

# INVESTIGATION OF RAPID EVAPORATIVE IONIZATION MASS SPECTROMETRY (REIMS) TO CHARACTERIZE BEEF BRISKETS

W. T. Fletcher<sup>1</sup>, B. Mills<sup>1\*</sup>, A. J. Garmyn<sup>1</sup>, J. F. Legako<sup>1</sup>, D. R. Woerner<sup>1</sup>, J. C. Brooks<sup>1</sup>, and M. F. Miller<sup>1</sup>,

<sup>1</sup>*Animal and Food Science, Texas Tech University, Lubbock, TX, USA,*

\*ben.mills@ttu.edu

## I. OBJECTIVES

The objective of this study was to evaluate the ability of rapid evaporative ionization mass spectrometry (REIMS) to predict beef brisket composition and eating quality characteristics.

## II. MATERIALS AND METHODS

Beef briskets from the USDA Prime, Average Choice, and Select quality grades ( $n = 54$ ; 18 per treatment) were collected at a commercial abattoir in Omaha, Nebraska. After selection, briskets were vacuum packaged and frozen until use. Briskets were thawed, and raw meat samples were taken from the brisket flat (*pectoralis profundus*) and point (*pectoralis superficialis*) for REIMS and compositional analysis. These samples were vacuum packaged, labeled, and frozen. The remaining brisket portions were smoked and served for sensory evaluation. Panelists ( $n = 360$ ) scored each sample for tenderness, juiciness, flavor, and overall liking. Each consumer was served 6 samples representing all quality grade  $\times$  muscle combinations. Consumers scored point portions similarly ( $P > 0.05$ ) for all palatability traits ( $P > 0.05$ ) regardless of quality grade. Choice and Select flat portions ( $P > 0.05$ ) were scored similar in tenderness, flavor, and overall liking. Samples were thawed for proximate analysis and ground in a 4.5-mm grinding plate before being analyzed in a FOSS Foodscan (FOSS North America, Eden Prairie, MN). Lipid content was highest in Prime point samples ( $P < 0.05$ ), whereas Prime Flat, Choice point, and Select point samples had similar fat percentages ( $P < 0.05$ ). Prime point samples had the lowest moisture percentage ( $P < 0.05$ ) and the highest collagen content ( $P < 0.05$ ). REIMS samples were thawed, and 5 “burns” were collected with an iKnife (Waters Corporation, Milford, MA) sampling tool to create a molecular fingerprint of each sample. Variables with correlation coefficients of greater than 0.75 were identified, and highly colinear variables were removed. Models were built in R to classify samples by brisket type and sensory attributes. Sensory models were used to assign samples into High, Medium, and Low categories based on all sensory attributes (i.e., tenderness, juiciness, flavor, and overall liking).

## III. RESULTS

When Prime, Choice, and Select, flat and point sections were combined, balanced prediction accuracy reached 98.2% on REIMS. Tenderness class was predicted with 90.7% balanced prediction accuracy, and Juiciness class was predicted with 88.9% balanced prediction accuracy. Additionally, Flavor class was predicted with 85.2% balanced prediction accuracy, and Overall Liking class was predicted with 91.7% balanced prediction accuracy.

## IV. CONCLUSION

These data suggest that with fine-tuning REIMS generates a metabolic fingerprint that can meaningfully predict beef brisket palatability with diverse composition.

Keywords: brisket, quality grade, rapid evaporative ionization mass spectrometry

