

## Beef Grading 101

Alexander M. Stelzleni PhD, University of Georgia Meat Science Technology Center

As we enter the summer months and the period of the year where beef demand and consumption (especially for higher quality middle cuts like the rib and loin) will increase, I thought it would be an opportune time to review beef grading standards and what they mean. Understanding beef grades, how they are derived, and what they mean is not only important for beef producers and industry personnel, but it is also important for consumers to understand what they are buying. In this article we will look at beef yield grade standards, quality grade standards, the economic impact these can have to the producer, and what these mean to the consumer.

There are a tremendous number of beef breeds and breed crosses that are used throughout the United States. These immeasurable combinations lead to a very heterogeneous population of cattle that combine an almost endless combination of traits. The overall intent of the beef grading system is multifaceted: 1) Segregate the heterogeneous population of cattle/carcasses into more homogenous, or similar, groups; 2) Facilitate trading, ordering, and purchasing site unseen (it does not set the price, but helps facilitate the trades based on expected outcomes that have economic merit); 3) Gives definition to traits of economic importance that producers can use for targeted outcomes; and 4) Help the consumer understand what they can expect from a value and eating quality perspective.

One last important distinction that needs to be made is that meat grading and meat inspection are not synonymous. Either federal or state meat inspectors **MUST** inspect all meat sold or intended for sale. Meat inspection is managed by the USDA – Food Safety and Inspection Service and ensures a wholesome, safe, and properly labeled product. Meat grading is handled by the USDA – Agricultural Marketing Service and is a voluntary fee-based system that must be requested by the packing plant. Therefore, all meat sold has to be inspected but it does not have to be graded.

### Beef Yield Grade:

Yield grade has little practical importance to the consumer but is vital to the industry and producer in determining overall value. Yield grade is an estimation of the cutability of a carcass, or an estimation of the *Boneless, Closely Trimmed Retail Cuts (BCTRC)* from the four major primal areas (chuck, rib, loin, and round). It can be expressed as a percentage basis, or on a numerical scale ranging 1-5 (Table 1). It is important to recognize that a low yield grade number (e.g. YG1) equates to a greater percentage of BCTRC and a high yield grade number (e.g. YG5) equates to a carcass that produces a lower percentage of BCTRC (Figure 1). Therefore, a carcass with a lower yield grade typically has more value associated with it than a carcass with a higher yield grade.

There are four traits that are measured for the calculation of yield grade. The first, 12<sup>th</sup> rib fat thickness (FT), is determined by ribbing (separating) the carcass at the 12-13<sup>th</sup> rib juncture. Fat thickness is measured in inches and is commonly adjusted up or down based on total carcass fat (Adjusted FT). The second measurement is the percent of kidney, pelvic, and heart fat (%KPH) that makes up the total weight of the carcass. Hot carcass weight (HCW), measured in pounds,

and ribeye area (REA), measured in square inches, make up the final two measurements. The values obtained from the measurements can be utilized in the following equations:

$Numeric\ Yield\ Grade = 2.5 + (2.5 * Adj.\ FT) + (0.20 * \%KPH) + (0.0038 * HCW) - (0.32 * REA)$   
and

$\%BCTRC = 51.34 - (5.784 * Adj.\ FT) - (0.462 * \%KPH) - (0.0093 * HCW) + (0.74 * REA)$ .

Keep in mind that the total edible yield will be greater as a percent of the carcass than the BCTRC because it will also include cuts from the shank, plate, flank, and ground beef.

### Beef Quality Grade:

Quality grade is an estimation of expected cooked palatability or eating quality (tenderness, juiciness, and flavor). Quality grade is not only economically important to producers and the greater beef industry, but is also the grading system that provides consumers with information about what they can expect. The traits that influence Quality Grade are primarily the amount and distribution of intramuscular fat (marbling) in the ribeye at the 12<sup>th</sup> rib and the carcass' physiological maturity, which is a combination of skeletal ossification down the spine and the color, firmness, and texture of the lean. Marbling scores from least to most are: practically devoid, traces, slight, small, modest, moderate, slightly abundant, moderately abundant, and abundant (some of these are depicted in Figure 2). Carcass maturity, expressed A to E, is based on physiological cues and not chronological age, however, the two are usually related (Table 2).

Marbling and maturity can then be put together in a grid (Figure 3) to express the final quality grades. Beef quality grades, starting with the greatest expected palatability, include Prime, Choice, Select, Standard, Commercial, Utility, Cutter, and finally Canner. As maturity increases so must marbling to maintain a similar quality grade, with the exception of Select which is only available for A-maturity carcasses. Another distinction is the division in nomenclature between B and C-maturities. In classes of C and greater the onset of physiological maturity is great enough that even increased marbling will not create the same eating experience as similar marbling scored carcasses in the A-B maturity classes. By count and volume most beef in the United States falls into the more youthful maturity and quality grade classifications.

### Yield and Quality Grade Grid Pricing:

Currently between 55-60% of beef is priced based on formulated (grid) pricing. Regardless of retaining ownership and selling on a carcass grid basis, on the hoof, or selling cattle prior to slaughter, it must be noted that weight, yield grade, and quality grade, or the perceptions of these traits, has a large impact on value. If retaining ownership and selling on a yield, quality, or combined grid the value should accurately reflect the carcass weight and carcass grading characteristics. However, if selling on the hoof buyers will look at other clues that may (but not always) be indicative of what they can expect. Without prior knowledge or experience of the cattle some of the main cues will be frame size, muscling, and coat color. As of the writing of this article the current premiums and discounts are shown in Figure 4. The basis value is a 600-900 pound Choice, Yield Grade 2-3 carcass at \$204.31/Cwt. To give some additional context, the latest report available (week ending 03/18/2016; NW\_LS196) showed that 5.34% of the beef graded Prime, 70.72% Choice, 17.95% Select, and 5.98% fell into the "Other" category. Additionally, of cattle offered under USDA Certified Beef Programs (of which there are

currently 109), 61.16% were offered under a GLA Schedule (claiming some Angus influence) and 27.54% of the branded carcasses grading Choice fell into the upper 2/3<sup>rd</sup> Choice range.

What does this mean to the customer?:

Although an aspect of the beef quality grading system was to provide consumers some insight about the expected eating quality of the beef they purchase, one of our hurdles as an industry is that most consumers still do not fully understand what these terms mean. Furthermore, at the retail level it is common to hear terms such as “premium” attached to the quality grade of Choice. The term “premium” is typically used to identify beef that falls into upper 2/3 Choice (modest to moderate degree of marbling), but it is still somewhat ambiguous to the consumer. Adding to the terminology puzzle is an array of branded beef programs. However, it has been suggested that consumer perception of beef quality increased up to 12% with some basic knowledge of brand identity, which usually includes quality grade specifications (O’Quinn, 2015; Tatum 2015). As quality grade increases from Standard to Prime, so do sensory tenderness, juiciness, beef flavor, and buttery flavor (Tatum, 2015). Additionally, mean sensory scores were positively correlated with increasing quality grade and boxed beef and quality grade grid premiums, indicating that premiums for greater quality grades are aligned with improved eating experiences. Further supporting the association of quality grade and eating satisfaction, Tatum (2015) reported that the probability of a satisfactory eating experience was: 97% for Prime, 93% for Premium (upper 2/3) Choice, 82% for Low Choice, 66% for Select, and 55% for Standard.

The beef industry offers a multitude of options that fit into any lifestyle regardless of being driven by economics, lean/low fat diets, only concerned with the absolute best eating experience, or consumers that want a great eating experience for the value. The challenge is ensuring that consumers understand what quality grades mean and how they relate to their expectations.

For more information regarding beef grading standards see:

<https://www.ams.usda.gov/grades-standards/slaughter-cattle-grades-and-standards>

For additional information from O’Quinn (2015), Tatum (2015) and others see:

<http://www.cabpartners.com/news/research.php>

Table 1. Association of numeric Yield Grade with %BCTRC

Yield Grade	%BCTRC
1	52.3 or greater
2	50.0 – 52.3
3	47.7 – 50.0
4	45.4 – 47.7
5	Less than 45.4

Table 2. Relationship of maturity classification and age

Overall Maturity	Approx. Age
A	9 to 30 months
B	30 to 42 months
C	42 to 72 months
D	72 to 96 months
E	over 96 months

Figure 1. Representation of steer cross-section at the 12-13<sup>th</sup> rib of Yield Grade 2 (A) vs Yield Grade 5 (B). Photo from: Taylor, R.E. 1995. Scientific Farm Animal Production, 5<sup>th</sup> ed. Prentice Hall, Inc. Englewood Cliffs, NJ.

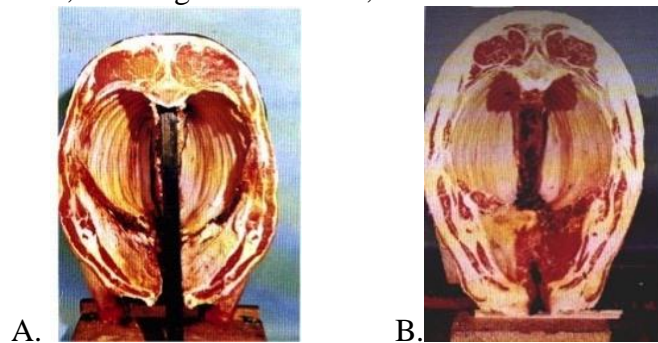


Figure 2. USDA Marbling Standards and associated Quality Grade if A-maturity. Pictures taken from the National Live Stock and Meat Board Official USDA Marbling Photographs, National Cattlemen’s Beef Association, 2000.

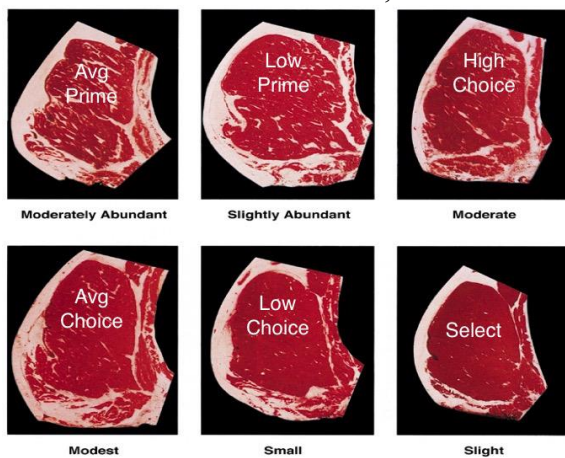


Figure 3. Beef Quality Grade Grid. Photo from: Meat Evaluation Handbook, American Meat Science Association, 2001.

RELATIONSHIP BETWEEN MARBLING, MATURITY, AND CARCASS QUALITY GRADE <sup>1</sup>					
DEGREES OF MARBLING	MATURITY <sup>2</sup>				
	A <sup>3</sup>	B	C	D	E
Abundant	PRIME				
Moderately Abundant					
Slightly Abundant				COMMERCIAL	
Moderate					
Modest	CHOICE				
Small				UTILITY	
Slight	SELECT				
Traces					
Practically Devoid	STANDARD			CUTTER	

<sup>1</sup>Assumes that firmness of lean is completely developed with the degree of marbling and that the carcass is not a "dark cutter."

<sup>2</sup>Maturity increases from the left to right (A through E).

<sup>3</sup>The A maturity portion of the figure is the only portion applicable to bullock carcasses.

Figure 4. Beef carcass grid pricing for deviations from Basis Value of Choice, Yield Grade 2-3, 600-900 pound carcasses. USDA-AMS Daily National Carlot Meat Report, 04/01/2016.

Equivalent Values for Outlying Beef Carcass Types						
Basis Value = 204.31						
Qty/Yield	(1)	Carcass Weights				
		400-500#	500-600#	600-900#	900-1000#	1000#/up
		-28.46	-14.25		-4.65	-23.93
Prime 1-3	13.32	\$189.17	\$203.38	\$217.63	\$212.98	\$193.70
Certified 1-3	5.21	\$181.06	\$195.27	\$209.52	\$204.87	\$185.59
Choice 1	3.69	\$179.54	\$193.75	\$208.00	\$203.35	\$184.07
Select 1	-6.11	\$169.74	\$183.95	\$198.20	\$193.55	\$174.27
Stndrd 1-3	-25.92	\$149.93	\$164.14	\$178.39	\$173.74	\$154.46
Prime 4	0.19	\$176.04	\$190.25	\$204.50	\$199.85	\$180.57
Choice 4	-11.67	\$164.18	\$178.39	\$192.64	\$187.99	\$168.71