

## **Project Summary**

### **In-Depth Profiling of the Splenius**

**Principal Investigator: Chris Calkins, Ph.D.,  
University of Nebraska-Lincoln**

**Study Completed  
May 2008**



*Funded by The Beef Checkoff*

# In-Depth Profiling of the Splenius: Project Summary

## Background

The *splenius* muscle is a flat muscle located in the beef chuck roll with visual characteristics similar to the beef flank steak. A full characterization of this muscle will provide valuable information to supplement the checkoff's chuck roll initiative and provide insight into the possibility of utilizing *splenius* muscle as a flank steak alternative.

The objectives for this project were to:

1. Map the dimensions of the beef *splenius* muscle.
2. Characterize the shear force of the *splenius* muscle in comparison with the beef flank.
3. Conduct a consumer taste panel comparing the flank and the *splenius* muscle.

## Methodology

Two-piece chucks from 30 A-maturity, Choice-grade beef carcasses were obtained. Half of the carcasses were from heifers and the rest were from steers. From each sex group, 5 chucks came from carcasses weighing 750-800 lbs, 5 were from carcasses weighing 800-850 lbs, and 5 from carcasses weighing 850-900 lbs. This allowed testing of the effects of gender and weight class on splenius dimensions. Beef chucks were fabricated 7 days post-mortem and the entire *splenius* muscle could be obtained.

After fabrication, *splenius* muscles were weighed untrimmed and then were denuded (completely trimmed of fat). Length, width and thickness dimensions were recorded on denuded muscles. For comparative purposes, Choice-grade flank muscles were obtained. Both *splenius* and flank muscles were separated into anterior and posterior segments and cooked by moist- or dry-heat methods for shear force analysis (tenderness). Dry-heat cooking consisted of cooking on Hamilton Beach® table-top grills. Muscles were cooked to an internal temperature 158° F. For moist heat cookery, muscles were browned for 90 seconds on each side in a skillet with a small amount of vegetable spray and then placed on a wire rack in a glass dish. Water was added to the bottom of the dish and a lid was placed on top. The entire assembly was placed into an oven preheated to 275° F.

When the internal temperature reached 158° F, the assembly was removed from the oven and lids were immediately removed. Samples were allowed to cool to room temperature for two or more hours before 6 to 8 ½ inch diameter cores were removed parallel to muscle fiber direction. Cores were sheared using a Warner-Bratzler shear force apparatus attached to an Instron Universal Testing Machine. An untrained, consumer sensory panel was conducted on flank and *splenius* muscles cooked by dry heat on Hamilton Beach table-top grills to 158° F. Approximately 25 consumers evaluated each sample.

## Findings

*Splenius* muscles from heavy-weight steer carcasses were significantly heavier than all other *splenius* muscles, including those from heavy-weight heifer carcasses. There were no length differences among *splenius* muscles sampled. Muscles from steer carcasses were wider and thicker than those from heifer carcasses. *Splenius* muscle width was also greater in heavy weight carcasses, regardless of gender. Flank steaks were shorter, wider and (slightly) thicker than splenius, although these differences were not tested statistically. There were no differences among muscles for shear force,

(tenderness) regardless of cooking method. For dry-heat cookery, *splenius* muscle steaks averaged 13.3 lb. of shear force and flank steaks averaged 13.1 lb.

Although moist-heat cookery improved tenderness of both muscles, there were still no differences in shear force. *Splenius* muscles cooked in a moist environment had a mean shear force of 10.5 lb. while moist-heat cooked flank steaks required 9.6 lb. of shear. Similarly, the consumer taste panel failed to perceive any differences in tenderness, flavor or overall desirability among the two muscles when cooked under dry-heat conditions. There were no differences in shear force among locations within a muscle, regardless of cooking method or muscle type. Cooking losses from flank steaks that were cooked under moist-heat conditions were lower than all other cooking losses, regardless of muscle or cooking method.

### **Implications**

Results from this study indicate that there are no differences in tenderness for either muscle from one end to the other. In addition, there were no differences in shear force or consumer sensory panel evaluation of tenderness, flavor, or overall desirability between the two muscles.

From a dimensional perspective, *splenius* muscles from heavy-weight steer carcasses were significantly heavier than *splenius* muscle from all other weight and gender categories. Taken together, these data indicate a great deal of tenderness and sensory similarity between *splenius* muscles and flank steaks, suggesting the *splenius* might be successfully marketed as a flank steak alternative.

---

### ***For more information contact:***

National Cattlemen's Beef Association  
9110 East Nichols Avenue  
Centennial, Colorado 80112-3450  
(303) 694-0305