



## PROJECT SUMMARY PRODUCT QUALITY

**BEEF**  
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# Assessment of Post-mortem Aging Influence on Beef Brisket Palatability

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## Background

Beef brisket has become an ever popular staple among barbecue enthusiasts and is increasingly in high demand. Beyond barbecue, brisket is becoming more mainstream in restaurants where chefs are refining the use of brisket for specialty ground beef items. Not only this, quick service restaurants such as Arby's, have empowered the rise in brisket consumption by offering specialty sandwiches that go beyond the traditional hamburger. The demand pressure from multiple vendors has caused prices to skyrocket since 2013. Although prices have dropped from the record 2014 and 2015 prices, it is still important for the beef industry to develop ways to add value to briskets through varying production methods which enhance palatability characteristics. This is of utmost importance for pit masters and chefs alike as they demand briskets to be of the highest standards for flavor, juiciness and tenderness.

## Objective

To determine if post-mortem aging times impact quality attributes (tenderness and consumer acceptability) of smoked beef briskets.

## Methods

Twenty-four USDA Choice beef carcasses were selected at a commercial beef harvest and processing facility for use in this study. Paired, untrimmed beef briskets (Institutional Meat Purchase Specifications 119), were removed from each of the selected carcasses, vacuum-packaged, boxed, and stored under refrigerated conditions prior to refrigerated transport to the Texas A&M Rosenthal Meat Science and Technology Center (College Station, TX).

Each pair of briskets ( $n = 24$  pairs) was randomly assigned to an aging treatment within one of three comparison sets: (1) 7- versus 21- day (Set 1); (2) 21- versus 35- day (Set 2); (3) 7- versus 35- day (Set 3). Briskets were aged under refrigerated conditions ( $2^{\circ}\text{C}$  to  $4^{\circ}\text{C}$ ) for each designated treatment length and then frozen in a  $-10^{\circ}\text{C}$  environment. After thawing, deckle fat was removed and sternum and external fat were trimmed to 0.64 cm for each brisket. Briskets were seasoned with equal parts Morton's Kosher Salt (Grand Saline, TX) and 16 mesh coarse ground black pepper (REO Spice and Seasoning, Huntsville, TX). Briskets were spaced evenly on one of six racks in an Oylar Barbecue Pit (J&R Manufacturing, Inc., Mesquite, TX) and smoked at a pit temperature of  $98.8^{\circ}\text{C}$  for approximately eleven hours. Upon approach of the doneness threshold ( $85^{\circ}\text{C}$  internal brisket temperature), an experienced pit master physically manipulated briskets to assess for final doneness. Briskets then were placed in insulated containers after being wrapped in peach paper.

Ten minutes prior to serving, briskets were removed from insulated containers and peach paper wrapping. Point and flat portions were separated, rewrapped in peach paper and held at  $93.3^{\circ}\text{C}$  until slicing and serving. From each point and flat portion of each brisket, seven slices were taken; one for Warner-Bratzler shear force measurements and the other six for consumer panelists. Each of the eighty-three panelists received six random samples of brisket and were asked to rank brisket slice attributes on a 9-point scale. Attributes included: overall liking (1 = dislike extremely; 9 = like extremely), flavor liking (1 = dislike extremely; 9 = like extremely), juiciness liking (1 = dislike extremely; 9 = like extremely), and tenderness liking (1 = dislike extremely; 9 = like extremely).



## Findings

No tenderness differences were seen between aging treatments as represented in Tables 1 through 3. However, as might be expected, point portions were significantly more tender than flat portions, regardless of aging time (Table 1 through 3). Consumer panelists were asked to evaluate brisket samples for overall liking, flavor liking, tenderness liking, and juiciness liking, but were unable to detect differences between aging treatments for all treatment comparison sets (Tables 4 through 6). Similar to tenderness measurements, consumer panelist ratings differed between point and flat portions in some cases (Tables 4 through 6). Points from treatment Set 1 (7- versus 21- day age) had lower flavor liking and higher juiciness liking scores than flats (Table 4), while point portions from treatment Sets 2 (21- versus 35- day age) and 3 (7- versus 35- day age) had lower overall liking and higher juiciness liking scores than flats from the same sets (Table 5 and 6).

## Industry Impact

Lengthened post-mortem aging times do not result in improved beef brisket palatability. However, findings from this study do support the characterization of the beef brisket as a “tender” cut when cooked using the Texas-style barbecue method (low and slow). Overall, pit masters and barbecue enthusiasts may find value in buying individual muscles or marketing the points and flats individually knowing there are palatability differences between the two portions.

## Graphs/Tables

**Table 1.** LSMMeans  $\pm$  SE for Warner-Bratzler Shear Force values for Set 1<sup>1</sup>, stratified by aging treatment and brisket portion main effects.

	<i>n</i> <sup>2</sup>	Mean Shear Force (N)
<i>Age</i>		
7-day	8	19.27 $\pm$ 1.01
21-day	8	18.14 $\pm$ 1.01
<i>P</i> -value		0.4396
<i>Portion</i>		
Flat	16	23.20 $\pm$ 1.01 <sup>a</sup>
Point	16	14.21 $\pm$ 1.01 <sup>b</sup>
<i>P</i> -value		< .0001

<sup>1</sup>7-day versus 21-day aging

<sup>2</sup>No. of units evaluated

<sup>a,b</sup>Means lacking a common letter differ ( $P < 0.05$ ).

**Table 2.** LSMMeans  $\pm$  SE for Warner-Bratzler Shear Force values for Set 2<sup>1</sup> stratified by aging treatment and brisket portion main effects.

	<i>n</i> <sup>2</sup>	Mean Shear Force (N)
<i>Age</i>		
21-day	8	16.92 $\pm$ 1.06
35-day	8	17.60 $\pm$ 1.06
<i>P</i> -value		0.6543
<i>Portion</i>		
Flat	16	22.05 $\pm$ 1.06 <sup>a</sup>
Point	16	12.47 $\pm$ 1.06 <sup>b</sup>
<i>P</i> -value		< .0001

<sup>1</sup>21-day versus 35-day aging

<sup>2</sup>No. of units evaluated

**Table 3.** LSMMeans  $\pm$  SE for Warner-Bratzler Shear Force values for Set 3<sup>1</sup>, stratified by aging treatment and brisket portion main effects.

	<i>n</i> <sup>2</sup>	Mean Shear Force (N)
<i>Age</i>		
7-day	8	17.99 $\pm$ 0.93
35-day	8	17.16 $\pm$ 0.93
<i>P</i> -value		0.5297
<i>Portion</i>		
Flat	16	22.95 $\pm$ 0.93 <sup>a</sup>
Point	16	12.20 $\pm$ 0.93 <sup>b</sup>
<i>P</i> -value		< .0001

<sup>1</sup>7-day versus 35-day aging

<sup>2</sup>No. of units evaluated

<sup>a,b</sup>Means lacking a common letter differ ( $P < 0.05$ ).

**Table 4.** LSMMeans ± SE for consumer sensory rankings of beef palatability attributes for Set 1<sup>1</sup>, stratified by aging treatment

	<i>n</i> <sup>2</sup>	Overall like/dislike <sup>3</sup>	Flavor like/dislike <sup>3</sup>	Tenderness like/ dislike <sup>3</sup>	Juiciness like/ dislike <sup>3</sup>
<i>Age</i>					
7-day	8	6.30 ± 0.21	6.57 ± 0.18	6.22 ± 0.28	6.01 ± 0.23
21-day	8	6.85 ± 0.21	6.94 ± 0.18	6.81 ± 0.28	6.50 ± 0.23
<i>P</i> -value		0.0818	0.1728	0.1456	0.1393
<i>Portion</i>					
Flat	16	6.78 ± 0.21	7.05 ± 0.18 <sup>a</sup>	6.16 ± 0.28	5.57 ± 0.23 <sup>a</sup>
Point	16	6.37 ± 0.21	6.46 ± 0.18 <sup>b</sup>	6.87 ± 0.28	6.93 ± 0.23 <sup>b</sup>
<i>P</i> -value		0.1807	0.0348	0.0864	0.0004

<sup>1</sup>7-day versus 21-day aging<sup>2</sup>No. of units evaluated<sup>3</sup>Rankings were assigned based on a nine-point hedonic scale for each attribute (1 = dislike extremely and 9 = like extremely).**Table 5.** LSMMeans ± SE for consumer sensory rankings of beef palatability attributes for Set 2<sup>1</sup> stratified by aging treatment and brisket portion main effects.

	<i>n</i> <sup>2</sup>	Overall like/dislike <sup>3</sup>	Flavor like/dislike <sup>3</sup>	Tenderness like/ dislike <sup>3</sup>	Juiciness like/dislike <sup>3</sup>
<i>Age</i>					
21-day	8	6.40 ± 0.24	6.88 ± 0.19	6.74 ± 0.26	6.55 ± 0.19
35-day	8	6.93 ± 0.24	7.33 ± 0.19	6.98 ± 0.26	6.61 ± 0.19
<i>P</i> -value		0.1381	0.1073	0.5269	0.8533
<i>Portion</i>					
Flat	16	7.02 ± 0.24 <sup>a</sup>	7.37 ± 0.19	6.65 ± 0.26	5.83 ± 0.19 <sup>a</sup>
Point	16	6.31 ± 0.24 <sup>b</sup>	6.84 ± 0.19	7.08 ± 0.26	7.33 ± 0.19 <sup>b</sup>
<i>P</i> -value		0.0499	0.0602	0.2571	<0.0001

<sup>1</sup>21-day versus 35-day aging<sup>2</sup>No. of units evaluated<sup>3</sup>Rankings were assigned based on a nine-point hedonic scale for each attribute (1 = dislike extremely and 9 = like extremely).

**Table 6.** LSMMeans  $\pm$  SE for consumer sensory rankings of beef palatability attributes for Set 3<sup>1</sup>, stratified by aging treatment and brisket portion main effects.

	<i>n</i> <sup>2</sup>	Overall like/dislike <sup>3</sup>	Flavor like/dislike <sup>3</sup>	Tenderness like/dislike <sup>3</sup>	Juiciness like/dislike <sup>3</sup>
<i>Age</i>					
7-day	8	6.82 $\pm$ 0.22	7.11 $\pm$ 0.22	6.81 $\pm$ 0.24	6.61 $\pm$ 0.22
35-day	8	6.38 $\pm$ 0.22	6.78 $\pm$ 0.22	6.65 $\pm$ 0.24	6.38 $\pm$ 0.22
<i>P</i> -value		0.1719	0.3031	0.6498	0.4669
<i>Portion</i>					
Flat	16	6.96 $\pm$ 0.22 <sup>a</sup>	7.21 $\pm$ 0.22	6.52 $\pm$ 0.24	6.07 $\pm$ 0.22 <sup>a</sup>
Point	16	6.24 $\pm$ 0.22 <sup>b</sup>	6.68 $\pm$ 0.22	6.94 $\pm$ 0.24	6.92 $\pm$ 0.22 <sup>b</sup>
<i>P</i> -value		0.0296	0.1028	0.2285	0.0112

<sup>1</sup>7-day versus 35-day aging

<sup>2</sup>No. of units evaluated

<sup>3</sup>Rankings were assigned based on a nine-point hedonic scale for each attribute (1 = dislike extremely and 9 = like extremely).

<sup>a,b</sup>Means within an attribute category and within a main effect lacking a common letter differ ( $P < 0.05$ ).

## Photos



**Figure 1.** Oylar Barbecue Pit (J&R Manufacturing, Inc., Mesquite, TX)



**Figure 2.** Cooked brisket slices destined for Warner-Bratzler shear force determination