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Evaluation of Citrus Fiber as a Natural Alternative to Sodium Tripolyphosphate in Alternatively Cured Bologna

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Objectives

Consumers are currently driving the demand for "clean labels" and the elimination of ingredients from their further processed foods that are perceived as unnatural or unhealthy. The meat industry is not exempt from these growing trends and is one of the major industries attempting to meet the consumers demand. Most of the focus has been on eliminating nitrite/nitrate, ascorbate/erythorbate, and phosphates from processed meat. It is well established that cultured celery juice powder and cherry powder can serve as natural alternatives to sodium nitrite and sodium ascorbate/erythorbate, respectively. However, little research has been published on a natural alternative to conventional phosphate in processed meat products. The objective of this research was to evaluate the functionality of citrus fiber as a natural alternative to sodium tripolyphosphate in alternatively cured bologna.

Materials and Methods

Effects of citrus fiber on cook and chill yield, rancidity (TBARS), texture (simplified TPA measuring hardness, adhesiveness, resilience, cohesion, springiness, gumminess, chewiness), color (Hunter L, a, b, on samples in both lighted, simulated retail display (RD) and samples with no light exposure), and sensory properties of an alternatively cured, all-pork-bologna throughout a 98-d shelf life (1°C) was investigated. The bologna (target fat ~27%) was assigned to 1 of 5 treatments: positive control (phosphate), negative control (no phosphate/no citrus fiber), 0.50% citrus fiber treatment, 0.75% citrus fiber treatment, or 1.00% citrus fiber treatment. All treatments were replicated 3 times. Proximate analysis was conducted once for each replication. All other parameters were analyzed at d 0, 14, 42, 70, and 98. Statistical analysis was conducted in SAS (SAS Inst. Inc., Cary, NC) using the mixed procedure.

Results

Cook and chill yields, TBARS, Hunter a, L (RD), a (RD), adhesiveness, gumminess, chewiness, bologna aroma, bologna flavor, off flavor, and sensory color (light to dark) were not significantly different across treatments ($P > 0.05$). Hunter L values were significantly different ($P < 0.05$) between the negative control and the 0.50% citrus fiber treatment. The 0.50% citrus fiber samples were slightly darker than the no phosphate control. All 3 citrus fiber treatments had higher Hunter b and b (RD) values and were significantly different ($P < 0.05$) from the positive and negative controls. This is most likely due to the yellow coloring of the citrus fiber. The hardness of the 1.00% citrus fiber treatment was significantly higher ($P < 0.05$) than all other treatments. Resilience and cohesion for all citrus fiber treatments and springiness for the 0.50% citrus fiber treatment were significantly lower ($P < 0.05$) compared to the positive control. The positive and negative controls were significantly higher than the citrus fiber treatments for moistness ($P < 0.05$) and the positive control had significantly higher texture scores, were firmer, than the other treatments ($P < 0.05$).

Conclusion

Overall, citrus fiber did not negatively affect the physical, chemical, or sensory characteristics of the alternatively cured bologna. These results indicate that citrus fiber has potential to serve as a natural alternative to phosphate in processed meat products.

