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Utilization of Phosphate Alternatives in Chunked and Formed Deli Ham and Marinated Chicken Breast

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Objectives

Consumer demand for clean ingredient labels has led to research into natural alternatives to synthetically derived functional ingredients. Phosphates, including sodium tripolyphosphate, have been reported as an undesirable additive in meat products by some consumers. Phosphates are used by meat processors to increase yields, improve texture, and protect flavor. The objective of this research was to determine if the addition of phosphate substitutes including oat fiber, oat fiber with dried vinegar, and whey protein concentrate are viable natural alternatives to phosphate in ready-to-eat (RTE) marinated chicken breast.

Materials and Methods

Broiler breast meat (0.19 to 0.25 kg per fillet) was marinated with formulations containing 1.0% NaCl and 0.4% sodium tripolyphosphate or a phosphate substitute treatment and water. The treatment variables consisted of positive phosphate, negative phosphate, whey protein concentrate (WPC), oat fiber, or oat fiber with dry vinegar. Treatments were vacuum tumbled at 25 mm hg for 30 min at 8 rpm with 0.91 kg of brine solution and 7.8 kg of chicken breast. Samples were measured for percent pickup of brine, cooking loss, pH, color, and instrumental tenderness. Sensory evaluation was conducted (n = 180 total panelists) to evaluate the appearance, aroma, texture, flavor and overall acceptability of chicken breast treatments. A randomized complete block design with 3 replications was used to test the effect of adding whey protein concentrate, oat fiber, and oat fiber DV on quality parameters and sensory acceptability of chicken breast. Duncan's multiple range test was utilized to separate the treatment means when significant differences occurred ($P < 0.05$).

Results

Phosphate treatments yielded breast meat with less ($P < 0.05$) cooking loss and a greater pH than the negative control and phosphate substitute treatments. No differences existed ($P > 0.05$) among treatments with respect to brine pick up and shear force. On average, no differences existed ($P > 0.05$) in consumer acceptability for appearance, texture and overall acceptability, with all mean values between like slightly and like moderately on the 9 point hedonic scale. Furthermore, 82% of panelists rated the positive phosphate treatment at least like slightly. The oat fiber treatment was liked slightly or greater by 77% of panelists, while 74% of panelists rated the whey protein concentrate treatment at least like slightly or greater. Both the oat fiber with dry vinegar and negative phosphate treatments were like slightly or greater by 68% of panelists. This indicates that formulating whey protein concentrate, and oat fiber into chicken marinades can effectively increase the percentage of panelists that like chicken breast as compared to the negative phosphate treatment

Conclusion

Whey protein concentrate and oat fiber have potential as phosphate alternatives in marinated chicken breast. Future research should be explored to determine ingredients that can increase negative charges on myofibrillar proteins to maximize yield and functionality for use in conjunction with oat fiber and whey protein concentrate as a potential phosphate replacer in meat systems.

