

## **Project Summary**

### **Value Optimization of Muscles from the Veal Chuck**

**Principal Investigators: Chris R. Calkins, Ph.D.,  
University of Nebraska, Lincoln & D. Dwain Johnson, Ph.D., University of  
Florida**

**Study Completed  
September 2006**



*Funded by The Beef Checkoff*

# Value Optimization of Muscles from the Veal Chuck: Project Summary

## Background

Recent studies conducted by scientists at the University of Florida in conjunction with the University of Nebraska have characterized muscles from the beef chuck and round revealing significantly positive palatability attributes for several of these muscles. A similar characterization of muscles was performed in this study to evaluate nine muscles from the veal chuck in search of ways to better utilize and add value to these muscles. Conclusions from previous studies indicate that adding value can be achieved by isolating and cutting certain muscles into steaks rather than selling them as part of a roast or grinding them into ground beef.

The objectives of this project were to:

1. Characterize promising muscles from the veal chuck.
2. Evaluate performance of promising muscles.

## Methodology

Four Choice veal rib whole chucks (IMPS #308) and four Choice veal rib square cut chucks (IMPS #309) were fabricated into 9 isolated muscles at the University of Florida that included the Complexus, Deep Pectoral, Infraspinatus, Rhomboideus, Serratus ventralis, Splenius, Supraspinatus, Triceps brachii and Teres major. Each isolated muscle was denuded, weighed and measured to obtain length, width, minimum depth and maximum depth. A portion of the muscles were kept at the University of Florida where they were vacuum packaged, aged for 14 days and frozen until subsequent analysis for sensory properties.

Expressible moisture/water holding capacity was evaluated from a small muscle sample on the day following fabrication. The remainder of the muscle samples were vacuum packaged and shipped to the University of Nebraska-Lincoln where they were aged for 13 days at  $\pm 2$  °F. On day 13, muscles were evaluated for  $L^*$ ,  $a^*$  and  $b^*$  color values and then ground and powdered with liquid nitrogen before evaluation of pH and proximate composition.

## Findings

### Weights & Measurements

The heaviest muscle found in the study was the Triceps brachii and the lightest muscle was the Teres major. The Complexus was determined to be the longest of the nine muscles and the Teres major was the shortest. In terms of width and depth, the Serratus ventralis was the widest and the Teres major was most narrow while the Splenius was the thinnest and the Triceps brachii the thickest overall.

### Sensory

Trained sensory panel evaluation revealed that the most tender veal chuck muscle was the Infraspinatus followed by the Teres major, while the toughest muscle in the study was the Rhomboideus. The Complexus muscle was most juicy followed by the Supraspinatus, while the driest muscles in the study were the Triceps brachii, Infraspinatus and Splenius. Panelists determined that the Supraspinatus had the most intense beef flavor followed by the Complexus. The blandest muscle in the veal chuck was the Splenius. The Infraspinatus had the least amount of connective tissue present while the Rhomboideus had the most in this study. No extreme off-

flavors were found in any of the muscles evaluated. The off-flavors that appeared most frequently included milky, metallic and grassy. The muscle with the least amount of off-flavor detected was the Triceps brachii.

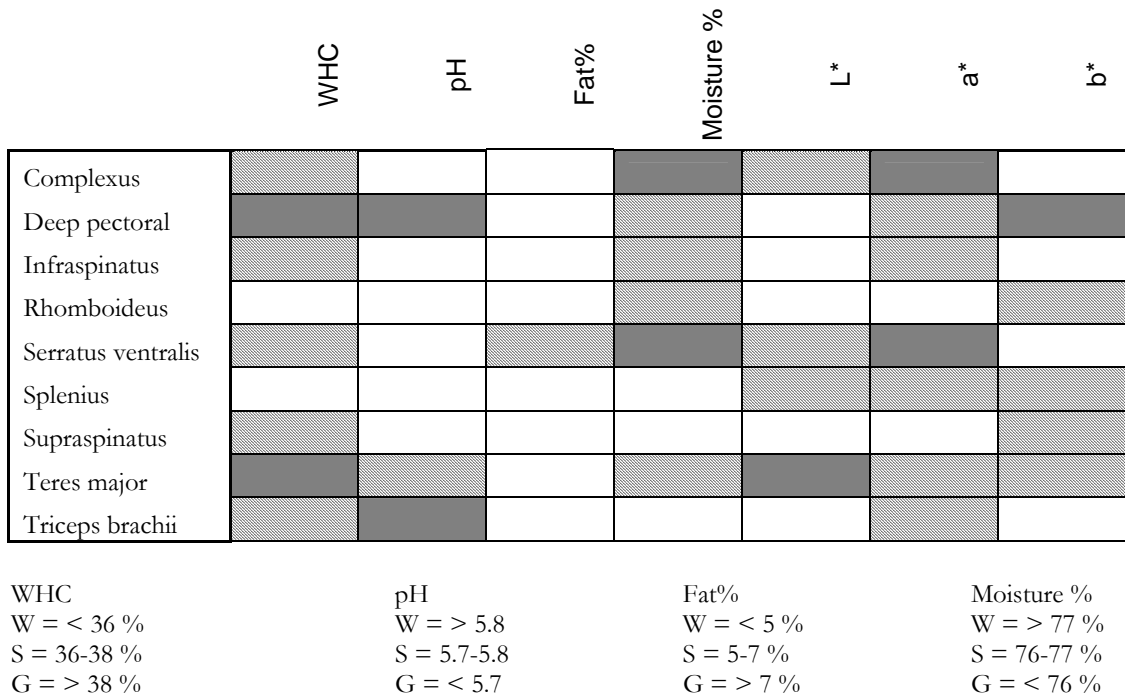
Expressible Moisture & Compositional Analysis

Of the nine muscles evaluated for expressible moisture, two (Rhomboides and Splenius) were especially desirable with values of 35.23% and 35.88%, respectively. The Teres major and Deep pectoral muscles were considered undesirable for this trait with values of 39.53% and 38.56%, respectively. Expressible moisture values less than 36% are considered desirable while those greater than 38% are considered undesirable. Following compositional analysis, the Serratus ventralis was the only muscle with higher than 5% fat content and was also the lowest in moisture content.

Color & pH

When measured for  $L^*$  values (lightness/darkness), the Supraspinatus was the lightest muscle and the Teres major was the darkest. For  $a^*$  values (redness), the Supraspinatus was most desirable and the Serratus ventralis was the least desirable muscle evaluated. For  $b^*$  values (yellowness), the Serratus ventralis was most desirable and the Deep pectoral least desirable. Four muscles were considered desirable for two categories of color and intermediate for the third: Infraspinatus, Rhomboides, Supraspinatus and Triceps brachii. Of the nine muscles evaluated, only two (Deep pectoral and Triceps brachii) were considered undesirable for pH. The muscle with the highest pH was the Infraspinatus at 5.99.

Figure 1. Graphic representation of the traits of veal muscles where white (W) is desirable, striped (S) is intermediate, and dark gray (G) is undesirable



### Industry Evaluation

For further evaluation of the muscles from the veal chuck, two foodservice industry chefs and two industry representatives were contacted to evaluate the quality and application potential of these nine muscles. The most tender muscles evaluated (Infraspinatus, Teres major, Complexus) will require minimal processing while the toughest muscles (Splenius, Serratus ventralis, Rhomboideus) will require a more aggressive tenderization strategy to increase performance.

### **Implications**

Several of the nine muscles of the veal chuck have potential to be better utilized to increase the value and performance of veal carcasses. Some muscles will require more attention than others to help improve consistency and performance. One concern among industry representatives was the added cost associated with producing these value-added veal chucks. A cost analysis could help reveal the true applicability of these muscles in the foodservice industry.

---

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

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