INFORMATION AND INDEX PROCEDURES FOR RANKING BEEF CARCASSES[1]

CUSTER COUNTY CARCASS CONTEST

Introduction

Current methods used for ranking beef carcasses in carcass contests typically involve the use of a cutability index. The cutability index for beef is an estimate of carcass cutability (lean meat yield), which has been adjusted for differences in USDA quality grade. Although the cutability index is effective for identifying carcasses that excel in cutability and quality, there is a need for a ranking system that more accurately reflects industry specifications for other economically important carcass traits. The purpose of this publication is to provide alternative procedures for ranking carcasses in beef carcass contests. The intent is to provide an evaluation system that will accurately reflect industry specifications for quality grade, yield grade, carcass weight, fat thickness and ribeye area.

Industry Specifications for Carcass Traits

Quality Grade. Most of the beef produced in the U.S. is from fed steers and heifers, and U.S. feeding and management systems are designed to facilitate production of Choice grade beef carcasses. The major packing companies prefer that 60 to 80% of the cattle they slaughter meet specifications for the Choice grade. Because of consumers' demands for leaner beef, the Select grade recently has received greater attention in the industry, yet Select carcasses continue to be priced lower than Choice carcasses. Continued emphasis on quality by the restaurant industry has created a demand for high quality beef (Average Choice or higher), which has resulted in a premium price for loin and rib cuts from these carcasses. Prices for carcasses with quality grades lower than Select usually are discounted substantially. The proposed ranking system for beef carcass contests was designed to reflect differences in beef carcass quality grades corresponding to these pricing trends.

Fat Thickness. Currently, nearly every major beef retailer features beef cuts trimmed to 1/4 inch fat thickness or less. The recent "Market Basket" study showed that nationwide fat thickness levels on retail beef cuts averaged about 1/8 inch. Research concerning the effects of fat thickness on beef tenderness has shown that a minimum of .25 to .30 inch fat thickness is necessary to prevent cold-induced meat toughening and ensure acceptable beef tenderness. Correspondingly, the proposed ranking system was designed to discriminate against carcasses that were either too fat or too lean. The "optimal" range for fat thickness was defined as .25 to .35 inch; carcasses outside of this range are penalized.

[1]Taken from RECOMMENDED PROCEDURES FOR RANKING BEEF CARCASSES IN CARCASS CONTESTS by J. Daryl Tatum, Department of Animal Sciences, Colorado State University

Ribeye Area. Many meat companies with major restaurant and food service accounts specialize in portion sizing of beef cuts, especially cuts from the rib and loin. As a result, the size of the ribeye has become critical. Ribeyes with areas larger than 17.0 square inches or smaller than 12.0 square inches appear to present some problems with portion control. The proposed ranking system was designed to reflect such preferences for ribeye size. Within the 12 to 17 square inch range, increased ribeye area is rewarded. However, carcasses with ribeye areas less than 12 or greater than 17 are penalized.

Carcass Weight. In today's beef industry carcass weights between 600 and 950 pounds generally are acceptable. Carcass weights between 750 and 950 pounds are most preferred. The proposed ranking system reflects these preferences for carcass weight, and penalizes excessively light or excessively heavy carcasses.

Proposed Methods for Determining Rank of Carcasses

1. Carcass data to be recorded.

Carcass data collection procedures outlined below correspond to descriptions provided in the Official U.S. Standards for Grades of Carcass Beef (USDA, 1989).

(a) Adjusted fat thickness. External fat thickness of the carcass is measured over ribeye muscle, perpendicular to the outside surface at a point 3/4 the length of the eye from its medial edge. This measurement is adjusted, as necessary, to reflect unusual amounts of fat on other parts of the carcass.

(b) Estimated percent kidney, pelvic and heart fat. The amount of kidney, pelvic and heart fat includes the kidney know (the kidney and surrounding fat), the lumbar and pelvic fat in the loin and round, and the heart fat in the chuck and brisket areas. The amount of these fats is evaluated subjectively and expressed as a percent of the carcass weight.

(c) Ribeye area. The area of the ribeye is measured where this muscle is exposed by ribbing the carcass between the 12th and 13th ribs. Ribeye measurements are made by means of a grid calibrated in tenths of a square inch.

(d) Hot carcass weight. Hot carcass weights should be recorded for individual animals at the time of slaughter. Additionally, each carcass should be identified with its ear tag number of other identification number at slaughter.

(e) USDA yield grade. USDA yield grade is the measurement of lean meat in a carcass. The yield grades for beef carcasses range from 1 to 5 and predict the percentage yield of closely trimmed, boneless round, loin, rib and chuck (See USDA Yield Grade Table). Yield grades are calculated using values for adjusted fat thickness (FT), ribeye area (REA), hot carcass weight (WT) and estimated % kidney, pelvic and heart fat (%KPH).

YIELD GRADE TABLE

PERCENT OF CARCASS WEIGHT IN BONELESS, CLOSELY TRIMMED, RETAIL CUTS FROM ROUND, LOIN, RIB AND CHUCK FOR CORRESPONDING YIELD GRADES

Yield Grade	Yield of Cuts	Yield Grade	Yield of Cuts
1.0	54.6	3.5	48.9
1.1	54.4	3.6	48.7
1.2	54.2	3.7	48.4
1.3	53.9	3.8	48.2
1.4	53.7	3.9	48.0
1.5	53.5	4.0	47.7
1.6	53.3	4.1	47.5
1.7	53.0	4.2	47.3
1.8	52.8	4.3	47.0
1.9	52.6	4.4	46.8
2.0	52.3	4.5	46.6
2.1	52.1	4.6	46.4
2.2	51.9	4.7	46.1
2.3	51.6	4.8	45.9
2.4	51.4	4.9	45.7
2.5	51.2	5.0	45.4
2.6	51.0	5.1	45.2
2.7	50.7	5.2	45.0
2.8	50.5	5.3	44.7
2.9	50.3	5.4	44.5
3.0	50.0	5.5	44.3
3.1	49.8	5.6	44.1
3.2	49.6	5.7	43.8
3.3	49.3	5.8	43.6
3.4	49.1	5.9	43.3

(f) USDA quality grades. The USDA quality grades for young beef are Prime, Choice, Select and Standard, and are used to reflect differences in cooked meat palatability (tenderness, juiciness and flavor). Quality grades are determined visually by evaluating carcass maturity, lean firmness and the amount and distribution of marbling in the ribeye. The USDA recognizes 10 degrees of marbling for beef carcass quality grading: Abundant (AB), Moderately Abundant (MAB), Slightly Abundant (SLAB), Moderate (MD), Modest (MT), Small (SM), Slight (SL), Traces (TR), Practically Devoid (PD) and Devoid (D). Marbling requirements for grades of A maturity carcasses are presented below.

MARBLING SCORE	QUALITY GRADE
AB	Prime +
MAB	Prime
SLAB	Prime -
MD	Choice +
MT	Choice
SM	Choice -
SL +	Select +
SL	Select
SL -	Select -
TR & TR +	Standard +
PD + & TR -	Standard
PD - & PD	Standard -

In carcass contests, “dark-cutting” beef carcasses frequently are encountered. The dark-cutting condition may be present in varying degrees from that which is barely evident to so-called “black cutters” in which the lean actually is nearly black in color and usually has a “gummy” texture. Depending upon the degree to which this condition is developed, the final grade of carcasses which otherwise would qualify for the Prime, Choice or Select grades may be reduced as much as one full grade. In beef otherwise eligible for the Standard grade, the final grade may be reduced as much as one-half of a grade (USDA, 1989).

(g) Sex of carcass. The sex of the animal producing each carcass should be determined. Carcasses produced by intact males or cryptorchids should be disqualified from competition.

2. Determining the rank of carcasses in a contest.

It is recommended that the final placing of the beef carcasses be based on an “adjusted yield grade.” The adjusted yield grade is an index number and merely a ranking system. (See Introduction). It’s calculated as follows:

(a) Determine the USDA yield grade of each carcass using the following formula:

YG = 2.5 +(2.5 * adjusted fat thickness, in,)
+(.2 * estimated % KPH fat)
-(.32 * ribeye area, square inches)
+(.0038 * hot carcass weight, lb.)

(b) Adjust the yield grade derived from this formula for ribyeye area, fat thickness, hot carcass weight and quality grade using the adjustment factors listed below.

Ribeye Area (REA):

REA	ADJ
>16.9	+ .6
16.0 to 16.9	- .3
15.0 to 15.9	- .6
14.0 to 14.9	- 1.0
13.0 to 13.9	- .6
12.0 to 12.9	0
11.0 to 11.9	+ .3
10.0 to 10.9	+ .6
9.0 to 9.9	+ .9
<9.9	+1.2

Adjusted Fat Thickness (FT), Inches (Changes made effective in 2020)

Fat Thickness	Adjustment
<.15	+.7
.15 - .25	+.5
.26 - .35	+.3
.36 - .45	0
.46 - .55	+.3
.56 - .65	+.6
.66 - .75	+.9
>.8	+1.2

Hot Carcass Weight (HCW), pounds (Changes made effective in 2020)

Weight	
>1050	+1.2
1001 - 1050	+.9
951 – 1000	+.6
876 – 950	+.3
801 – 875	0
751 – 800	+.3
651 – 750	+.6
550 – 650	+.9
< 550	+1.2

USDA Quality Grade (QG):

QG:	ADJ
Prime	- 1.2
CH/CH+	- .9
CH-	- .6
SE+	+1.2
SE	+1.8
SE-	+2.4
ST or lower	+4.0

EXAMPLE OF CALCULATIONS:

Carcass Data for Example	Fat thickness	.40
	Ribeye Area	14.2
	%KPH	3.0
	Hot weight	845
	USDA Quality Grade	CH-

1. Calculation of USDA Yield Grade:

   YG = 2.5 + (2.5*.40) + (.2*3.0) - (.32*14.2) + (.0038*845) = 2.76

2. Determine “Adjusted Yield Grade”:
   2.76 (USDA Yield Grade)
   -1.0 (Adjustment for REA)
   +0 (Adjustment for FT)
   +0 (Adjustment for WT)
   -.6 (Adjustment of QG)
   1.16 (Adjusted Yield Grade)