A COMPARISON OF BEEF FLAVOR INTENSITY AMONG MAJOR MUSCLES

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Summary

Twelve muscles from eight Select/Choice grade steers were evaluated for beef flavor intensity, tenderness, and juiciness. Sample steaks were cut, and evaluation was performed by a five-member professional panel. The biceps femoris ranked highest in beef flavor intensity but was not different (P > .05) from the psoas major, gluteus medius, semimembranosus, and triceps brachii (scores of 7.8, 7.5, 7.4, 7.4, and 7.3, respectively). The rectus femoris, longissimus lumborum, serratus ventralis, infraspinatus, semitendinosus, deep pectoral, and supraspinatus were less intense in beef flavor (7.1, 7.1, 7.0, 6.8, 6.8, 6.7, and 6.6, respectively).

The psoas major was most tender (P < .05) of all muscles, followed by the infraspinatus, longissimus lumborum, rectus femoris, and serratus ventralis, which were all similar (P > .05). Muscles from the chuck and loin were generally juicier than those from the round.

This information may be useful in assisting processors in raw material selection for restructured, value-added processing and in assisting purveyors and consumers in selecting steaks and roasts for specific characteristics such as beef flavor intensity.

(Key Words: Beef Muscles, Flavor, Tenderness, Juiciness.)

Introduction

Beef flavor intensity is an important component of meat palatability. In fact, it is probably second only to tenderness among factors that influence consumers' perception of palatability. Unfortunately, evaluating meat palatability, particularly beef flavor, is not an easy task. Research has focused on characteristics of flavor desirability, off flavors, etc.; however, no work has focused on relative beef flavor intensity among major muscles.

This study was conducted to determine if there are differences in beef flavor intensity among muscles that are usually consumed in the form of intact steaks or roasts or may be restructured into steak- or roast-like products.

Experimental Procedures

Eight Select/Choice grade carcasses were fabricated 7 days after slaughter. The semimembranosus, semitendinosus, biceps femoris, rectus femoris, gluteus medius, longissimus lumborum, psoas major, supraspinatus, infraspinatus, triceps brachii, serratus ventralis, and deep pectoral muscles were utilized. Steaks (1 in.) were cut immediately, trimmed of all subcutaneous and intermuscular fat, vacuum packaged, and frozen (-4°F) until evaluation.

Panel Training. Three open discussion sessions were held to train the five-member professional panel. Training samples were selected from veal, Choice/Select, and grain-fed D/E maturity cattle to represent differences in beef flavor intensity, tenderness, and juici-

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ness. Additional differences in flavor intensity were created by soaking samples in water prior to cooking to leach out flavor components. Different degrees of doneness were also used to create a variety of tenderness and juiciness differences.

Evaluations. Steaks were thawed for 24 hr at 40°F and cooked on open-top electric grills to an internal temperature of 158 F, measured by thermocouples placed in the approximate center of each steak. After steaks reached 158 F, they were held in double boilers (147 F) until samples were cut. All dried edges were removed from the steaks, which were then cut into cubes ($.5 \times 0.5 \times 1.0$ in.). All muscles from an animal were evaluated in each of eight sessions. A reference sample of D/E maturity longissimus lumborum muscle was served first and between each group of four samples to keep panelists oriented. Samples were served in random order, and responses were marked on a line with 10 divisions (1 = least intense beef flavor, tender, juicy; 10 = most intense beef flavor, tender, juicy).

Results and Discussion

Means for sensory attributes are presented in Table 1. The biceps femoris ranked highest in beef flavor intensity. However, it was not different ($P > .05$) from the psoas major, gluteus medius, semimembranosus, semitendinosus, and triceps brachii. The rectus femoris, longissimus lumborum, serratus ventralis, infraspinatus, semitendinosus, deep pectoral, and supraspinatus were lower in beef flavor intensity ($P < .05$) than the biceps femoris, with the supraspinatus ranking the lowest. The psoas major and gluteus medius ranked higher ($P < .05$) in beef flavor intensity than the infraspinatus, semitendinosus, deep pectoral, and supraspinatus.

The psoas major was the most tender ($P < .05$) of all muscles. The infraspinatus, longissimus lumborum, rectus femoris, and serratus ventralis were all similar ($P > .05$) and more tender ($P < .05$) than the supraspinatus, semitendinosus, biceps femoris, semimembranosus, and deep pectoral muscles. The deep pectoral was ranked least tender, although it was not different ($P > .05$) from the semimembranosus.

The serratus ventralis was ranked juiciest but was not significantly different ($P > .05$) from the infraspinatus. The semimembranosus and semitendinosus scored lowest, but were not different ($P > .05$) from the triceps brachii, rectus femoris, gluteus medius, and biceps femoris. Generally, muscles of the chuck and loin, with the exception of the gluteus medius, were juicier than those from the round.

Overall, the psoas major consistently ranked high, whereas the semitendinosus ranked low. Our results indicate that the infraspinatus muscle could be used as a high quality steak because it ranked high in tenderness and juiciness and average for beef flavor intensity. These results suggest that by utilizing selected muscles in restructured or intact products, beef flavor, tenderness, and/or juiciness could be optimized depending on the processing goals and target markets.

Table 1. Rank and Means of Muscles by Sensory Evaluation

Rank	Beef flavor intensity[g]	Tenderness[h]	Juiciness[i]
1	Biceps femoris[a]	Psoas major[a]	Serratus ventralis[a]
	7.8	8.5	6.8
2	Psoas major[ab]	Infraspinatus[b]	Infraspinatus[ab]
	7.5	7.2	6.6
3	Gluteus medius[ab]	Longissimus lumborum[b]	Psoas major[bc]
	7.4	6.9	5.9
4	Semimembranosus[abc]	Rectus femoris[b]	Longissimus lumborum[cd]
	7.4	6.9	5.2
5	Triceps brachii[abcd]	Serratus ventralis[bc]	Deep pectoral[cd]
	7.3	6.5	5.1
6	Rectus femoris[bcde]	Gluteus medius[cd]	Supraspinatus[cd]
	7.1	5.8	5.1
7	Longissimus lumborum[bcde]	Triceps brachii[cd]	Triceps brachii[de]
	7.1	5.8	4.9
8	Serratus ventralis[bcde]	Supraspinatus[d]	Rectus femoris[de]
	6.9	5.1	4.8
9	Infraspinatus[cde]	Semitendinosus[de]	Gluteus medius[de]
	6.8	5.0	4.7
10	Semitendinosus[cde]	Biceps femoris[de]	Biceps femoris[de]
	6.8	4.9	4.7
11	Deep pectoral[de]	Semimembranosus[ef]	Semitendinosus[e]
	6.7	4.0	4.2
12	Supraspinatus[e]	Deep pectoral[f]	Semimembranosus[e]
	6.6	3.8	4.1

[a-f]Means within a column with same superscript are not significantly different ($P > 0.05$).
[g]The brown, roasted, aromatic flavor generally associated with beef cooked by dry heat; measured at its peak point during initial 10 chews.
[h]Ease with which a sample is masticated until it would be swallowed.
[i]Moisture in sample perceived at its peak during initial 10 chews.