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Will blade tenderization decrease iridescence in cooked beef semitendinosus muscle?

Abstract

Ten beef semitendinosus muscles were divided into three sections, which were randomly assigned to one of three blade tenderization treatments (control-zero, one, or two times). Blade-tenderized muscles were cooked in a forced-air convection oven at 325° to 145°F and held for 1 min. Cooked muscles were chilled overnight at 38°F and sliced by a sharp knife. Panelists (n=19) evaluated iridescence intensity on a five-point scale (0=no iridescence, 5=very strong) and extent of iridescence (0=no iridescence, 5=81-100% affected area). Blade tenderization decreased (P<0.05) iridescence intensity from 2.37 to 2.02 and extent of iridescence from 2.18 to 1.83 (control zero vs. two passes). Cooking loss increased (P<0.05) with blade tenderization (30.4% control, 32.6% one pass, 33.7% two passes). Blade tenderization has a moderate effect on reducing iridescence.

Keywords

Cattlemen's Day, 2002; Kansas Agricultural Experiment Station contribution; no. 02-318-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 890; Beef; Iridescence; Blade tenderization

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WILL BLADE TENDERIZATION DECREASE IRIDESCENCE IN COOKED BEEF *SEMITENDINOSUS* MUSCLE?

E. Obuz and D. H. Kropf

Summary

Ten beef *semitendinosus* muscles were divided into three sections, which were randomly assigned to one of three blade tenderization treatments (control-zero, one, or two times). Blade-tenderized muscles were cooked in a forced-air convection oven at 325° to 145°F and held for 1 min. Cooked muscles were chilled overnight at 38°F and sliced by a sharp knife. Panelists (n=19) evaluated iridescence intensity on a five-point scale (0=no iridescence, 5=very strong) and extent of iridescence (0=no iridescence, 5=81-100% affected area). Blade tenderization decreased ($P<0.05$) iridescence intensity from 2.37 to 2.02 and extent of iridescence from 2.18 to 1.83 (control zero vs. two passes). Cooking loss increased ($P<0.05$) with blade tenderization (30.4% control, 32.6% one pass, 33.7% two passes). Blade tenderization has a moderate effect on reducing iridescence.

(Key Words: Iridescence, Beef, Blade Tenderization.)

Introduction

Color, an important characteristic of any meat, is an indication of freshness, appropriate storage temperature, adequate processing, and wholesomeness. Deviations from proper meat color may result in consumer rejection and decrease the value of meat products. Iridescence, an unnatural rainbow-like or multi-colored appearance, is caused by optic diffraction by meat microstructure. Consumers may confuse iridescence with microbial discoloration, resulting in product rejection.

Blade tenderization is a mechanical method used to improve meat tenderness by disrupting muscle structure. Since iridescence is a structural problem, blade tenderization might reduce or eliminate it. The objective of this study was to investigate the effects of blade tenderization on iridescence of cooked beef *semitendinosus* muscle.

Experimental Procedures

Ten USDA Select grade beef *semitendinosus* muscles were divided into three portions. Blade tenderization treatment (control (OX), one time (1X) or two times (2X)) was randomly applied to portions from each muscle using a blade tenderizer (Model T7001, Ross Industries, Midland, Virginia). Blade tenderization was accomplished by inserting the long direction of muscle parallel to the conveyor belt (parallel to muscle fibers) but perpendicular to needles. The first pass had muscle with the deep portion on top. For blade tenderization (2X) the muscle was rotated 90° after the first pass and passed through with muscle fiber direction again parallel to the conveyor belt. After blade tenderization, each muscle was cooked in a forced-air convection oven held at 325° to 145°F internally and held for 1 min. Cooking loss was evaluated on each sample. Cooked muscles were chilled overnight at 38°F, sliced perpendicular to muscle fiber direction

with a sharp knife and each slice was individually vacuum-packaged in a polyethylene-nylon-polyethylene film. A group of experienced panelists (n=19) evaluated iridescence intensity and extent of iridescence on each sample. The iridescence intensity was evaluated on a five-point scale (0=no iridescence, 1=very slight, 2-slight, 3=moderate, 4=strong, 5=very strong iridescence). The extent of iridescence was also evaluated on a five-point scale (0=no iridescence, 1=1 to 20%, 2=21 to 40%, 3=41 to 60%, 4=61 to 80%, 5=81 to 100% affected area).

The statistical design was a completely randomized block. The data were analyzed by SAS using PROC MIXED procedure. When significant at $\alpha<0.05$, mean values were separated by Fisher's Least Significant Difference method.

Results and Discussion

Blade tenderization (two passes) reduced iridescence intensity (P=0.013) (Table 1). Both one and two passes reduced extent of iridescence (P=0.003). Blade tenderization increased the cooking loss because blades opened the meat surface. Previous work found that muscles sliced with a dull blade exhibited less iridescence than those sliced with a sharp blade, suggesting that iridescence could be reduced by physical alteration of the meat surface. Our results confirm this effect, although reductions in iridescence were moderate.

Table 1. Mean Panelist Scores for Blade Tenderization and Cooking Loss

Blade Tenderization	Iridescence Intensity[1]	Extent of Iridescence[2]	Cooking Loss (%)
0X (control)	2.37[a]	2.17[a]	30.4[a]
1X	2.27[a]	1.84[b]	32.6[a,b]
2X	2.02[b]	1.83[b]	33.7[b]

[1]0 = none, 5 = very strong iridescence.
[2]0 = none, 5 = 81 to 100% affected area.
[a,b,c]Means in a column sharing the same letter are not different (P>0.05).