DIMENSIONAL MEASUREMENTS AND RETAIL YIELDS OF INDIVIDUAL MUSCLES AND SUBPRIMALS SOURCED FROM VARIOUS BEEF CARCASS WEIGHT/RIBEYE SIZE COMBINATIONS

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I. OBJECTIVES

The objectives were (1) to determine how various combinations of carcass weights and ribeye sizes impact weight, size, and shape of individual muscles and subprimals, and (2) to calculate primary and total yields of muscles and subprimals when manufactured into case-ready products.

II. MATERIALS AND METHODS

Beef carcasses ($n = 36$) were selected from a beef processing plant in Nebraska to be upper 2/3's USDA Choice (Modest and Moderate marbling only) and to meet a 3 × 3 treatment scheme of ribeye area (REA) sizes (REA: 83.9 to 89.8 cm^2, 90.3 to 96.1 cm^2, and 96.7 to 102.6 cm^2) and hot carcass weights (HCW: 340.6 to 385 kg, 386.0 to 430.9 kg, and 431.4 to 476.3 kg). One hindquarter per carcass was identified for individual muscle dissection—*M. gluteobiceps*, *M. gluteus medius*, *M. longissimus lumborum*, *M. semitendinosus*, and *M. semimembranosus*—whereas the other was designated for conventional fabrication—strip loin, boneless; top sirloin butt, center-cut, cap off, boneless; top sirloin butt, cap (coulotte); top (inside) round, cap off; outside round (flat); and eye of round. Muscles and subprimals were vacuum packaged, boxed, and transported to a case-ready manufacturing facility. At the facility, products were removed from their packaging and weighed; length, width, depth, and circumference measurements were taken. From each, primary cuts (steaks and roasts), secondary items (stew meat and lean trimmings), and fat trimmings and refuse were generated. Weights were taken to calculate primary steak/roast yield and total saleable yield. Analysis of variance was performed to investigate the main effects of REA and HCW along with their interaction.

III. RESULTS

For dissected muscles, there were increases ($P < 0.05$) in weight with increasing HCW category, but only the *M. longissimus lumborum* and *M. semimembranosus* were impacted by REA. Only four dimensional measurements differed significantly across REA categories, whereas there were 15 measurements that differed ($P < 0.05$) across the HCW categories indicating how HCW influenced the size and shape of these muscles more than REA. For the subprimals, weight increases were similar to those seen for dissected muscles with all becoming heavier ($P < 0.05$) as HCW increased, but only the strip loin and inside round became heavier with increasing REA. Significant dimensional differences occurred 3 times more often (31 vs. 10) with HCW categories compared to REA categories although there were 5 REA × HCW interactions. With the exception of one interaction for the *M. gluteobiceps*, neither REA nor HCW impacted primary or total yield for dissected muscles and subprimals. If steak/roast weights were impacted, significant differences were most likely due to HCW rather than the REA category. Weights for dissected muscles generally increased with increasing REA and HCW; however, when muscle-to-muscle variation was calculated, these

ratios were quite similar, indicating that these muscles remained proportional regardless of the REA/HCW category.

IV. CONCLUSION

Increasing carcass weights played a greater role than increasing REA in the size, shape, and weights of muscles or subprimals. Primary and total saleable yields were unaffected by REA or HCW. Even in carcasses that varied in weight and REA, muscle-to-muscle relationships appear to be similar.

Keywords: beef, carcass weight, composition, retail cutting, ribeye area