

Project Summary

Evaluating the Impacts of Gender, Fatness, Muscling and Weight on the Cutability of Yield Grade 4 Beef Carcasses

**Principal Investigator: Jeff Savell, Ph.D.
Texas A&M University**

**Study Completed
2008**



Funded by The Beef Checkoff

Evaluating the Impacts of Gender, Fatness, Muscling and Weight on the Cutability of Yield Grade 4 Beef Carcasses:

Project Summary

Background

Excessive numbers of Yield Grade 4 carcasses have been identified as one of the top 10 quality challenges facing the beef industry, according to results from the 2005 National Beef Quality Audit (NBQA). USDA yield grades are an estimate of the percentage of boneless, closely-trimmed retail cuts derived from a carcass. They are assigned to carcasses based on an equation that incorporates fat thickness, ribeye area, hot carcass weight and percentage of kidney, pelvic and heart (KPH) fat. Within the typical Yield Grade 4 population, there are carcasses that are classified as such because of below average muscling, excessive fat thickness, heavy carcass weight or a combination of these factors.

Data from the 2005 NBQA indicated that Yield Grade 4 heifer carcasses most often were classified as such because of fat thickness, whereas steer carcasses were assigned Yield Grade 4 because of various reasons. In addition to steers becoming Yield Grade 4s because of excess fat, a significant portion of those received the Yield Grade 4 designation because of a small ribeye area-heavy carcass weight combination.

Given the differences among USDA Yield Grade 4 carcasses found in the 2005 NBQA and because these carcasses are receiving large discounts, it would be important to determine if these discounts should be equally applied to the entire population of carcasses in this category. This study was conducted to determine if this USDA Yield Grade 4 category should be further divided or segmented to provide a more accurate measure of cutability and value.

Methodology

USDA Choice, Yield Grade 4 beef carcasses (n =60) were selected from two commercial packing facilities located in different regions of Texas and one side of each was purchased. Carcasses were evaluated by a USDA grader for the following:

- Preliminary yield grade
- Adjusted preliminary yield grade
- Maturity (skeletal and lean)
- Marbling score
- Quality grade

The research team also collected the following information:

- Lot number
- Hot carcass weight
- Ribeye area to hot carcass weight ratio
- Hump height
- Gender

The carcasses were selected on parameters that separated them into six different groups of 10 carcasses (Table 1) and fabricated into boneless primal/subprimals and minor cuts. Throughout

fabrication, each subprimal and corresponding lean trimmings, excess fat and bone components were weighed and recorded to the nearest 0.01 pounds. All components were summed to ensure a 99 percent recovery yield of each subprimal weight.

Table 1. Carcass selection parameters

		Steers	
Weight		REA:cwt	
		<1.41	≥ 1.41
800-900	Lighter weight 1		Lighter weight 2
901-1000	Heavier weight 1		Heavier weight 2
		Heifers	
Weight			
700-800	Lighter weight 1		
801-900	Heavier weight 1		

* 10 carcasses per group

Findings

The mean USDA yield grade for both the steers and heifers was 4.48. While having similar mean yield grades, heifers had greater 12th rib fat thickness, a larger ribeye, and a lower numerical yield grade than steer carcasses with lower ribeye area per hundred weight (cwt). The selection criteria used in this study were chosen for the purpose of obtaining a sample of carcasses that represented the variation in gender, weight, fat, and ribeye that are typically found in the fed beef population and the researchers felt that goal was accomplished.

There were no major differences between defined heifer/steer groups, however, some carcass cutout components did differ when contrasted between defined groups. Overall, steer carcasses had a higher percentage of arm roast, chuck roll, chuck tender and percentage bone, whereas heifer carcasses had a higher percentage of trimmable fat. In general, cuts from the forequarters of steer carcasses tended to have higher numerical percentages than heifer carcasses and heifer carcasses had a higher percentage of trimmed fat than their steer counterparts.

Gender affected yields, and the resulting red meat product derived from fabrication showed heifer carcasses to have a lower red meat yield than steer carcasses.

Within the steer and heifer carcasses that weighed between 800 and 900 pounds, heifer carcasses had a higher percent kidney, pelvic and heart fat and a higher percent total fat removed from the carcass during fabrication. The researchers felt that the total fat percentage differences were due to more kidney, pelvic and heart fat and more intramuscular fat in the forequarter. This could be a concern to meat processors if the increased seam fat in the forequarter translates to more kernel fat in the ribeye roll and chuck roll.

Wholesale prices of carcass components were obtained from USDA Market News reports and applied to weights of each carcass. The values for each component, as well as overall carcass value and value per hundred weight were calculated. Most of the differences in prices were attributable to weight, rather than substantial differences in carcass composition. Although the researchers noted differences in individual carcass components, when total carcass value was divided by carcass weight per hundred pounds, no statistical differences were observed in total value per hundred weight.

The researchers examined which yield factors, if any, were related to carcass value on a per hundredweight basis and found that even with a nearly \$20 per cwt range in value from the highest to lowest valued carcass, there were no clear trends for any of the carcass traits to play a role in driving the value differences. The only factor that seemed to play a role in driving the value difference was sex-class because the lowest valued group was made up of more heifers than steers.

Within the USDA Yield Grade 4 carcasses examined in this study, USDA yield grade and the four factors used in the USDA yield grade equation (fat thickness, ribeye area, hot carcass weight and percentage of kidney, pelvic and heart fat) had low and non-significant correlations with final carcass value per cwt, indicating that these measures may not have value in segmenting carcasses according to final carcass value per cwt.

The researchers also noted that the total percentage of subcutaneous fat had a low and non-significant correlation, while intermuscular fat had a moderate and significant simple correlation with final carcass value per cwt. The researchers felt this indicated that seam fat may be a bigger driver in final carcass value compared to other fat depots when examined within USDA Yield Grade 4 carcasses.

Implications

Even though there were substantial ranges in carcass values among the carcasses, the researchers found it difficult to find carcass traits that were responsible for the differences. As expected, carcasses from heifers had more trimmable fat than steers, and carcasses from steers had higher yields of certain cuts from the chuck and round than did carcasses from heifers. This study is the most exhaustive to be conducted on Yield Grade 4 carcasses in recent time, and unfortunately, the researchers did not find any clear relationships in carcass trait parameters that could be used to more accurately sort value differences in Yield Grade 4 carcasses other than differences between steer and heifer carcasses.

For more information contact:

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