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Potential for Rice Bran Wax and Soybean Oil Oleogels as a Pork Fat Replacement in Frankfurters

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Objectives

The objective of this study was to evaluate the potential of rice bran wax/soybean oil oleogels as pork fat replacements in frankfurters.

Materials and Methods

Frankfurters almost entirely devoid of animal fat were produced using the following lipid replacement strategies: 1) soybean oil (SBO); 2) oleogel made with soybean oil and 2.5% rice bran wax (2.5 RBW); 3) oleogel made with soybean oil and 10% rice bran wax (10 RBW); and 4) oleogel made with soybean oil and 2.5% rice bran wax added later in the chopping step of the frankfurter batter (RBW/LS). Frankfurters produced with pork backfat were used as a control (PF), and all 5 treatments were targeted to 21% lipid.

Results

Replacing pork fat did not influence emulsion stability or cook/chill yield of the frankfurters. Color L*, a*, and b* values revealed PF to be significantly darker ($P < 0.05$) than SBO, 2.5 RBW, and 10 RBW, and significantly redder ($P < 0.05$) than all other treatments. Texture Profile Analysis showed that PF and oleogel-containing treatments were similar in firmness and springiness, but SBO was significantly different ($P < 0.05$) from PF in these attributes. PF offered less resistance to puncture than all other treatments ($P < 0.05$), as measured by an incisor probe. According to a trained sensory panel, cured frankfurter aroma was not affected by pork fat replacement, but cured frankfurter flavor was significantly reduced ($P < 0.05$) when pork fat was substituted. 10 RBW had higher lipid oxidation values, but these remained consistently low throughout the entire study and were not detected by the sensory panel. Microstructural image analysis revealed that PF and 10 RBW both had a significantly greater ($P < 0.05$) proportion of fat globules larger than 100 mm^2 when compared to all other treatments, indicating that a stronger oleogel may be necessary to more closely resemble pork fat after frankfurter processing.

Conclusion

In conclusion, rice bran wax/soybean oil oleogels have potential to produce frankfurters with similar technological quality, instrumental texture values, oxidative stability, and microstructural features as those made with pork fat. Future research should focus on optimizing this technology by examining the behavior of different types of oleogels under different comminution conditions.

