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Innovative wholesale carcass fabrication and retail cutting to optimize beef value

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Abstract

Innovations in beef carcass fabrication to improve subprimal yield, retail cut yield, and overall carcass value were evaluated. Alternating sides from 30 beef carcasses were assigned to either an innovative or conventional style of fabrication. The innovative method resulted in greater ($P < 0.001$) total subprimal yield and less ($P < 0.001$) lean trimmings from the forequarter; however, hindquarter total subprimal yield and lean trimmings were not affected ($P > 0.05$) by fabrication style. Value was greater for the innovative forequarter ($P < 0.001$) and hindquarter ($P < 0.01$), and total value was increased by more than US $14 per beef carcass compared to the conventional style. Selected subprimals were evaluated in retail cutting tests. In general, the innovative retail subprimals had yields equal to or greater than the conventional subprimals. Innovative carcass fabrication may allow for greater marketing options for beef cuts to improve carcass value and to offer greater retail merchandizing opportunities.

Keywords: Beef; Cutability; Value; Retail cut yields

1. Introduction

Armed with the goal of increasing the overall value of the beef chuck and round and thus the entire beef carcass, the Beef Value Cuts Program (NCBA, 2001) and the muscle profiling and bovine myology studies (Jones, Burson, & Calkins, 2001) were launched with support from US cattle producers. These studies defined processing characteristics and fabrication techniques that could be employed to help the industry better understand and utilize each muscle individually, rather than marketing traditional multiple-muscle cuts.

Much of the basis for beef carcass fabrication is tradition, rather than optimizing value of the resultant cuts. The initial cuts that separate the chuck and round from the rib and loin are of major concern, as these primal breaks bisect multiple muscles and muscle groups. With current retail trends to merchandize individual muscle cuts, it may be more advantageous to remove intact muscles and/or muscle groups from the carcass rather than producing wholesale cuts based on tradition.

Wholesale fabrication of beef carcasses has remained relatively constant with few major changes employed throughout the industry. This study was conducted to examine alternative methods of beef carcass fabrication. Important questions to be asked if alternative methods of beef carcass fabrication are to be employed are: (1) what impact would changing fabrication styles have on subprimal and total yields, (2) how would overall carcass value be impacted, and (3) how would retail cut merchandizing be influenced? Our study was designed to address these three points.

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2. Materials and methods

2.1. Carcass selection

Beef carcasses ($n = 30$) were selected from a commercial packing facility and transported to the Rosenthal Meat Science and Technology Center at Texas A&M University for subsequent fabrication. Ten carcasses were selected per week for three consecutive weeks. Carcasses were selected by trained evaluators to obtain an equal mix of USDA (1997) Choice and Select, yield grade 2 and 3 carcasses. Additional criteria included: sex (steer), approximate weight range (325–390 kg), and minimal slaughter/dressing defects (e.g., incorrect carcass splits, major fat tears, large bruises, excess trimming of lean and/or fat).

2.2. Carcass fabrication

Inside skirt muscles were loosened from the hindquarter before ribbing of the carcass at the packing facility. Carcasses were separated into beef quarters and transported by refrigerated carrier. Upon arrival at Texas A&M University, quarters were bagged in large polyethylene bags to minimize shrink and ensure freshness, and were held at 2 °C until they were cut (0–3 days). Comparisons were made by fabricating one side of each carcass in a conventional manner, whereas the opposite side was fabricated by an innovative method. Cutting styles were assigned to carcasses by alternating sides to avoid any potential biases (e.g., kidney fat from the ''tight side'' vs. ''loose side''). Throughout fabrication, each subprimal and its corresponding lean trimmings, excess fat, and bone components were weighed to ensure at least 99% recovery yield of each subprimal and then totaled for the entire quarter. The briskets were trimmed to 1.27 cm of subcutaneous fat. All other subprimals were trimmed to no more than 0.32 cm of subcutaneous fat, and when trimmings were generated, the targeted visual lean percentage was 85%. Where applicable, Institutional Meat Purchase Specification numbers (IMPS #) were used to characterize fabricated subprimals as described by USDA (1996) and NAMP (2003).

2.2.1. Conventional style

The following describes the fabrication of the conventional forequarter. The inside (*M. Transversus abdominis*) and outside (*M. Diaphragma pars costalis et sternalis*) skirt muscles were removed and all major connective tissue and fat was trimmed in preparing the IMPS #121D Beef Plate, Inside Skirt and the IMPS #121C Beef Plate, Outside Skirt. The rib/chuck separation was made by a saw cut between the fifth and sixth rib, perpendicular to the dorsal edge of the carcass. From the chuck, the brisket portion was separated by an initial saw cut 2.54 cm from the dorsal edge of the *M. Pectoralis profundus*. The cut was completed by following the natural seam on the medial side of the foreshank. All bones and cartilage were removed and the deckle fat was trimmed to expose the lean surface of the *M. Pectoralis profundus*. The hard fat along the ventral edge was trimmed flush with the lean surface and the external fat was trimmed to 1.27 cm to create an IMPS #120 Beef Brisket, Deckle Off, Boneless. The chuck portion then was hung by the foreshank and the IMPS #114 Beef Chuck, Outside Shoulder (Clod) was removed. The medial side of the subprimal was trimmed practically free of fat. The scapula, including the *M. Supraspinatus* and the *M. Subscapularis*, was removed from the chuck. The #116B Beef Chuck, Chuck (Mock) Tender was fabricated by separating and trimming the *M. Supraspinatus*. The dorsal section of the *M. Pectoralis profundus* remaining on the chuck after brisket separation was removed and trimmed of all seam fat, creating the IMPS #115D Beef Chuck, Square Cut, Pectoral Meat. The remainder of the chuck portion was separated from the foreshank through the natural seam. A saw cut, perpendicular to the dorsal edge of the carcass between the fifth and sixth cervical vertebra, was made to separate the neck from the chuck. Chuck short ribs were removed by a saw cut immediately ventral to the vertebral column and perpendicular to the rib end. IMPS #130 Beef Chuck, Short Ribs were fabricated by removing the first rib and trimming the lean surface practically free of fat. The IMPS #116A Beef Chuck, Chuck Roll was fabricated by removing the vertebrae, dorsal spinous processes, *ligamentum nuchae*, and the *M. Trapezius* and associated fat. The tail was reduced to 2.54 cm ventral to the *M. Longissimus thoracis* on the posterior end and 2.54 cm ventral to *M. Complexus* on the anterior end. The remaining foreshank and neck were separated into lean trimmings, excess fat, and bone components.

The rib/plate separation was made by a saw cut 10.16 cm ventral to the *M. Longissimus thoracis* on the anterior end and 7.62 cm ventral to the *M. Longissimus thoracis* on the posterior end. The plate was separated into lean trimmings, excess fat, and bone components. The bodies of the thoracic vertebrae on the rib were removed by a saw cut to expose the underlying lean. The blade meat (*M. Rhomboideus thoracis*, *M. Trapezius pars thoracia*, and *M. Latissimus dorsi*) was separated from the rib. IMPS #109B Beef Rib, Blade Meat was fabricated by separating each individual muscle and trimming practically free of fat. The IMPS #124 Beef Rib, Back Ribs was removed from the rib. IMPS #112A Beef Rib, Ribeye, Lip-On was fabricated by removing the *ligamentum nuchae* and reducing the tail to 2.54 cm ventral to the *M. Longissimus thoracis* on both ends.

The following describes the fabrication of the conventional hindquarter. Before separating the round and loin, practically all kidney and pelvic fat was removed.