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Abstract

Restructured, pre-cooked roasts were prepared from four hot-boned USDA Utility grade cow carcasses. Before forming the roasts, meat was either blade tenderized, manually trimmed of large connective tissue deposits, or both blade tenderized and trimmed. Control roasts received neither treatment. Although trimming minimized the negative effects of connective tissue, blade tenderization was frequently as effective, and sometimes superior, and minimized the high labor costs and shrink losses associated with manual trimming.

Keywords

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Methods of Tenderization for Value-Added, Hot-boned, Restructured, Pre-cooked Roasts from Cows

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Summary

Restructured, pre-cooked roasts were prepared from four hot-boned USDA Utility grade cow carcasses. Before forming the roasts, meat was either blade tenderized, manually trimmed of large connective tissue deposits, or both blade tenderized and trimmed. Control roasts received neither treatment. Although trimming minimized the negative effects of connective tissue, blade tenderization was frequently as effective, and sometimes superior, and minimized the high labor costs and shrink losses associated with manual trimming.

Introduction

As a consequence of age-associated problems with tenderness, much of the beef from older animals is currently used as ground beef or raw material for sausage. If the palatability of beef from older animals could be improved to a level comparable to that from younger carcasses, it could be marketed more flexibly.

Blade tenderization is one of the most effective mechanical meat tenderization methods. It reduces the effects of connective tissue and may make cuts from older animals comparable in tenderness to those from younger animals.

There are economic pressures to minimize processing cost, maximize product palatability, and develop new high quality meat products using less valuable carcasses and carcass portions. The overall concept of restructured meat includes the utilization of less expensive beef cuts to manufacture a product that provides satisfactory roast- or steak-like eating qualities at a low unit cost.

Improving the energy, labor, and yield efficiencies of beef processing are major goals of hot boning. Some potential advantages of hot boning include: 1) facilitating centralized processing, 2) reducing cooler space and energy needs, 3) improving yields, 4) reducing labor, and 5) improving the emulsifying properties of the product.

This investigation was designed to evaluate the effects of blade tenderization and manual trimming of large connective tissue deposits on restructured, pre-cooked roasts from hot-boned cow carcasses.

Experimental Procedures

Sample preparation

Muscles were removed from both sides of four USDA Utility grade cow carcasses within 1 hr postmortem. All muscles from one side were trimmed of exterior fat, blade tenderized three times, cut into pieces (approximately 8.0 x 10.0 cm), mixed, and divided into two batches. One batch was manually trimmed of large connective tissue deposits, whereas the companion batch was not trimmed. Muscles from the other side were treated identically, except they were not blade tenderized. This resulted in four treatment batches: 1) blade tenderized and trimmed, 2) blade tenderized and non-trimmed, 3) trimmed only, and 4) a non-trimmed control. The pieces from each batch were coarsely ground through a three-hole kidney plate yielding irregular chunks of approximately 4.0 x 1.9 cm. Ten percent by weight of each batch was reground through a 0.64 cm plate. Fat content was standardized at 10%.

The individual batches were placed immediately into a mixer with 1.5% salt and 0.25% sodium tripolyphosphate for 6 min of pre-blending at 1°C. After pre-blending, the individual treatment batches were placed in a vacuum paddle mixer and mixed under vacuum (686 mm Hg) for 7 min. Then, the ground fat component was added to each batch to achieve a final fat content of 10%, and vacuum mixing continued for an additional 7 min. The order of pre-blending and vacuum mixing of product from each treatment was randomized to eliminate variation in the time postmortem before blending and mixing. To form the restructured roasts, the product was stuffed through a 5.1 cm horn into 20.4 x 81.6 cm fibrous pre-stuck casings. Casings were compressed and clipped using a Polyclip device, and the resulting roasts were individually weighed.

Cooking procedures

Roasts were steam cooked in a smokehouse to an internal temperature of 62.8°C (145°F) during a three-stage heating cycle. Roasts were weighed, chilled for 24 hr at 1°C, and reweighed prior to being frozen. Maximum frozen storage time was 1 mo before taste panel evaluation. Subsequent analyses were performed after an overnight thawing period at 1°C.

Analyses

Samples were evaluated for pH, taste panel traits, connective tissue content, and Instron textural measures.

Results

Roasts from beef trimmed of large deposits of connective tissue were more palatable and more tender as measured by an Instron tester, had smaller cooking losses and less connective tissue, and were less variable compared with treatments involving no trimming. However, the treatment involving blade tenderization and no trimming was frequently equal, and in some cases superior, to trimmed treatments, considering taste panel traits, peak yield, and product uniformity. As Instron measures increased, taste panel scores for tenderness became less desirable and total connective tissue content increased. Greater cooking losses and total connective tissue values were associated with less desirable perceptions by the taste panel of tenderness, juiciness, and overall acceptability.

Even though blade tenderization was less effective than trimming of connective tissue, for some restructured, value-added products, it may be a viable alternative to trimming, since it is much less labor intensive and does not reduce product yield.

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Restructured, Value-Added Meat Products

Restructuring meat isn't new. Sausage is a good example of a restructured product, and it's been around for years! To make a restructured product, meat is ground, chunked, flaked, sliced, or treated in some other way to subdivide it into smaller particles. Then the particles are physically re-formed into items that resemble steaks, roasts, bacon -- items that the customer can identify. But why take meat apart and put it back together? The subdivision process tenderizes the meat, allowing use of less tender carcass parts, or parts of older, less tender carcasses. In the process, value is added. What would have been sold as hamburger can be sold at a higher price. Generally, a small amount of salt is added to extract protein and bind the product together. But for customers that should minimize their salt intake, new techniques are being developed to allow restructuring without adding salt. Product composition can also be changed. For example, the fat content can be adjusted to satisfy today's calorie-concious consumer.

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