IMPROVEMENT OF PROTEIN FUNCTIONALITY AND GEL-FORMING ABILITY IN FAT-REDUCED PORK HOT DOGS USING HOT-BONING AND COLD-BATTER MINCING TECHNOLOGY

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I. OBJECTIVES

Cold-batter mixing of meat is an emerging technology that can be used to improve protein functionality and gel-forming ability for fat reduction in pork hot dogs. When mixing meat batters at near-freezing temperatures, it is postulated that internal residues of hydrophobic protein are subtly twisted outward and exposed to the surface during the cold mixing, thereby improving protein functionality and gel-forming ability. The purpose of this research was to generate low-fat hot dogs without textural quality loss using the cold-batter mixing technology of hot-boned (HB; or pre-rigor)/crust-frozen muscle.

II. MATERIALS AND METHODS

Ham muscles of eviscerated pork carcasses were subjected to either HB/crust-freeze-air-chilling or chill-boned (CB)/crust-freeze-air-chilling. The muscles were then minced in a bowl chopper for 9 min for control batters using 2% salt, 2% starch, 20% backfat, and 16% ice, whereas low-fat batters were similarly minced using the same ingredients except using 0% backfat and 36% ice. Protein solubility was determined using the method of centrifuge force and filtration. Sulphydryl content was measured using Ellman's reagent and molar extinction coefficient. Data in 4 replications were evaluated by one-way analysis of variance, using the PASW 18 statistics program and a completely randomized design. A post hoc analysis was performed using Duncan's multiple range test to evaluate difference among treatments at $P < 0.05$.

III. RESULTS

During cold-batter mincing, more protein was solubilized from HB batters than CB batters, regardless of fat content. After mincing, the values of surface reactive and total sulfhydryl contents in HB batters were lower than CB batters, indicating that the proteins of HB gels were less denatured than those of CB batters. During batter heating, higher storage modulus (G') and higher loss modulus (G") were observed in HB batters than CB batters up to 60°C, except the G' of CB control-fat gel after 60°C. These results were expected due to more extracted protein, less protein denaturation, and more protein–protein interaction in HB batters than CB batters.

IV. CONCLUSION

Based on these results, the combination of HB/crust-freeze-air-chilling and cold-batter mincing technologies can produce low-fat hot dogs without textural quality loss via the improvement of protein extraction, protein functionality, and gel-forming ability over the cold-batter mincing of CB muscle ($P < 0.05$).

Keywords: crust freezing, cold-batter mincing, hot-boning, low fat, protein functionality