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## Premium Choice Steaks Purchased from Grocery Outlets Are Generally More Tender Throughout the Year than Lower Quality Grade Steaks

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## Abstract

Consumers typically have the opportunity to select steaks from a variety of marketing categories that relate to quality, price, and expected tenderness. Research on quantifying characteristics of strip steaks from different marketing programs available in self-serve retail display cases and establishing benchmark data for strip steak comparisons for future years is needed. The purpose of this study was to determine mechanical tenderness as well as physical and cooking characteristics of strip steaks purchased from self-serve display cases in grocery store outlets throughout the year.

## Keywords

tenderness, retail, seasonality

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## Premium Choice Steaks Purchased from Grocery Outlets Are Generally More Tender Throughout the Year than Lower Quality Grade Steaks

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### Introduction

Consumers typically have the opportunity to select steaks from a variety of marketing categories that relate to quality, price, and expected tenderness. Research on quantifying characteristics of strip steaks from different marketing programs available in self-serve retail display cases and establishing benchmark data for strip steak comparisons for future years is needed. The purpose of this study was to determine mechanical tenderness as well as physical and cooking characteristics of strip steaks purchased from self-serve display cases in grocery store outlets throughout the year.

Key words: tenderness, retail, seasonality

### Experimental Procedures

Self-serve display steaks ( $n = 311$  steaks) were purchased from four local grocery stores. Six steak types were purchased weekly from March 2014 through February 2015. They included branded Premium Choice from store A, branded Premium Choice and Choice steaks from store B, Premium Choice and Non-grade Specified steaks from store C, and branded Natural steaks from store D. The Premium Choice specifications required marbling scores of modest or higher. The 52 weekly observations for each steak type were divided into four seasons of spring (March-May), summer (June-August), fall (September-November), or winter (December-February) for analysis. The day following steak purchases, physical measurements of steak weight, area, depth, fat thickness and marbling scores were recorded before steaks were cooked using a convection oven. Temperatures were monitored using thermocouples and steaks were removed from the oven once they reached an internal temperature of 158°F. Weight loss during cooking time were measured before cooked steaks were refrigerated. Cooked steaks were refrigerated for at least 12 hours prior to coring (8 cores per steak) and shearing, which was achieved using an Instron Universal Testing Machine (Model 5569, Instron Corp., Norwood, MA) with a Warner-Bratzler shear force V-shaped blade attachment (G-R Manufacturing Co., Manhattan, KS). Warner-Bratzler shear force thresholds of 7.1, 8.6, and 10.1 lb were used to indicate very tender, tender, and intermediate steaks, respectively.

## Results and Discussion

In a steak type by season interaction ( $P=0.03$ ) for shear force (Figure 1), Choice steaks had lower ( $P<0.05$ ) shear force values and instrumentally were more tender during winter than steaks during summer and fall. Non-grade specified steaks purchased in winter had lower ( $P<0.05$ ) shear force values than steaks purchased in spring. Branded Natural steaks purchased in summer had lower ( $P<0.05$ ) shear force values than those purchased in spring and winter. During the spring, Premium Choice and store A branded Premium Choice had lower ( $P<0.05$ ) shear force values than Non-grade Specified and branded Natural steaks, while store branded Premium Choice steaks had lower ( $P<0.05$ ) shear force values than Non-grade Specified steaks. During summer, Premium Choice, branded Natural, and store A branded Premium Choice steaks had lower ( $P<0.05$ ) shear force values than Choice steaks. During fall, store B branded Premium Choice steaks had lower ( $P<0.05$ ) shear force values than Non-grade Specified, Branded Natural, and Choice steaks; and store A branded Premium Choice steaks had lower ( $P<0.05$ ) shear force values than Choice steaks. Premium Choice, store A branded Premium Choice steaks, store B branded Premium Choice steaks, and Choice steaks purchased in winter had lower shear force values than branded Natural steaks. However, steaks from higher quality grades (Premium Choice) generally were instrumentally more tender with a lower shear force than steaks with lower quality grades.

Quality and physical characteristics of strip steak types are shown in Table 1. As expected, strip steaks with Premium Choice classifications generally had more observed marbling than those with lower quality classifications: Premium Choice and store A branded Premium Choice > store B branded Premium Choice steaks > Choice > Non-grade Specified > branded Natural ( $P<0.05$ ). Cooking loss percentages were lower ( $P<0.05$ ) for Premium Choice, store A branded Premium Choice steaks, store B branded Premium Choice steaks, and Non-grade Specified steaks than Choice steaks; and Premium Choice steaks had lost less weight during cooking ( $P<0.05$ ) than branded Natural steaks. Quality and physical characteristics of strip steaks sorted by season are shown in Table 2. Steaks purchased during the summer were ( $P<0.05$ ) lightest and less ( $P<0.05$ ) thick than steaks purchased in spring. Steaks purchased in the spring had the greatest ( $P<0.05$ ) fat thickness and marbling scores as well as greater cooking losses than steaks purchased in summer. Steaks purchased in the fall and winter required a longer ( $P<0.05$ ) cooking time than steaks purchased in summer. Steaks purchased in summer had less ( $P<0.05$ ) cooking losses than steaks purchased in spring. The percentage of steaks meeting different Warner-Bratzler shear force thresholds for very tender, tender, and intermediate tenderness are shown in Table 3.

The results from this study revealed a wide variation in physical attributes of strip steaks available for purchase at retail grocery stores. Some variation in weight may be related to store specifications for steak depth and fat thickness. Additional variation in physical and quality characteristics may be due to inherent differences in steak source.

## Implications

Physical characteristics of steak weight, loin eye area, depth, and fat thickness exhibited significant differences among steak type and season of purchase. Higher quality strip

steaks generally have greater amounts of marbling, were instrumentally more tender, and were more consistent in tenderness throughout the year than lower quality steaks.

**Table 1. Quality and physical characteristics of six strip steak types from four grocery stores**

Trait	Store A	Store B	Store C		Store D		SEM <sup>1</sup>
	Branded Premium Choice	Branded Premium Choice	Premium Choice	Choice	Non-grade specified	Branded Natural	
Weight, lb	0.66 <sup>a</sup>	0.67 <sup>a</sup>	0.80 <sup>b</sup>	0.79 <sup>b</sup>	0.70 <sup>a</sup>	0.86 <sup>c</sup>	0.02
Area, in <sup>2</sup>	12.92 <sup>a</sup>	13.37 <sup>a,b</sup>	13.25 <sup>a,b</sup>	13.17 <sup>a,b</sup>	13.69 <sup>b</sup>	14.67 <sup>c</sup>	0.27
Depth, in	1.00 <sup>b</sup>	1.10	0.93 <sup>a</sup>	1.06 <sup>bc</sup>	0.93 <sup>a</sup>	1.07 <sup>c</sup>	0.02
Fat thickness, in	0.27 <sup>c</sup>	0.33 <sup>d</sup>	0.23 <sup>b</sup>	0.33 <sup>d</sup>	0.17 <sup>a</sup>	0.19 <sup>a,b</sup>	0.01
Marbling score <sup>2</sup>	511 <sup>c</sup>	478 <sup>d</sup>	519 <sup>c</sup>	439 <sup>c</sup>	402 <sup>b</sup>	364 <sup>a</sup>	8.2
Cook time, min <sup>3</sup>	27.63 <sup>a</sup>	31.58 <sup>b</sup>	25.87 <sup>a</sup>	32.67 <sup>b</sup>	27.04 <sup>a</sup>	32.33 <sup>b</sup>	0.90
Cook loss, %	22.06 <sup>a,b</sup>	22.68 <sup>b</sup>	20.72 <sup>a</sup>	24.65 <sup>c</sup>	22.73 <sup>b</sup>	23.21 <sup>b,c</sup>	0.64

<sup>a,b,c,d,e</sup> Means within a row with a different superscript are different ( $P < 0.05$ ).

<sup>1</sup> SEM = standard error of the mean.

<sup>2</sup> Marbling score: 300 to 399 = Slight, 400 to 499 = Small, 500 to 599 = Modest.

<sup>3</sup> Cook time=minutes of cook time to reach an internal temperature of 158°F.

**Table 2. Quality and physical characteristics of six types of strip steaks purchased from four grocery stores throughout four seasons**

Trait	Spring	Summer	Fall	Winter	SEM <sup>1</sup>
Weight, lb	0.75 <sup>b</sup>	0.71 <sup>a</sup>	0.76 <sup>b</sup>	0.76 <sup>b</sup>	0.01
Area, in <sup>2</sup>	13.61	13.42	13.76	13.26	0.22
Depth, in	1.05 <sup>b</sup>	0.979 <sup>a</sup>	1.00 <sup>a,b</sup>	1.01 <sup>a,b</sup>	0.02
Fat thickness, in	0.30 <sup>b</sup>	0.25 <sup>a</sup>	0.25 <sup>a</sup>	0.23 <sup>a</sup>	0.01
Marbling score <sup>2</sup>	478 <sup>b</sup>	458 <sup>a</sup>	431 <sup>a</sup>	442 <sup>a</sup>	6.67
Cook time, min <sup>3</sup>	29.15 <sup>a,b</sup>	27.27 <sup>a</sup>	30.88 <sup>b</sup>	30.77 <sup>b</sup>	0.73
Cook loss, %	23.76 <sup>b</sup>	21.81 <sup>a</sup>	22.65 <sup>a,b</sup>	22.48 <sup>a,b</sup>	0.52

<sup>a,b</sup> Means within a row with a different superscript are different ( $P < 0.05$ ).

<sup>1</sup> SEM = standard error of the mean.

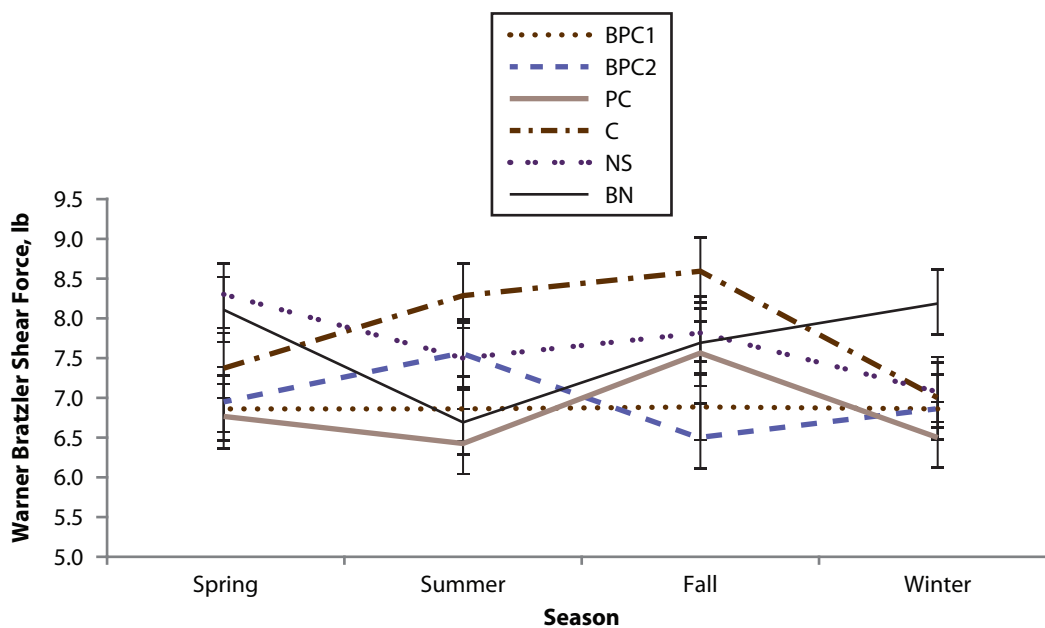
<sup>2</sup> Marbling score: 300 to 399 = Slight, 400 to 499 = Small, 500 to 599 = Modest.

<sup>3</sup> Cook time=minutes of cook time to reach an internal temperature of 158°F.

**Table 3. Percentage of six steak types meeting Warner-Bratzler shear force thresholds for very tender, tender, and intermediate tenderness**

Steak type	n	Very tender <sup>1</sup>	Tender <sup>1</sup>	Intermediate <sup>1</sup>
Branded Premium Choice, store A	51	66.7	90.2	100
Branded Premium Choice, store B	52	51.9	84.6	98.1
Premium Choice, store C	52	51.9	94.2	100
Choice, store B	52	44.2	65.4	86.5
Non-grade specified, store C	52	40.4	71.2	86.5
Branded Natural, store D	52	38.5	67.3	94.2

<sup>1</sup>Warner-Bratzler shear force thresholds of 7.1, 8.6 and 10.1 lb were used to indicate very tender, tender, and intermediate steaks, respectively.



**Figure 1. Interaction of strip steak type by season for Warner-Bratzler shear force values.** BPC1=branded Premium Choice store A; BPC2=branded Premium Choice store B; PC=Premium Choice store C; C=Choice store B; NS=Non-grade Specified store C; and BN= branded Natural store D.