

## **Project Summary**

### **Beef Carcass Value Optimization: Identification and Prediction of Primal, Sub-Primal and Value-Cut and Offal Fabrication Styles that Optimize Carcass Value**

**Principal Investigators: T.D. Carpenter, J.L. Meisinger, J.D. Tatum, Ph.D.,  
G.C. Smith, Ph.D. and K.E. Belk, Ph.D.  
Colorado State University**

**Study Completed  
May 2008**



*Funded by The Beef Checkoff*

# **Beef Carcass Value Optimization: Identification and Prediction of Primal, Sub-Primal and Value-Cut and Offal Fabrication Styles that Optimize Carcass Value:**

## **Project Summary**

### **Background**

Opportunities to increase the value of individual beef carcasses are becoming more prevalent. These opportunities require systems that can identify the optimal primal, subprimal and value-cut mixes and styles that will subsequently optimize the value returned for each carcass. In addition to adding value to carcasses, these tools will also add clarity to market signals being passed through the beef chain as more accurate carcass value determinations can be made at the time of carcass grading or sorting.

The objectives for this project were to:

1. Conduct an industry-wide survey to identify commonality among and between U.S. beef processor primal, subprimal, value-cut and offal fabrication specifications.
2. Create two carcass yield databases suitable for development and validation of subprimal and value-cut yield prediction equations that are representative of fed cattle slaughtered in the U.S.
3. Create two offal yield databases suitable for development and validation of offal yield prediction equations.
4. Develop carcass optimization tools that would allow the beef industry to optimize carcass value, based upon current market conditions, using on-line grading instrumentation, ribeye area and USDA yield grade.

### **Methodology**

Data from Export Verification and export Certification documents were provided by USDA-AMS to determine which countries import the highest volume of beef products and construct survey questions posed to industry officials. Data collected in each of 4 countries (Japan, Hong Kong, Taiwan and Mexico) included product description, harvest date, pack date, cut type, storage condition, USDA quality grade, box weight, number of packages in each box, number of pieces in each package, Institutional Meat Purchasing Specification (IMPS), and any deviations from the specification.

The cutting scheme used for carcass fabrication to measure product yields was designed using the industry-wide survey and port collection data, along with information obtained through export verification documents. There were a total of three cutting styles for fabricating the brisket, seven styles for fabricating the chuck, eight styles for fabricating the rib and plate, eight styles for fabricating the loin, and 16 styles for fabricating the round; therefore, a total possible 21,504 different carcass styles for which yields were measured were generated for each individual carcass.

Following harvest and prior to chilling, carcasses were imaged using a full-side hot camera video imaging system. After chilling, carcasses for which hot camera images were obtained were selected to represent specific carcass weight and yield grade combinations. Selected carcasses were then circulated past a cold ribeye camera video imaging system and yield grade factors were recorded. During fabrication, primal faces were imaged using a subprimal video imaging system. Chilled primals were weighed and fabricated according to the cutting scheme designed for each subprimal.

Offal items of interest were collected and weighed and included hearts, hearts bone-out, tongue, swiss-cut tongue, oxtail, kidneys, cheek meat, beef lips, sweetbreads, leg tendons, livers and skinned livers. Honeycomb tripe, beef intestines and hides also were of interest, and yields for these items were collected through industry dialogue.

Values as reported by USDA were assigned to cut weights for two separate periods of time using a four-week average for November 2007, the last three weeks of May and the first week of June 2008. Value was assigned to each carcass cut according to prices and respective of grade and weight limitations. Values for certain trim levels used the similarly reported ground beef value. Additionally, a standard value of 15 cents per hundred weight (cwt) was used for fat and a standard value of 30 cents per cwt was used for bone, while femur bones were assigned a value of 50 cents per cwt.

## **Findings**

### *Port Audits and Survey Results*

Seventy beef cuts from seven companies were surveyed in Mexico. Most of the products (83%) were not branded, were chilled rather than frozen (80%) and were boneless (97.1%). Fourteen percent of the products were variety meats including tongues, tripe, heart and oxlips. Eighteen products were either not graded (15) or no roll (3), while 27 were either Select or Select or higher and 25 were Choice or higher. Most items were from the chuck (21.4%) or round (35.7%) while variety meats represented 14.3% of the products. Eleven of the products were not represented in the IMPS.

Thirty-seven beef products from seven companies were assessed in Taiwan. All products were boneless and most were chilled (78.4%). Approximately a quarter (27%) of the products were branded and the majority of the products were from the chuck (35.1%) and the rib (35.1). Most products were graded and 18.9% were Prime, 64.9% were Choice or higher and 2.7% were Select or higher; 13.5% were portrayed as “not graded.” About half of the products were represented with IMPS (56.8%) but 16 products did not have IMPS numbers.

Eight companies and 30 individual products were evaluated in Hone Kong. Nearly one half (46.7%) of the cuts were frozen and all but two were boneless. Almost all of the products were either Prime (46.7%) or Choice or higher (46.7%). Most of the products (53.3%) were in branded programs. The majority were from the loin (40%), rib (26.6%) or chuck (26.6%) with the remaining items from the round or navel. Seventy percent of the products had IMPS numbers.

In Japan, 74 beef products were assessed from eight companies. All products were boneless, most were chilled (92.1%) and only about a fifth were branded (17.6%). The majority of items were cut to IMPS (79.8%).

### *Heifers*

A total of 38 different cutout strategies optimized carcass value for the November time period. Six different strategies optimized carcass value for yield grade 1, 24 for yield grade 2, 19 for yield grade 3, nine for yield grade 4 and four for yield grade 5, meaning that different cutting styles should be applied within a yield grade to optimize value. Differences between were found between the standard and optimized values for yield grades 2 and 3. A total of 39 different cutout strategies optimized carcass value for the heifer population in the June time period. Seven different strategies optimized carcass value for yield grade 1, 22 for yield grade 2, 20 for yield grade 3, nine for yield

grade 4 and five for yield grade 5. Differences were found between the standard and optimized carcass values in yield grades 2, 3 and 4.

#### *Steers*

A total of 40 different cutout strategies optimized carcass cutout value for the steer population for the November time period. Fifteen different strategies optimized carcass value for yield grade 1, 29 for yield grade 2, 25 for yield grade 3, five for yield grade 4, and one for yield grade 5. A total of 60 different fabrication strategies were used for steers to optimize cutout value in the June time period. A total of 19 different strategies that optimized cutout value were used for yield grade 1, 38 for yield grade 2, 25 for yield grade 3, seven for yield grade 4 and one for yield grade 5.

#### *Dairy*

A total of 38 different cutout strategies optimized carcass value for the dairy-type population for the November time period. Four different strategies optimized value for yield grade 1, 14 for yield grade 2, nine for yield grade 3, and two for yield grade 4. A total of 24 different cutout strategies optimized carcass value for the June time period. Four different styles optimized value for yield grade 1, 15 for yield grade 2, eight for yield grade 3 and two for yield grade 4.

In all three cattle types, the standard cutout did not optimize cutout value for either time period, suggesting that all carcasses were not fabricated to their full carcass value potential when cut to the standard strategy used in this study. The average value per cwt for June offal was \$5.85 on a live weight basis. The average value for November offal was \$5.57 per cwt on a live weight basis.

#### **Implications**

In order to determine which fabrication style optimizes the cutout value of an individual carcass, regression equations will be developed and validated using the carcass assessment information collected in this study via camera instruments. This will result in an ability to determine the most value optimizing cutout strategy prior to fabrication. Additionally, information collected allows for the updating of the checkoff-funded Beef Cutout Calculator to include the ability to calculate value of all of the different fabrication styles available from this study. The datasets created with this study will allow for the capability to reflect gains and/or losses in value due to the opening and/or closing of export markets.

---

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

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