



The Effect of Breadfruit (*Artocarpus altilis*) Flour on Color of Comminuted Beef Compared with Other Flour Sources

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Objectives

Novel, non-allergenic ingredients with properties that improve the quality of processed meat products are needed for the meat industry. The objectives of this study were to investigate the effect of breadfruit (*Artocarpus altilis*) flour on color of comminuted beef compared with other flour sources.

Materials and Methods

Flour sources included breadfruit, corn, soy, tapioca, and wheat. All flours were obtained commercially and were unmodified. Lean beef (from the same commercially sourced batch targeted to 90% lean and 10% fat), 10% ice, 1.5% salt, and flour sources at two inclusion levels (2.5% and 5%) were mixed using a bowl chopper to prepare beef patties for evaluation. The ground beef was manufactured into 115 g patties that were placed on a retail display shelf under continuous LED lighting at 4°C for 7 d. Lighting was measured periodically during the study and LUX was ensured to be between 1612.5 lux and 2152.0 lux. Objective CIE L* (lightness), a* (redness), and b* (yellowness), chroma, and hue scores were collected with a Minolta CR-400 Chroma meter (Konica Minolta Sensing, Inc., Osaka, Japan) utilizing a D65 light source and a 0° observer with an aperture size of 8 mm on each day of the simulated retail display. This study was conducted in three independent replicates for each treatment. Statistical analyses for parameters (L*, a*, b*, chroma, and hue) were conducted using the MIXED procedure of SAS with fixed effects of flour source*inclusion level, day, and their interaction. Least square means were separated using the PDIF option with a Tukey-Kramer adjustment. Differences were considered statistically different at $P < 0.05$.

Results

The interaction of storage day and treatment significantly ($P \leq 0.001$) affected a*, b*, chroma, and hue. There was not an interaction of storage day and treatment for L*. Both the main effect of storage day and the main effect of treatment significantly ($P < 0.01$) affected all the attributes measured in this study. Mean L* over the display period of beef patties prepared with 2.5% breadfruit flour were not different ($P = 0.95$) compared with control samples. There was no significant difference between the mean hue over the 7-d display period of the beef patties prepared with 2.5% breadfruit flour compared with control samples. a* decreased at different rates for each treatment throughout the display period. Beef patties prepared with 2.5% and 5% breadfruit flour were redder (greater a*; $P < 0.05$) compared with other treatments and control samples over the 7-d display period. To the contrary, a* values of beef patties prepared with soy flour were less than ($P < 0.05$) other treatments and the control samples on Day 0 and Day 1 and remained constant at lower values as the display period increased.

Conclusion

Breadfruit flour improved the redness of comminuted beef products immediately and prevented discoloration for a longer period. The results indicate that breadfruit flour can effectively improve initial color and stability of color in processed beef products. More research is warranted to further investigate the mechanism of action of breadfruit flour in governing the color properties of comminuted beef products.