the adverse effect on organoleptic properties particularly post ultra-high temperature (UHT) processing. Successfully incorporating insoluble fibres into these formulations would increase both the intake of fibre and the consumption of microconstituents such as phenolic acids that have antioxidant properties and other health benefits. Current literature maintains that the phenolic compounds, present in insoluble dietary fibres, do not irreversibly react with proteins unless in highly basic conditions or in the presence of appropriate enzymes. However, the effect of elevated processing temperatures on the type of interactions taking place has not been thoroughly investigated.

Recent research in this area has shown that phenolic acids appear to interact chemically rather than physically with proteins at elevated temperatures, permanently altering the structure of proteins. Work has only recently begun and probing the effect of UHT on single protein/phenolic systems is an important step towards more successfully including insoluble dietary fibres in beverages.

Through the use of spectroscopic methods, as well as molecular modelling techniques, this research presents for the first time a profile of interaction occurring between hydroxycinnamic or hydroxybenzoic acids and **-casein at 140⁰C. Interestingly, modelling shows the structure of the phenolic acid appears to have a significant effect on the binding site of the protein, with the main bond forming between different amino acid residues depending on ligand structure.

Both protein and phenolic compound are significantly affected by UHT treatment, likely causing a change in their functionality and bio-availability. Therefore, greater knowledge of these molecular interactions is vital for successful formulation of fibre fortified beverages.

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