

Project Summary

Effects of Muscle Type, Enhancement and Cooking Technique on Selected Underutilized Beef Cuts

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Background

The objective of this research was to determine the effect of marinating and cooking method as a way to add value to underutilized beef muscles from USDA Select (A and B maturity) and Commercial grade or lower (C to E maturity) carcasses.

Enhancing underutilized beef muscles, especially from lower-grading carcasses, offers beef processors an opportunity to add value, while at the same time increasing the likelihood that consumers will have a consistent and enjoyable eating experience. To ensure future demand for beef products, especially for underutilized cuts, this area of research provides significant opportunities.

Methodology

USDA Select and USDA Commercial or lower beef rounds (IMPS/NAMP 167A, *vastus lateralis*) and Chuck Rolls (IMPS/NAMP 116A, *serratus ventralis*) were obtained from commercial processing facilities. All of the muscles were fabricated into approximately 0.49 kilogram pieces, and with the exception of the control group, were injected to 112 percent of their original weight with one of three marinades: 1) a commercial marinade (Dale's Seasoning, Birmingham, Ala.), 2) a 50:50 mixture of the commercial marinade and red wine or 3) red wine. The injected muscles were vacuum packaged in "cook-in" bags and were allowed to marinate for approximately 16 hours. The muscles were water-cooked until they reached an internal temperature of 82.14°C. (180°F). The cooked products were randomly assigned to a storage time of either seven or 60 days.

Thiobarbituric acid reactive substances (TBARS) assays, an indicator of oxidative rancidity (i.e. "warmed-over flavor"), were performed at seven and 60 days of refrigeration.

After either seven or 60 days of refrigeration, the samples were evaluated by a trained sensory panel for appearance, flavor, tenderness, juiciness, warmed over flavor and grassy flavor on a 15-point scale where 15 was extremely desirable. An overall rating on a scale of one to nine was also assigned to each sample. All of the precooked samples were reheated by steeping in boiling water.

Marinade retention was evaluated by obtaining cooked product yields. Immediately after reheating each sample for sensory evaluations, the roasts were removed from the cook-in bag, drained weight determined and final cooked yields calculated based on the initial nonmarinated weight.

All of the samples were also evaluated for tenderness using Warner Bratzler shear force (WBSF) after being reheated for the sensory evaluations.

Findings

There was no difference in TBARS or rancidity among the treatment groups. Only the unmarinated or control steaks showed a significantly higher level of rancidity, which indicated that the marinades used singly or in combination helped retard the development of rancidity in these beef cuts.

Beef cuts from the chuck from the older-age grass fed animals had a higher cooked yield than the USDA Select chucks. This result was as expected as the Select grade cuts of beef would have more yield loss due to higher levels of external and intramuscular fat. There were no differences in cooked yield due to the marinating treatments.

There were no significant differences in tenderness in the chucks due to the marinade treatments. The knuckles treated with the marinade or the combination of the marinade and wine did exhibit lower shear force values indicating that the commercial marinade could have some tenderizing effect.

Sensory evaluations conducted at seven and 60 days of refrigerated storage found that panelists rated the steaks marinated with the commercial marinade higher in flavor than the other treatment groups for the chuck. The commercial marinade treatment alone and combined with wine scored more favorably among sensory panelists for attributes of juiciness, warmed over flavor, grassy flavor and overall satisfaction.

Although statistical differences did exist for knuckle sensory attributes, the numerical values were extremely similar and did not demonstrate much practical significance. Numerically, the commercial marinade treatment alone or combined with wine received higher flavor scores for knuckles from both the older animals, as well as beef from USDA Select carcasses.

Implications

Based on this research, the application of a marinade did improve quality attributes for cuts from the chuck and round from lower grading carcasses. This project demonstrates that there are opportunities to add value and increase the quality and consistency of beef cuts from lower quality carcasses or older animals.

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