

Project Summary

Adding Value to Non-conforming “Out” Beef Carcasses

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**Study Completed
May 2007**



Funded by The Beef Checkoff

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Background

Carcasses that are considered less desirable with respect to color or size of the ribeye generally do not return the full value that potentially could have been associated with that carcass. Discounted prices, or inability to achieve premium process, are extremely detrimental to the producer being paid based on carcass quality parameters. This study was developed to determine the ideal range of sizes and colors of beef muscles and to add value back to carcasses determined to be “non-conforming.” The study was also designed to determine which muscles within non-conforming carcasses should be value at full price. By identifying muscles that are not affected by ribeye lean color or ribeye size, value can be added back to the carcass by means of valuing the individual muscles at full price.

Methodology

Dark cutting carcasses were purchased from two commercial beef packing companies between December of 2006 and February of 2007. Degrees of USDA dark cutting condition (DEGDC) chosen for the study were 1/3, 1/2 and full degree. Carcass sides were weighed to determine chilled carcass weight and sequentially fabricated into primal cuts (chuck/shank, brisket, rib, loin, round, plate and flank) and subprimal cuts (Clod Heart-*Triceps brachii* Long Head, Clod Heart-*Triceps brachii* Lateral Head, Top Blade-*Infraspinatus*, Mock Tender-*Supraspinatus*, Petite Tender-*Teres major*, Chuckeye Roll-*Complexus/Longissimus dorsi*, *Spinalis dorsi/Multifidus*, Deckel-off Brisket, Ribeye Roll-*Complexus/Longissimus thoracis/Spinalis dorsi/Multifidus*, Lifter Meat-*Latissimus dorsi*, Top Sirloin Butt, 1x0 Strip Loin-*Longissimus lumborum*, Tri-tip-*Tensor faciae latae*, Tenderloin-*Psoas major*, Flank Steak, Top Round-*Semimembranosus/Adductor*, Bottom Round Heel Out-*Biceps femoris/Semitendinosus*, Knuckle-*Vastus lateralis/Vastus medialis/Vastus intermedius/Rectus femoris*.

Dimensions and weights of each subprimal were recorded. Individual muscles were cut at the halfway point of the longitudinal axis of the muscle, and the face of that cut was measured for maximum depth and width. The face was then traced to determine cross-sectional surface area, and one-half of the muscle was subsequently sliced to obtain a 0.10 inch steak for pH analysis. The remainder of the muscle half was sliced for steaks at 0.50, 0.75 and 1.0 inches. Each steak was weighed and weights were recorded as portion steak weights. After a 20 minute bloom time, lean color was measured and that muscle half was vacuum packaged, aged 14 days and frozen.

Muscles evaluated for sensory characteristics and Warner-Bratzler shear force (WBSF) included: *Longissimus lumborum* (SLLD), *Longissimus thoracis* (RFD), *Gluteus medius* (GM), *Infraspinatus* (IN), *Tensor faciae latae* (TF), *Vastus lateralis* (VL), Round *Biceps femoris* (RBF), *Psoas major* (PM), *Semimembranosus* (ST), Deep Pectoral (DP), *Triceps brachii*-Long Head (TBL), *Latissimus dorsi* (LFI), and Chuck *Complexus* (CHCOM). Steaks from the *Teres major* (TM) were cut for WBSF only.

Panelists were trained and panel sessions were conducted nearly every day for 5 weeks until all 60 panel sessions were completed. Each degree of dark cutter was represented in each panel session. Every panel session contained 5 steaks from 2 of the DEGDC and 4 steaks from the remaining DEGDC. The random assignment of steaks to panels was conducted in a rotating manner resulting in each DEGDC being represented by 4 steaks every third session. Panelists used an 8-point, end-anchored rating scale to evaluate overall tenderness, overall juiciness and beef flavor intensity.

Shear force steaks were randomly assigned to each shear force day with each muscle and degree of dark cutter represented equally. A combination telephone and internet-based survey was used to determine acceptability thresholds for subprimals in relation to *Longissimus* muscle (LM) area. Parameters were established and a web site was developed to display images of the subprimals and the steak faces of subprimals, as well as the characteristics associated with each cut. Additionally, color swatches were produced from digital images of the faces of individual muscles for which lean color was measured.

Those surveyed were asked to state whether or not they merchandised the beef subprimals in the study. Of the subprimals that received a “yes” response, the respondent was asked to evaluate the portion size characteristics listed under each letter of the respective muscle and to determine from those characteristics whether a letter was acceptable, unacceptable or neither for their customer base. Each individual was then asked to view the lean color swatches and determine which color swatches were acceptable and unacceptable to their customer base. A total of 34 corporate beef merchandisers and 33 U.S. chefs completed the survey.

Findings

- Ribeye color can be used to predict the color of the *Adductor*, Flank Steak, Flap Meat, *Gluteus medius*, *Latissimus dorsi*, Round *Biceps femoris*, *Longissimus thoracis*, *Longissimus lumborum*, *Semimembranosus*, *Semitendinosus* and *Teres major*.
- Ribeye color does not adequately predict the color of the Deep *Pectoral*, Chuck *Complexus*, Chuck LM, Chuck *Spinalis dorsi*, *Infraspinatus*, *Psoas major*, *Rectus femoris*, Rib *Complexus*, Rib *Spinalis dorsi*, Sirloin *Biceps femoris*, *Serratus ventralis*, *Supraspinatus*, *Triceps brachii* long and lateral heads, *Tensor faciae latae*, *Vastus intermedius*, *Vastus lateralis* and *Vastus medialis*.
- Estimated mean salvage dollar value of the 1/3, 1/2 and full degree of dark cutter carcasses [363.2 kg (800 lb) REA of 13.0 in²] containing muscles with acceptable color valued at Choice prices for foodservice chefs were \$70.20, \$60.11 and \$46.76 per head, respectively.
- Estimated mean salvage dollar value of 1/3, 1/2 and full degree of dark cutter carcasses containing muscles with acceptable color valued at Select prices for foodservice chefs were \$27.73, \$22.65 and \$17.11 per head, respectively.
- Estimated mean salvage dollar value of 1/3, 1/2 and full degree of dark cutter carcasses acceptable color valued at Choice prices for retail meat merchandisers were \$49.16, \$41.22 and \$26.94 per head, respectively.
- Estimated mean salvage dollar value of 1/3, 1/2 and full degree of dark cutter carcasses acceptable color valued at Select prices for retail meat merchandisers were \$17.99, \$12.91 and \$8.76 per head, respectively.
- Warner-Bratzler shear force was not dependent upon degree of dark cutting.
- Sensory attributes were not dependent upon degree of dark cutting.
- Ribeye area did not adequately predict the portion size of the muscles Chuck *Complexus*, *Semimembranosus*, *Tensor faciae latae* and *Vastus lateralis* and, therefore, should not contribute to reduced carcass value in programs specifying maximum and minimum ribeye area sizes.
- Ribeye area does not adequately predict the probability of acceptance of portion sizes of the *Infraspinatus* and *Latissimus dorsi*.
- When marketing to foodservice chefs and retail meat merchandisers, ribeye area sizes between 10.5 and 11.0 inches (lean trimmings and acceptable subprimals valued at premium branded prices and remaining subprimals valued at Select prices) result in estimated value

differences compared to a carcass valued entirely at Select prices of between \$111.05 and \$113.02 for both user groups.

- When marketing to foodservice chefs and retail meat merchandisers, ribeye area sizes between 16.0 and 18.0 (lean trimmings and acceptable subprimals valued at premium branded prices and remaining subprimals valued at Select prices) result in estimated value differences compared to a carcass valued entirely at Select prices of between \$134.91 to \$141.03 and \$131.39 and \$155.91, respectively.

Implications

This study suggests that evaluation of ribeye color and the resulting discount from the dark-cutting condition is not always a definite indication of other muscle colors in the remaining carcass. Within the carcass, many muscles do not have color relationships with the ribeye. Similarly, the size of a ribeye may not always be a good indication of the acceptability of other muscles within the carcass. By interviewing chefs and retail meat merchandisers around the U.S. and utilizing their responses to determine the acceptability of a particular muscle size and color, this study determined that several muscles are not fully valued when the dark cutting condition or ribeye area constraints are encountered.

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