

Project Summary

Application of a Collagen-based Functional Beef Protein to Reduce Purge from Enhanced Beef Subprimals

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**Study Completed
May 2010**



Funded by The Beef Checkoff

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Background

Sodium reduction and “clean labeling” have recently become high-profile issues for the food industry. In order to off-set the loss of fluid that occurs when fresh meat is placed in a package and to produce a product with consistent eating quality, many fresh meat products are injected with brines containing salt and sodium phosphate. Although this practice does provide consumers with a more consistent performing product, it also reduces the nutritional quality of the product through the increase of sodium. There is not a lot of literature available that gives processors guidance regarding the extent of fluid loss from injected fresh beef when levels of salt and phosphate in brines are varied. Therefore, one purpose of this study was to predict fluid loss from beef loin steaks injected with brines containing 0-3.6% salt and 0-4.5% sodium phosphate. In addition, there has been a pork-based water binding ingredient developed for the pork industry to replace sodium phosphate in brines. The addition of this ingredient in conjunction with the removal of phosphates provides pork processors the opportunity to create a product with a clean label statement (pork, salt, and water) with essentially 50% less sodium. A similar product for beef has recently been developed, but is not yet commercially available. Therefore, another purpose of this study is to evaluate beef loin steaks injected with brines formulated with the beef-based water binding ingredient.

Methodology

Brines with 0-3.6% salt and 0-4.5% sodium phosphate were injected into Select beef loins. Brines were targeted to be injected at 10% total weight. Loins were sliced into steaks and packaged. Sliced and packaged steaks were first stored in the dark for 4 days to mimic transportation. Half of the steaks then were placed for 6 days under lights in conditions intended to replicate storage in a grocery store-style meat case. The other half of the steaks were measured for fluid loss as soon as they were pulled from dark storage. Data then was analyzed to produce an equation that allows processors to calculate fluid loss when salt is varied between 0-3.6% and sodium phosphate is varied between 0-4.5% in the brine formulation. Equations also were constructed for fluid loss when the brines had the beef-based water binding ingredient added. Finally, loins were injected with either a commercially-formulated brine containing 3.6% salt and 4.5% sodium phosphate or a brine containing 3.6% salt, no phosphate and 5% beef-based water binding ingredient. Steaks were cut from loins and the steaks from the two treatments were packaged, stored in the dark and then placed under lights as stated previously. Steaks were sampled on the day they went under lights (d0) and days two, four and six. Steaks that were sampled were evaluated for fluid loss, color, sensory, shear force, rancidity, composition and microbiological characteristics.

Findings

Equations were generated that predict fluid loss from brine-injected beef loin steaks. Both two and three dimensional graphs were created to give visual representation of the prediction equations. Results demonstrated the beef-based water binding ingredient significantly reduced the loss of fluid that occurred in the first 30 minutes after meat injection. In addition, product injected with a brine that had the phosphate replaced with the beef-based water binding ingredient performed well when compared to product injected with a commercially-formulated brine. In general, steaks injected with a brine containing the beef-based water binding ingredient retained more fluid throughout their

storage. In addition, these steaks also had better beef flavor, did not have as much off-flavor, were noticeably less salty and were rated higher in terms of muscle color. However, steaks treated with the commercial brine performed better in terms of juiciness and tenderness. This is likely because these steaks experienced less fluid loss as a result of cooking.

Implications

Results from this project give processors tools to create lower sodium and/or cleaner-labeled, brine-injected fresh beef products.



Beef-based water binding ingredient (DBP)

Brine with DBP.

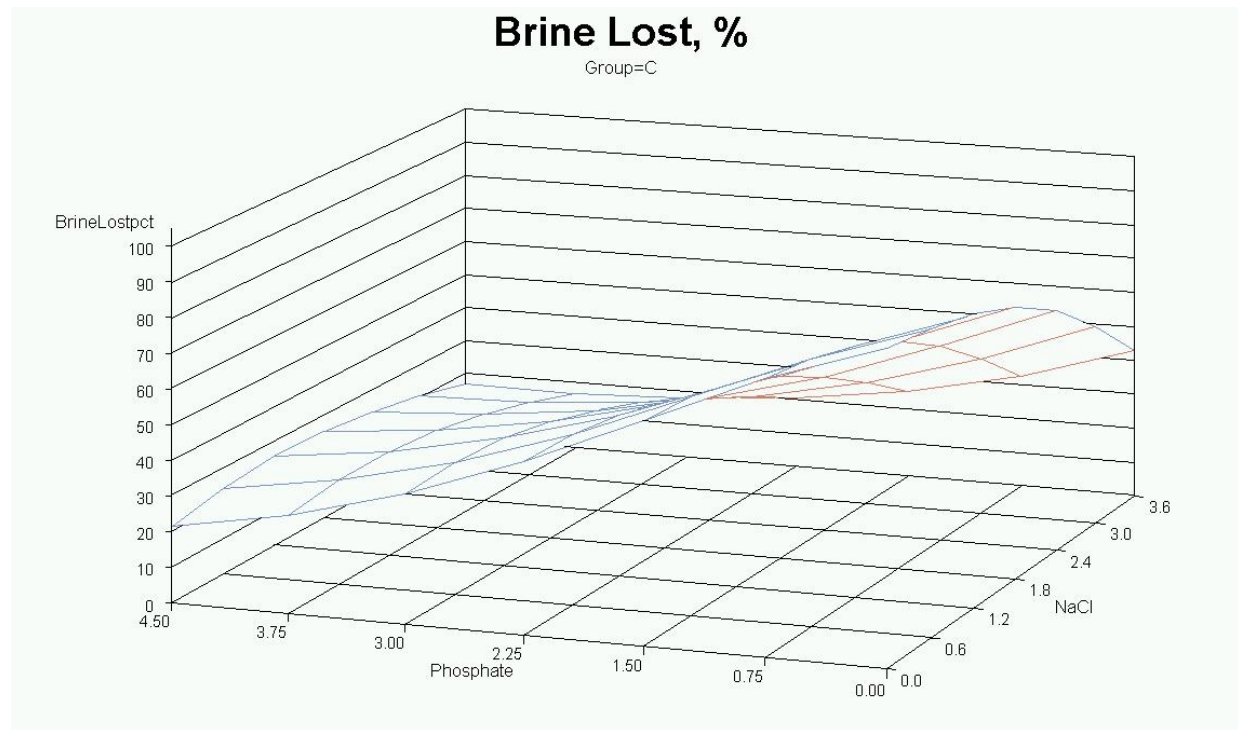


Figure 1. Predicted % brine loss in injected Select beef loins steaks when salt and phosphate are varied in the injection brine.

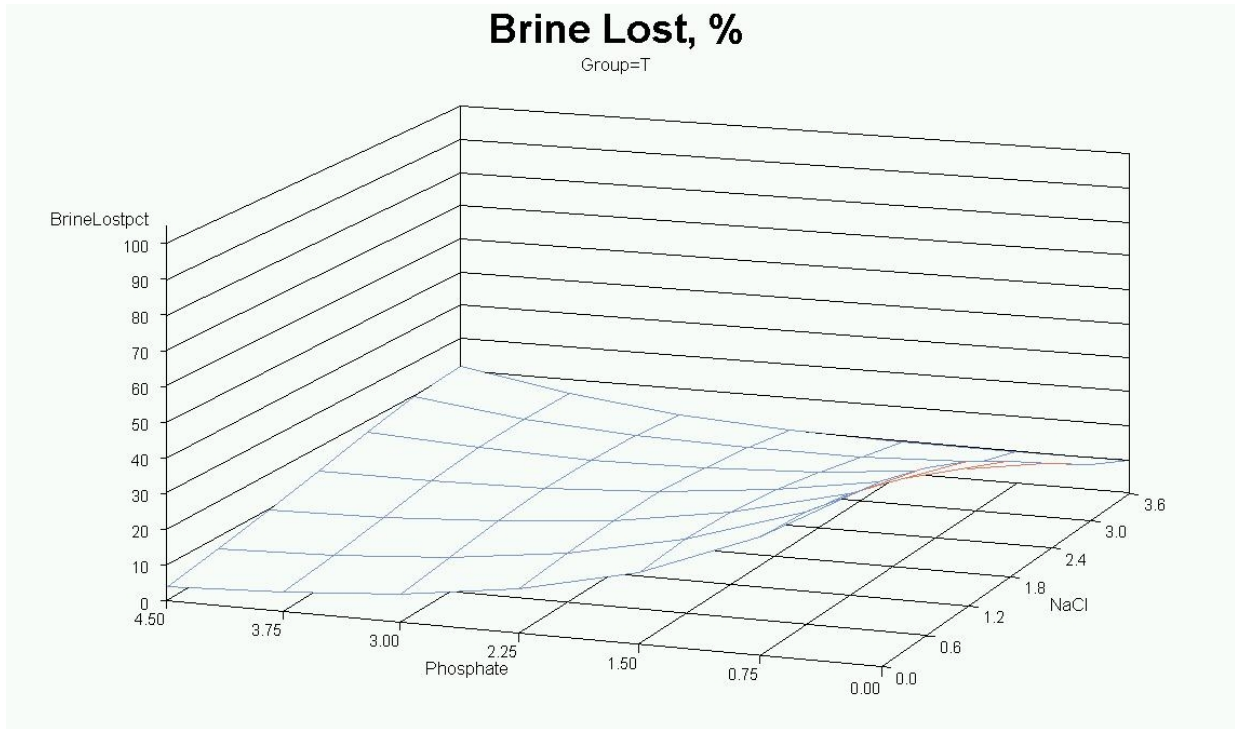


Figure 2. Predicted % brine loss in injected Select beef loin steaks when the beef-based water binding ingredient (DBP) was added at a level of 5% to injection brines formulated at varying levels of salt and sodium phosphate.

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