



Use of Beef Collagen in Beef Hot Dogs

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Objectives

The use of protein ingredients in meat products is becoming increasingly popular to increase protein levels, as a meat substitute due to its lower cost compared to meat, improve product texture, increase cook yields or to enhance final product flavor. Beef collagen comes from the corium layer of beef hides is an allergen-free, functional protein ingredient which can replace some or all of the traditional binders and other Group 2 protein ingredients like mustard (a declared allergen in Europe and Canada) in meat products. Beef collagen can also be used to replace meat to provide cost savings. Beef collagen is USDA/FSIS approved and listed on Directive 7120.1 for various comminuted meat products where binders are permitted not to exceed 3.5% of product formulation. The objective of this study was to evaluate quality characteristics of beef hot dogs by utilizing beef collagen with or without mustard flour as a Group 2 protein to maximize the added water.

Materials and Methods

Three treatments of beef hot dogs were formulated: Control with 0.6% mustard flour (added water = 8.78), TRT 2: 0.6% mustard flour + 0.4% Beef collagen + 1.37% additional water (added water = 8.78), TRT 3: 1.01% Beef collagen + 2.83% additional water (added water = 10). Lean beef with 10% fat, salt, sodium phosphate, sodium nitrite, sodium erythorbate and half the water/ice were chopped in a bowl chopper to a temperature of 12°C. Beef with 50% fat, rest of the dry ingredients and the remaining water were added to the bowl chopper and chopped until the temperature reached 21°C. The emulsion was stuffed into a 22 mm diameter cellulose casings and cooked in a smokehouse to an internal temperature of 71.6°C. Hot dogs were stabilized

using USDA Appendix B guidelines, peeled, vacuum packaged and stored in a cooler at 4°C for 120 d.

Hot dogs were evaluated for cook yield by difference in weight before and after cooking, texture profile analysis (TPA) using a Texture Analyzer equipped with a 1-cm diameter stainless steel probe, with compression setting to 30% of hot dog of 2.54-cm height. TPA was measured on hot dogs that were warmed on a Model 12 Star Roller Grill set on medium heat for 15 min. Interior color (L, a, and b values) was measured using a handheld Hunterlab color reflectance meter equipped with a D65 Optical Sensor. Purge was measured by difference in weight of product and weight of liquid expelled in the package over 12 wk of refrigerated storage of vacuum packaged hot dogs. The study was replicated three times and statistical analysis was performed using ANOVA ($P < 0.05$) with StatView for Windows.

Results

Cook yields were significantly ($P < 0.05$) higher for TRT 2 and TRT 3, compared to control. The hardness, gumminess and chewiness values were significantly ($P < 0.05$) higher for TRT 2, but not significantly ($P > 0.05$) different for TRT 3 compared to control. Hunterlab interior L values were significantly ($P < 0.05$) higher for the test treatments compared to the control. Hunterlab a and b values were not significantly ($P > 0.05$) different for any of the treatments. Purge was significantly ($P < 0.05$) lower for all test treatments compared to control over 12 wk of refrigerated storage of vacuum packaged hot dogs.

Conclusion

Beef collagen is an allergen-free functional Group 2 protein ingredient that can be used to replace other protein ingredients or meat to increase cook yields, reduced purge and improve texture in comminuted meat products.