Abstract

Mycoprotein is a fungi-derived protein source with filamentous structure that allows for binding ingredients in an emulsion. However, the weaker gel network of fungal filaments requires additional hydrocolloids to achieve commercial qualities. *Aspergillus oryzae*-derived mycoprotein was used to develop meatballs to study the interactions of different hydrocolloids on the texture profile analysis (TPA), color, water holding capacity (WHC), and cooking yield, and optimize the formulation using Response Surface Methodology with commercial meatball as benchmark. Combinations of hydrocolloids used were xanthan gum (XG), sodium alginate (SA), and kappa-carrageenan (KP) at concentration ranges of 0.5%, 1.0%, and 1.5%. The TPA includes hardness, springiness, cohesiveness, gumminess, and chewiness while color, WHC, and cooking yield used colorimeter and gravimetric methods. Central Composite Design was chosen to generate experimental design. Results showed all three hydrocolloids had significant effect on the hardness, chewiness, and WHC of mycoprotein meatball. XG reduces hardness and chewiness by binding water that softens the meatball at high concentrations while SA and KP strengthens hardness and chewiness through gel network with interaction effects also significant. The WHC was near maximum as the hydrocolloids participated in water binding. The predicted formulations optimized for benchmark based on hardness were 1.60% XG, 0.51% SA, 1.18% KP and 1.66% XG, 1.44% SA, 0.51% KP. Model validation confirmed the predicted formulation results were within 95% prediction interval and low relative error. This research provided insights on combined hydrocolloid interactions and predicted formulations for mycoprotein-based meat analogue.

Keywords: *Hydrocolloid, mycoprotein, meatball, formulation, response surface methodology*