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Improving the quality of cow steaks

Project Title:	
Use of Glycolytic Inhibitors to Improve Beef Tenderness	
Researchers:	
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Background

Much of the beef from mature cattle (D or E grade) is used for grinding because it is darker and tougher than beef from youthful, grain-fed cattle. Processing methods that overcome the inconsistent quality and tenderness of the steaks and roasts from older animals would potentially increase their appeal to casual dining and fast food restaurants. Two of these potential interventions are glycolytic inhibitors and modified carcass chilling.

Muscle cells continue to live for some time after an animal dies. This process (called glycolysis) produces lactic acid. When the muscle becomes more acidic, muscle proteins cannot bind as much water. This ultimately changes the color, texture and tenderness of beef. Glycolytic inhibitors are substances that slow this process, decrease lactic acid production, increase the water-holding capacity of the muscle, enhance moisture content and improve beef tenderness.

Carcass chilling and boning methods can also affect tenderness. Most packing plants chill carcasses for 24 hours before boning. Some researchers have suggested that hot-boning (removing muscles from the skeleton before chilling) can improve the tenderness of youthful beef.

Objective

To evaluate if hot-boning and glycolytic inhibitors can improve the appearance and eating quality of cull cow beef.

What they did

This two-year study used 134 cows up to 17 years of age. One side from each carcass was hot-boned and the other side was chilled conventionally. Several food-grade glycolytic inhibitors (moisture enhancements) were compared in steaks from the strip loin and inside round (Year 1) and steaks from the ribeye and outside round (Year 2). After 14 days of aging, the steaks were

cooked and used in shear force and taste panel tests. Shear force is a mechanical measure of toughness; decreased shear force indicates improved tenderness. Conventionally chilled, non-enhanced AA and AAA striploin and ribeye steaks from youthful, grain-finished cattle were included in the study for comparison purposes.

What they learned

Different combinations of chilling methods and moisture enhancement strategies improved the tenderness and acceptability of the striploin and ribeyes steaks from cow carcasses.

Conventional chilling and calcium ascorbate decreased shear force by 20% in striploin steaks and by 25% in ribeye steaks. Using a phosphate/salt solution in hot-boned beef decreased shear force by 15% in both striploin and ribeye steaks.

The trained taste panel showed similar results. In both years of the study, the cow striploin and ribeye steaks that had been conventionally chilled and enhanced with calcium ascorbate or hot-boned and enhanced with phosphate/salt were as tender, juicy and flavorful as the AA/AAA steaks.

Mature cow beef enhanced with calcium ascorbate was more likely to have off-flavors than the AA/AAA beef. It is difficult to say whether this would be a problem with mainstream consumers who use salt, spices, sauces or marinades on the beef; trained taste panel tests do not use any seasonings at all. The cow beef enhanced with calcium ascorbate was also darker than youthful beef prior to cooking, but this difference would not likely be noticeable in cooked steaks.

The hot-boning and moisture enhancement treatments did not improve the tenderness of steaks from the inside or outside rounds. Both of these muscles have more connective tissue (gristle) than the striploin or ribeye. Neither hot-boning nor the moisture enhancement used in this study were expected to affect connective tissue. Slow-cooking with low temperatures and high moisture is recommended for cuts with high levels of connective tissue.

What it means

Moisture enhancement can improve the palatability attributes of cull cow beef. Hot-boning may also help, although removing muscles from the carcass before it enters the chill cooler may be difficult in conventionally designed beef processing plants.

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