



## Understanding Yield Grades and Quality Grades for Value-Added Beef Producers and Marketers

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The terms yield grade and quality grade are often, incorrectly, used interchangeably. The two terms are very different and they reflect very different carcass traits. It is important for cattle producers and value-added beef entrepreneurs to understand the difference between yield and quality grades and how both are determined and used in the industry. Important to the understanding and application of yield and quality grades is the definition of beef quality, cutability and undesirable carcass traits. This publication is intended to provide definitions and explanations of these important terms for cattle producers and entrepreneurs that are interested in direct marketing beef.

### Yield grades

Yield grades are expressed in numbers that estimate the percentage of expected cutability from a carcass. Cutability is defined as the percentage of closely trimmed, boneless, retail cuts from the round, loin, rib and chuck — the four major beef wholesale cuts. It is an estimate of the relative amount of lean, edible meat from a carcass.

The yield grade is determined by evaluating four carcass factors:

1. External fat thickness over the ribeye.
2. Ribeye area.
3. Estimate of the percentage of kidney, pelvic and heart fat.
4. Hot carcass weight.

Yield grade should not be confused with “yield” and should not be confused with quality grade. Yield is the dressing percentage which is calculated by dividing the carcass weight by the animal’s live weight.



Figure 1: USDA yield grade labels.

### Yield Grade Formula:

Yield Grade =  $2.5 + (2.50 * \text{Adj. Fat Thickness, inches}) + (0.20 * \% \text{Kidney, Pelvic and Heart}) + (0.0038 * \text{Hot Carcass Wt., pounds}) - (0.32 * \text{Ribeye Area, square inches})$

Using the yield grade formula, what is the Yield Grade for a carcass that weighs 760 pounds, has an Adj. Fat Thickness of 0.50 inches fat, 2.5% KPH and 13.2 sq. inches of REA?

$$YG = 2.5 + (2.50 * .45) + (0.20 * 2.5) + (0.0038 * 700) - (0.32 * 13.2) = 2.914.$$

This carcass would be marketed as a YG2 because the decimals are dropped and not rounded.

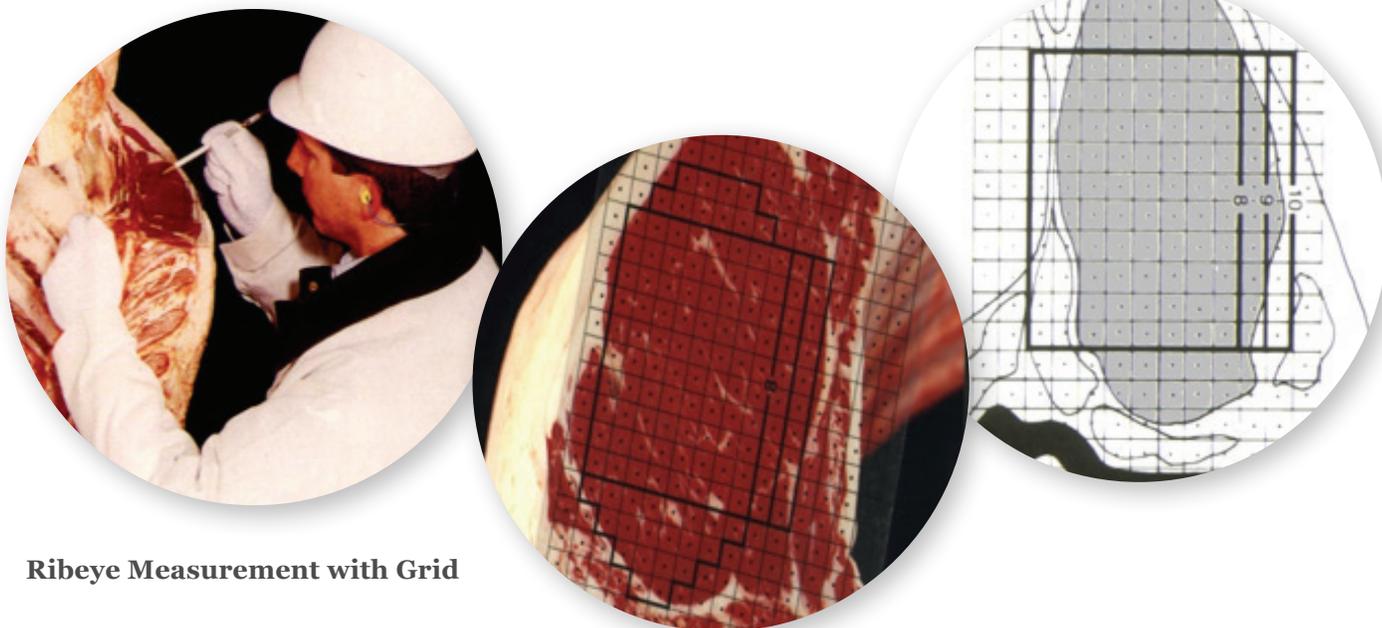
There are five yield grades: USDA yield grades 1, 2, 3, 4 and 5. The lower the numerical value of the USDA yield grade, the higher the expected yield of closely trimmed, boneless retail cuts. A yield grade 1 carcass provides the greatest amount of saleable beef while a yield grade 5 is the lowest-yielding carcass. An example yield grade stamp is provided in Figure 1.

Producers tend to use yield grades more than consumers. The yield grade is important to producers because it can affect animal value and the overall economic returns from the animal. Consumers are more familiar with quality grades, which are used to predict meat palatability.

### Beef cutability traits

Beef cutability traits are those carcass measurements or evaluations that predict the expected amount of retail cuts from the carcass. Carcass cutability traits evaluate indicators of fatness and muscling. USDA Beef Yield Grades are marketing tools that indicate carcass cutability. The carcass traits used to determine the USDA Yield Grade are:

**Fat Thickness at the 12th Rib (Adj. Fat Thickness):** To determine the overall fatness of a beef carcass, the carcass should be split between the 12th and 13th ribs. This split is called “ribbing the carcass.” The fat thickness is measured three-quarters the distance of the ribeye muscle from the backbone. Fat thickness measurement is oftentimes visually “adjusted” to reflect the total fatness of the carcass. For example, a USDA grader evaluates the total fatness of the carcass and can adjust the fat thickness higher if the carcass is fatter than the measurement or adjust the fat thickness lower if the carcass is leaner than the measurement indicates. Carcass fatness is the most important factor in determining cutability.



### Ribeye Measurement with Grid

**Ribeye Area:** Ribeye area is the area of the ribeye muscle located at the 12th and 13th ribs. The ribeye muscle, and only the ribeye muscle, is measured using a grid. The muscle area is expressed in square inches. Most fed beef carcasses will have ribeye areas measuring between 11 and 15 square inches.

**Percent Kidney, Pelvic Fat and Heart (% KPH):** The percent KPH is the internal fat in or around the kidney, pelvic and heart regions. KPH is expressed as a percentage of the hot carcass weight. Most carcasses will have 1.5-4.0 percent KPH.

**Hot Carcass Weight:** HCW is the unchilled carcass weight in pounds after the head, hide and internal organs have been removed. For most fed cattle, HCW will be approximately 60-64 percent of the live animal slaughter weight (dressing percent). Acceptable carcass weight typically ranges from 600 pounds to 900 pounds.

Quality grades are indicators of the expected palatability of the beef including flavor, juiciness and tenderness. The expected palatability is expressed through eight different quality grades:

- Prime
- Choice
- Select
- Standard
- Commercial
- Utility
- Cutter
- Canner

The prime, choice, and select grades are typically used for retail and food service cuts of meat while the lower grades are often used in manufactured beef products. The quality grade is determined by carcass maturity and marbling.



### Beef quality carcass traits

Beef quality carcass traits are the carcass characteristics most associated with beef palatability or eating satisfaction of the beef. USDA Quality Grades are an assessment of eating quality and are determined by carcass maturity and marbling.

**Maturity:** There are five classifications for beef carcass maturity: A, B, C, D and E. Maturity refers to the physiological age and not necessarily the chronological age of the animal. Although not perfectly related to the actual age of the animal, A maturity cattle tend to be 9-30 months of age, B is 30-42 months, C is 42-72 months, D is 72-96 and "E" is greater than 96 months of age. Most fed beef will be A maturity. Physiological maturity is determined by the ossification (cartilage turning to bone) pattern of the backbone, lean color, and rib bone shape and color. The most important factor is the ossification pattern of the dorsal tip (button) of the thoracic vertebrae. The thoracic vertebrae is the section of the backbone that has the ribs attached. In A maturity cattle, the buttons will have no to very little ossification, the ribs are red and round, the lean color is light red and the lean texture is fine. As cattle mature, the buttons contain greater ossification, the ribs become whiter and flatter, the lean color becomes darker and the meat texture becomes more coarse (grainy).

**Marbling:** Marbling is defined as the flecks of fat within the muscle (i.e., intramuscular fat) and is associated with the flavor and juiciness of meat. Greater marbling levels tend to improve eating satisfaction. Marbling is evaluated in the ribeye muscle between the 12th and 13th ribs. There are nine degrees of marbling: abundant (most), moderately abundant, slightly abundant, moderate, modest, small, slight, traces and practically devoid (least). The greater the amount of marbling, the higher the quality grade.

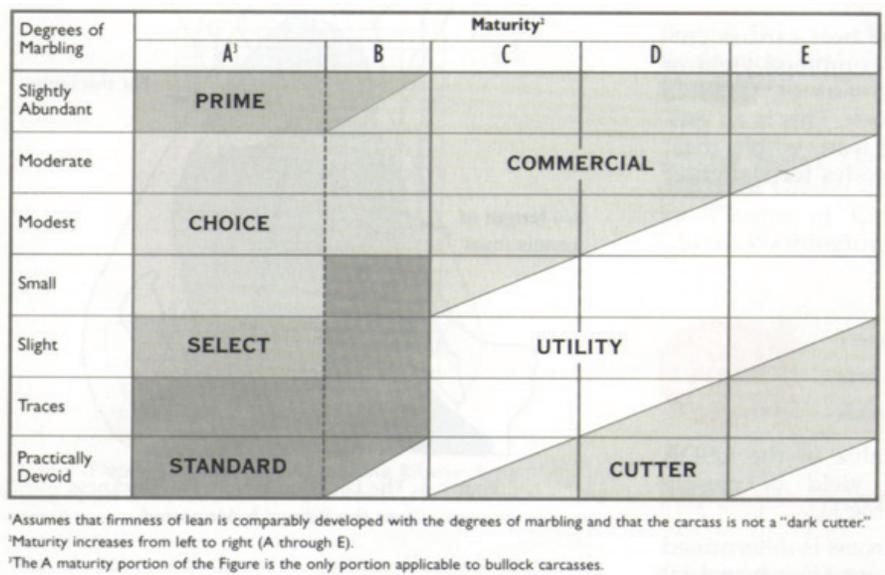


Figure 2: Beef Carcass Merit Chart

The USDA grading chart that appears in Figure 2 shows the relationship of maturity and marbling to the USDA Quality Grade. In a maturity, prime carcasses have slightly abundant or greater marbling, choice has small to moderate marbling, select has a slight degree of marbling and standard carcasses have traces and practically devoid. Some cattle are marketed as "premium choice" (Ex. Certified Angus Beef) and they are typically A maturity with modest and moderate degrees of marbling.

### Official USDA

Official USDA quality grades can only be assigned and used in marketing when done by an official USDA grader. Quality grades are not automatically done by USDA and the on-site inspector is not an official quality grader. The on-site USDA inspector works for the Food Safety and Inspection Service (FSIS) while the USDA quality grader works for the Agricultural Marketing Service (AMS). FSIS and AMS are both units of USDA, but they are different agencies. AMS offers quality grading on a voluntary and fee-based basis. If an animal owner desires to have meat from their animal graded, an official USDA, AMS quality grader must be requested to be on-site during processing. Quality grades can only be used in marketing when graded by an official USDA, AMS quality grader.

While lots of folks often estimate or guess at quality grades either from looking at a live animal, looking at an ultrasound or from observing the carcass, it is important to stress that quality grades can only be used in marketing or promotions when graded by an official USDA, AMS grader. Many times, the official USDA quality grade will be advertised or promoted to the consumer. This promotion may be done by application of the official USDA quality grade shield directly on the

### Inspection vs Grading

Difference between graders and inspectors: USDA employs both graders and inspectors. Inspectors work for USDA's Food Safety and Inspection Service (FSIS) while graders work for Agricultural Marketing Service (AMS). FSIS inspectors are responsible for inspecting live animals, carcasses, internal organs and the head. They also evaluate beef, byproducts and the facility for safety, cleanliness and wholesomeness. AMS graders evaluate carcasses for quality and cutability. Graders are also responsible for certifying various USDA Certified programs such as Certified Hereford Beef or Certified Angus Beef.

Figure 3: Examples of grade shields.



### Inspection vs Grading continued...

A USDA grader, not an inspector, determines both yield grades and quality grades, often at the same time during processing. That is, when a USDA grader is in a processing facility to grade carcasses, he or she normally provides both the yield grade and quality grade. Both of these measures can be valuable to the cattle producer for the purpose of comparing carcass traits genetics and other production considerations. The quality grade can be of additional value and benefit to consumers.

packaging. These shields are often referred to as the quality grade stamp. Example quality grade shields for USDA Prime, USDA Choice and USDA Select are shown in Figure 3.

Additional information about official USDA meat grading can be obtained from the USDA, AMS Meat Grading and Certification Branch Office at: <https://tiny.utk.edu/ag/meatgrading>

### Undesirable carcass traits

Undesirable carcass traits are those carcass characteristics that can negatively affect beef palatability or marketing. Producers should follow good management and quality assurance practices to produce high-quality, wholesome beef. Among the most common undesirable carcass traits are bruises, injection site scar tissue and dark cutters.

**Bruises and Injection Sites:** Trim losses from bruising and injection contamination are costly to both producers and packers. Producers should follow good management practices and beef quality assurance programs that result in safe, high-quality beef products.

**Dark Cutters:** Dark cutting refers to muscle tissue that does not turn the typical red color when the meat is exposed to air. Dark cutting beef is often a result of stress to the animal prior to harvesting. Environmental factors such as extreme heat, cold and rain or extreme weather fluctuations can lead to dark cutters as well. Other psychological and nutritional issues may cause the muscle color to develop improperly as well. Dark cutters do not pose food safety or meat palatability problems, but are often not marketable due to their abnormally dark color.



## Summary

A better understanding of the terms yield grade and quality grade should be helpful as value-added beef producers and marketers communicate with their processor and customers. Yield and quality grades are important meat terms that relate directly to cattle production and profitability. While yield and quality grades are often used incorrectly to describe the same thing, they actually reflect very different carcass traits. It is important to understand that official USDA quality grades can only be assigned and used in marketing when done by an official USDA, AMS grader. It is important for cattle producers and value-added beef entrepreneurs to understand the difference between yield and quality grades and how both are determined and used in the industry.



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