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Technological Properties of Beef Emulsions Prepared with a Novel Processed Potato Ingredient (O'Brien's Best)

B. M. Bohrer[1]*

[1]Department of Food Science, University of Guelph, Guelph, ON, Canada
*Corresponding author. Email: bbohrer@uoguelph.ca (B. M. Bohrer)

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Objectives

The processed potato ingredient tested in this study was a commercially available ingredient (O'Brien's Best; Botaniline Foods, LLC) that consists of skinned, sliced potatoes that were cooked to an exact time/temperature to enhance physiochemical properties. The objective of the study was to assess the technological properties of beef emulsion modeling systems prepared with the novel processed potato ingredient (O'Brien's Best).

Materials and Methods

The meat used in this study was lean ground beef from one master batch of beef that was targeted to 90% lean and 10% fat. The meat batter formulations contained 20% water, 6.15% spice/seasoning, 0.18% Prague powder, and 0.0035% sodium erythorbate, and varying quantities of sodium tri-polyphosphate, salt (NaCl), and binders (processed potato, tapioca starch, or all-purpose binder). In total, eight treatments were formulated and manufactured on three separate, independent occasions (N = 24 experimental units; n = 3 replications). Three treatments were formulated with the novel processed potato ingredient (formulated without phosphate, 0.635% NaCl, and either 5, 10, or 15% the processed potato ingredient). Three treatments were formulated with commercially sourced tapioca starch (formulated without phosphate, 0.635% NaCl, and either 5, 10, or 15% commercial tapioca starch, which was tested to be 78% starch purity). Two treatments were formulated with a commercial formulation [formulated with 0.30% sodium tri-polyphosphate, 10% all-purpose binder (a multi-ingredient proprietary blend binder from Herman Laue Spice Company Inc.; Uxbridge, Ontario), and 1.905% NaCl, or 1.270% NaCl]. Parameters tested were cooking loss, proximate composition of cooked meat batters, texture profile analysis of cooked meat batters, and instrumental color of uncooked and cooked meat batters. Data were analyzed with the GLIMMIX procedure of SAS v9.4 with a fixed effect of treatment and a random effect of replication. Least square means were separated using the PDIFF option with a Tukey-Kramer adjustment. Differences were considered statistically different at $P < 0.05$.

Results

Cooking loss was not different ($P = 0.44$) among treatments and ranged from 0.64% to 0.77%, indicating acceptable stability for all emulsion formulations in the study. Proximate composition revealed significant differences ($P < 0.05$) in moisture, protein, ash, and other components (carbohydrates), while lipid content was unaffected. Texture profile analysis revealed that textural properties were generally unaffected ($P > 0.05$) by treatment, with the exception of less gumminess ($P < 0.05$) and less chewiness ($P < 0.05$) in processed potato formulated emulsions compared with the tapioca starch and commercially formulated emulsions. Instrumental color of uncooked emulsions was affected to a greater degree than instrumental color of cooked emulsions. Yet, when tapioca starch was included at high levels (> 10%) in cooked emulsions lightness (L*) and yellowness (b*) were greater ($P < 0.05$) compared with emulsions formulated with the processed potato ingredient and with the commercial formulations.

Conclusion

In summary, the technological properties (cooking loss, texture profile analysis, and instrumental color) of beef emulsion systems were largely unaffected by the processed potato ingredient (despite removal of phosphates and less NaCl) and performed similar to the commercial formulations.