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Surface roughening during slicing reduces iridescence

Abstract

We evaluated surface roughening during slicing as a way to decrease iridescence of pre-cooked cured beef bottom round, inside round, and eye of round roasts. Using a textured slicing blade surface decreased iridescence intensity and the area of iridescence compared to the control (smooth surface). Iridescence intensity and percentage of iridescent area was greatest in the eye of round, followed by the inside bottom round. Iridescence (both intensity and percentage of area) in sliced meat products can be reduced by using a meat-slicing blade with a textured face.

Keywords

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SURFACE ROUGHENING DURING SLICING REDUCES IRIDESCENCE

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Summary

We evaluated surface roughening during slicing as a way to decrease iridescence of pre-cooked cured beef bottom round, inside round, and eye of round roasts. Using a textured slicing blade surface decreased iridescence intensity and the area of iridescence compared to the control (smooth surface). Iridescence intensity and percentage of iridescent area was greatest in the eye of round, followed by the inside bottom round. Iridescence (both intensity and percentage of area) in sliced meat products can be reduced by using a meat-slicing blade with a textured face.

(Key Words: Beef, Iridescence.)

Introduction

Iridescence, an unnatural rainbow-like color array, is often present in pre-cooked meats such as corned beef, ham, and pastrami. Consumers find this visually unappealing and may falsely associate a green or orange-red iridescent sheen with old or unwholesome meat products. Limited research has concluded that iridescence in cooked cured beef is caused by light diffraction by the meat surface microstructure. Using a dull slicer blade has been shown to cause less iridescence than a sharp blade and perpendicular cut muscle exhibits more iridescence than diagonally cut fibers. Our objective was to determine the effects of surface roughening during slicing on the iridescence of cooked cured beef products.

Experimental Procedures

Pre-cooked, vacuum-packaged corned beef inside round, eye of round, and bottom round were obtained (4 of each) from a commercial processor. Fine or medium textured sandpaper with adhesive backing was attached to the blade of a commercial meat slicer while a smooth slicer blade served as a control. The sandpaper was attached approximately 1/8 in. from the cutting edge of the blade, allowing the sharp edge to initialize the cut. For each treatment, three cross-sections from the interior portion of each muscle were sliced approximately 1/4 in. thick. Slices were placed on white foam trays, and wrapped in oxygen permeable heat shrinkable PVC film (23,250 cc $O_2/m^2/24$ hr).

Approximately 2 h after slicing, each slice was evaluated visually for iridescence intensity (0=no iridescence, 1=very slight iridescence, 2=slight iridescence, 3= moderate iridescence, 4=strong iridescence, 5= very strong iridescence) and percentage of surface area covered by iridescence (0=no iridescence, 1=1 to 20%, 2=21 to 40%, 3=41 to 60%, 4=61 to 80%, 5=81 to 100%) to the nearest 0.5 point by nine experienced panelists. All 12 pre-cooked muscle samples exhibited iridescence.

Panelist scores for each slice were averaged to give one score per slice. The three slice scores within a surface treatment and muscle combination were repeated measures and therefore averaged to give one score per treatment combination. Data

for iridescence intensity and percentage iridescent area were analyzed as four replications of a two-way treatment structure in a completely randomized design. Main effects for surface treatment and muscle as well as their interaction were tested by analysis of variance. When significant at the 5% level, mean values were separated using Duncan's multiple range test.

Results and Discussion

Compared to the control (smooth slicing blade) both fine and medium sandpaper surface roughing treatments reduced the intensity of iridescence (P=0.0054) and the percentage of surface area covered by iridescence (P = 0.0038; Table 1) suggesting that physical disruption by surface roughening reduced iridescence. However, no differences were found between the two blade textures.

Significant differences for iridescence intensity and iridescent area were found among the bottom round, inside round, and eye of round muscles (Table 1). Iridescence was most pronounced in eye of round and least in bottom round, with the inside round being intermediate. Within bottom round muscles, iridescence occurred most frequently in the ischiatic head. The muscle differences are most likely due to the angle of slicing. The eye of round muscle was sliced more perpendicular to the muscle fiber direction than the inside round, and the bottom round was the least perpendicular.

Our results support development of slicing blades with a textured face that could be used by the industry to reduce the costly problem of iridescence in slices of cooked beef.

Table 1. Mean Panelist Scores[1] for Sandpaper Treatment and Muscle Main Effects

Item	Iridescence[1] Intensity	Iridescent Area[2]
n	12	12
SE	.233	.195
Surface roughing treatment		
Control	2.83^{y}	2.48^{y}
Fine	1.73^{x}	1.51^{x}
Medium	1.75^{x}	1.46^{x}
P-value	.0054	.0038
Muscle		
Bottom round	1.22^{x}	1.07^{x}
Inside round	1.94^{y}	1.80^{y}
Eye of round	3.14^{z}	2.58^{z}
P-value	.0011	.0013

[1]Iridescent intensity: 1=very slight, 2=slight, 3=moderate.
[2]Iridescent area: 1=1 to 20%, 2=21 to 40%, 3=41 to 60%.
^{x,y,z}Means in the same main effect and column with unlike superscripts differ (P<0.05).