University of Nebraska - Lincoln
DigitalCommons@University of Nebraska - Lincoln

Nebraska Beef Cattle Reports | Animal Science Department

1-1-2013

Development of 2-Rib and 3-Rib Beef Chuck Subprimal

Justine J. Hosch
University of Nebraska - Lincoln

Kim A. Varnold
University of Nebraska - Lincoln

Lasika S. Senaratne-Lenagala
University of Nebraska - Lincoln

Michelle E. Semler
University of Nebraska - Lincoln

Michael D. Chao
University of Nebraska - Lincoln

See next page for additional authors

Follow this and additional works at: http://digitalcommons.unl.edu/animalscinbcr

Hosch, Justine J.; Varnold, Kim A.; Senaratne-Lenagala, Lasika S.; Semler, Michelle E.; Chao, Michael D.; and Calkins, Chris R., "Development of 2-Rib and 3-Rib Beef Chuck Subprimal" (2013). *Nebraska Beef Cattle Reports*. Paper 745.
http://digitalcommons.unl.edu/animalscinbcr/745

This Article is brought to you for free and open access by the Animal Science Department at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Nebraska Beef Cattle Reports by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

Authors
Justine J. Hosch, Kim A. Varnold, Lasika S. Senaratne-Lenagala, Michelle E. Semler, Michael D. Chao, and Chris R. Calkins

This article is available at DigitalCommons@University of Nebraska - Lincoln: http://digitalcommons.unl.edu/animalscinbcr/745

Development of 2-Rib and 3-Rib Beef Chuck Subprimal

Justine J. Hosch,
Kim A. Varnold,
Lasika S. Senaratne-Lenagala
Michelle E. Semler,
Michael D. Chao
Chris R. Calkins[1]

Summary

Under current U.S. fabrication methods the beef forequarter is divided into chuck and rib subprimals at the fifth/sixth rib junction. Forequarter breaks at the third/fourth and fourth/fifth rib junctions were evaluated in six beef carcasses each. Chuck roll subprimals from both fabrication methods were prepared. All muscles were weighed and a shear force assessment was conducted on steaks from the Longissimus dorsi. *There were no differences in tenderness between 3, 4, or 5 rib Longissimus dorsi steaks, and all steak locations assessed were rated as tender. These data suggest an alternative break point between the rib and chuck could increase value of the carcass.*

Introduction

The beef forequarter accounts for 52% of total carcass side weight. A majority of product marketed from the chuck primal is comprised of roasts with a range of muscles and variability in palatability. Currently the chuck is separated from the remainder of the beef forequarter by a division behind the fifth rib. The separation of the chuck and rib between the fifth and sixth ribs is somewhat arbitrary and bound by tradition. By altering the location of the chuck/rib break, steaks that are now cut from the chuck roll could be fabricated from a new subprimal which would allow the remainder of the chuck roll to be sold as roasts. Altering the break of the chuck/rib also could improve the short rib offerings currently available to international customers. In order to successfully develop a new subprimal, yield evaluations and product tenderness need to be fully assessed.

Procedure

Twelve Choice, YG 3 beef carcasses, weighing 800-850 lb, were tested for alternative forequarter fabrication. Alternative fabrication commenced with the removal of the *Latissimus dorsi* (lifter meat). The cartilaginous tip of the scapula was then located and an incision was made anterior following the seam posterior to the elbow. Pulling the scapula anterior, the knife was kept close to the medial side of the scapula, leaving the S*ubscapularis* on the suspended carcass. Once the medial side of the scapula was free from the carcass, a cut could be made that would free the thoracic limb from the forequarter.

Two fabrication methods were evaluated based solely on location of the chuck/rib break. Both fabrication methods resulted in a rib primal starting at rib seven; one rib posterior from traditional fabrication. Fabrication Method A resulted in a 3-rib subprimal: separation of the chuck and rib between ribs three and four. Fabrication Method B resulted in a 2-rib subprimal: separation of the chuck and rib between ribs four and five.

The 2-rib and 3-rib subprimals were weighed whole, and then vacuum packaged, transported to the University of Nebraska–Lincoln Loeffel Meat Laboratory and aged at 35°F for 21 days. The length and width of the subprimals were measured using a cloth measuring tape prior to further fabrication.

After aging, both the 2-rib and 3-rib subprimals were fabricated similarly to obtain individual muscles. Exterior fat was first removed and chuck muscles (*Longissimus dorsi, Longissimus costarum, Complexus, Spinalis/Multifidus dorsi, Serratus ventralis, Intercostales interni, ligamentum nuchae*, fat, connective tissue, and lean trim) were excised from the subprimal and weighed. *Longissimus dorsi* 1" thick steaks were cut from an anterior, medial, and posterior location in Method A, and anterior and posterior location in Method B. All steaks were cooked on a Hamilton Beach Indoor-Oudoor Grill to an internal temperature of 170°F. Cooked steaks were then placed on a plastic tray and overwrapped with oxygen permeable film. Steaks were stored at 39°F for 24 hours prior to being sampled for Warner Bratzler Shear Force (WBSF).

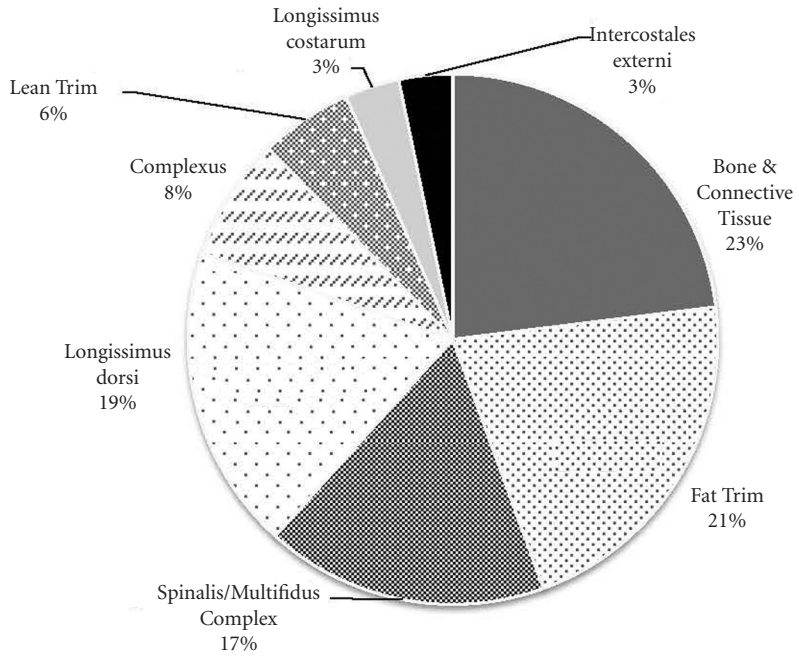
Cooked steaks were retrieved from the cooler and had cores prepared. Due to size, only four ½-inch cores were retrieved from anterior fabrication method A steaks, whereas all other steaks from both fabrication methods A and B had six ½-inch cores. These cores were sheared using a tabletop WBSF machine. Results were recorded for each core sheared.

Table 1. Warner-Bratzler shear force (lb) of *Longissimus dorsi* steaks from 2-rib and 3-rib subprimals.

	Subprimal Fabrication Style[1]	
Steak Location[2]	2-rib	3-rib
Anterior	6.42	7.29
Middle	—	8.10
Posterior	6.20	7.92
P-value	0.49	0.39
SEM	0.19	0.26

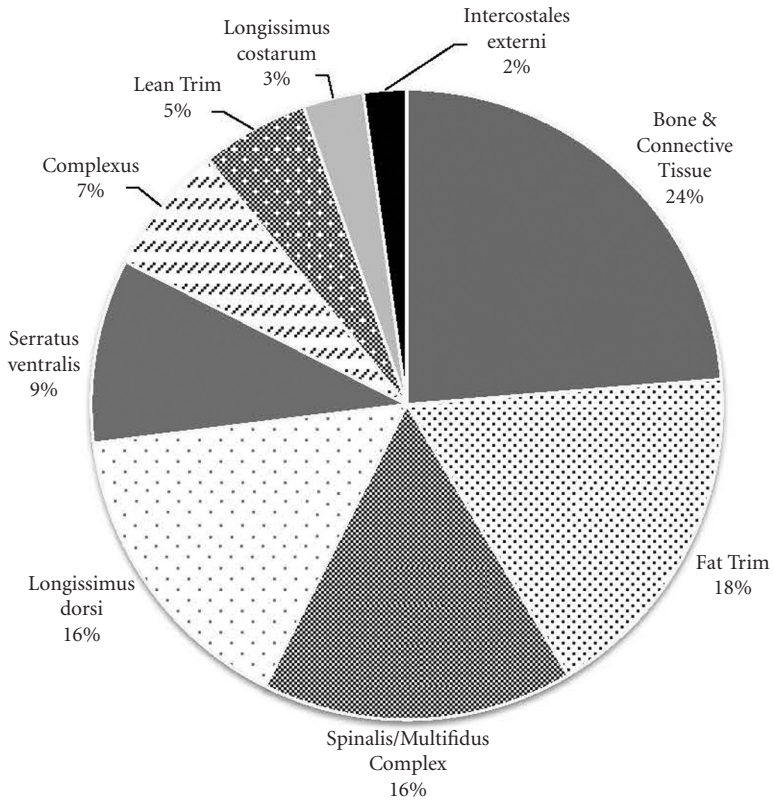
[1]Two subprimal fabrication styles were utilized: 2-rib (ribs 5-6) and 3-rib (ribs 4-6). In both cases the rib primal was split at the sixth/seventh rib.
[2] Steaks (1 in) were cut from the *Longissimus dorsi* at the listed locations. No middle steak was obtained from the 2-rib subprimal.

© The Board of Regents of the University of Nebraska. All rights reserved.



2-rib (fourth/fifth rib through sixth/seventh rib) subprimal muscles obtained by single muscle fabrication methods. Percentage calculated on a per weight basis.

Figure 1. Least square means of tissue composition yields from 2-rib subprimal.



3-rib (third/fourth rib through sixth/seventh rib) subprimal muscles obtained by single muscle fabrication methods. Percentage calculated on a per weight basis.

Figure 2. Least square means of tissue composition percentages from 3-rib subprimal.

Results

A sizeable subprimal, suitable for cutting into steaks, would be available through the development of a 2 or 3-rib subprimal. An added 3.45 lb of total subprimal weight was captured in the 3-rib subprimal when compared to that of the 2-rib subprimal (8.26 vs 4.81 lb). This added weight would account for seven additional 1 inch *Longissimus dorsi* steaks in the 3-rib subprimal and four steaks in the 2-rib subprimal. Given that this innovative subprimal is a combination of chuck and rib muscles, it would be expected that this new subprimal would be marketed at an intermediate price. Since the chuck is priced much lower than the primal rib, an intermediate price should result in a net gain in value.

Both alternative rib subprimals had lean yield values of greater than 60%. The *Longissimus dorsi, Spinalis dorsi*, and *Complexus* comprised the largest proportion of muscles in both subprimals (Figures 1, 2). These muscles are present in chuck eye and anterior ribeye steaks and are generally tender.

There were no significant differences in WBS between steak locations in either the 2-rib or 3-rib subprimals (Table 1). Tenderness classification of beef cuts have been recommended for application in the industry based on WBS results. According to those recommendations all *Longissimus dorsi* steaks from the 2-rib and 3-rib subprimals had WBS values less than 8.0 lb, rating them as tender product.

Based on these results *Longissimus dorsi* steaks from ribs three through six were consistently tender and could offer additional value from a 2-rib or 3-rib subprimal cuts. The 2-rib and 3-rib subprimal offerings could provide a value-added product for producers, versatility for processors, and tender steaks for consumers.

---

[1]Justine J. Hosch, graduate student; Kim A. Varnold, graduate student; Lasika S. Senaratne-Lenagala, graduate student; Michelle E. Semler, graduate student; Michael D. Chao, graduate student; Chris R. Calkins, professor, University of Nebraska–Lincoln Department of Animal Science, Lincoln, Neb.

© The Board of Regents of the University of Nebraska. All rights reserved.