Relationship Between *Longissimus* Slice Shear Force and Slice Shear Force of *Gluteus medius* and *Biceps femoris* (Top Sirloin Cap) as Influenced by Carcass Type and Postmortem Aging Period

*Principal Investigator:  S. D. Shackelford, PhD*

*USDA ARS, Roman R. Hruska U.S. Meat Animal Research Center*

Study Completed

April 2015

This project was funded by the Beef Checkoff.
Relationship Between *Longissimus* Slice Shear Force and Slice Shear Force of *Gluteus medius* and *Biceps femoris* (Top Sirloin Cap) as Influenced by Carcass Type and Postmortem Aging Period: Project Summary

**Background**

Several beef industry entities are considering adopting tenderness-based marketing strategies, which have the potential of increasing beef consumption. The recent development of tenderness claim standards by the American Society for Testing and Materials (ASTM) and the USDA-Agricultural Marketing Service (AMS) have given the industry added motivation to implement a tenderness-based marketing system. For retailers to effectively execute a tenderness-based marketing strategy, retailers need to be able to market all Loin and Rib cuts as certified tender. Yet, at present the ASTM and USDA-AMS protocols do not favor inclusion of Top Sirloins, which represent a substantial portion of retail meat cut sales. Data is needed to determine the extent to which the Top Sirloin could be included in certified tender programs and what postmortem aging specifications are needed to ensure adequate tenderness levels and a high level of customer satisfaction. Given that many entities intend to use the sample and audit approach to gain and maintain USDA-AMS approval for tenderness claims, further research is needed to understand how given product lines perform across multiple muscles.

**Objective**

The objective of this study was to determine the relationship between product line means for *Longissimus* (LM) slice shear force (SSF) and product line means for SSF of Top Sirloin muscles (*Gluteus medius* (GM) and *Biceps femoris* (BF)) as influenced by carcass type (marbling level and phenotype) and postmortem aging period.

**Methods**

Carcasses (n = 180) were sampled from two large-scale fed-beef packing plants representing geographical differences in cattle populations. In contrast to Plant A, Plant B was located in a region with a higher proportion of cattle with Brahman influence. At each plant, carcasses were sampled from Certified Angus Beef (i.e., Modest and Moderate marbling scores from black-hided cattle), Choice Angus (i.e., carcasses with Small marbling score from black-hided cattle) and Select Angus (i.e., Slight marbling score from black-hided cattle) product lines. Additionally, at Plant B, Commodity Select carcasses with evidence of Brahman influence (hump height > 2") were sampled. At plant A, 30 head were sampled for each product line. For plant B, 22, 22, 22 and 24 head were sampled for Certified Angus Beef, Choice Angus, Select Angus and Commodity Select, respectively. These numbers of observations were not designed to be an ample number to compare product lines but rather a diverse sampling of product lines. Such sampling was needed to create ample variation in tenderness to allow tests of the relationship between LM and GM and BF (2 plants × 90 carcasses/plant × 3 muscles/carcass × 4 aging periods/muscle = 2,160 steaks).

Strip Loins and Top Sirloins were individually identified and tracked through carcass fabrication. Once collected, cuts were transported (-1°C) to the U.S. Meat Animal Research Center (USMARC). At 6 days postmortem, each muscle was sliced into 1-inch thick steaks, and steaks were assigned to aging times of 7, 14, 21 and 35 days postmortem. At the appropriate day postmortem, fresh (never frozen) steaks were cooked and SSF was determined.

**Important Results**

These data support inclusion of the Top Sirloin Butt (*Gluteus medius* and *Biceps femoris*) in tenderness marketing claim programs. But, these data indicate that aging specifications should be 7 days greater for Top Sirloin than Strip Loin. In the plants tested for this experiment, it appears that 14 days of postmortem aging was adequate for Strip Loins from Certified Angus Beef, Choice Angus, and Select Angus; but 21 days of postmortem aging was needed for Strip Loins from Commodity Select. For Top Sirloins, 21 days of postmortem aging was needed for Top Sirloin Butts from Certified Angus Beef, Choice Angus, and Select Angus and 28 days of postmortem aging was needed for Top Sirloin Butts from Commodity Select.
Industry Impacts

Inclusion of Top Sirloin in the USDA-AMS/ASTM tenderness claims standard should greatly facilitate use of this process by retailers. Ultimately, this should drive demand for beef.

Figure A. Relationship ($r = 0.85; P < 0.0001$) between *Longissimus* muscle (LM) slice shear force (SSF) mean for each product type from each plant at each postmortem aging period and the corresponding *Gluteus medius* (GM) SSF mean for each plant at each postmortem aging period. Each of the 28 means, is the mean of 22 to 30 carcasses. Solid red line is $y = x$. 

$$GM_{SSF} = (1.073 \times LM_{SSF}) + 2.948$$

$R^2 = 0.7283$