

Abstract

The effects of ferulic acid (FA) at different concentrations on the aggregation behaviors of gluten and its components (gliadin and glutenin) were determined in this study. Results showed that the free sulfhydryl content of glutenin and gluten significantly reduced while the mean particle size of gluten increased following FA supplementation (0.5%). Moreover, β -sheet content of gluten increased by 20.40% compared with the control group when 0.5% FA was added. Contrarily, higher concentrations (1.0 and 1.5%) of FA significantly reduced tyrosine (TYR) bimodal ratio of glutenin. Furthermore, the concentrations increased the polarity of tryptophan (TRP) residues microenvironment, which promoted the formation of a disordered gluten structure. Additionally, SDS-PAGE showed that 0.5% FA supplementation promoted the formation of high molecular weight gluten by cross-linking and aggregation of low molecular weight gluten components. Using atomic force microscopy, it was confirmed that at 0.5% FA promoted the cross-linking aggregation of gluten molecules. Further, the microscopy analysis showed that higher doses of FA contributed to an uneven distribution of gluten aggregates and a disordered and loose structure of gluten network, which was not favorable for the formation of continuous and stable dough.