Beef Grading

By Daryl Tatum, Ph.D.
Department of Animal Science
Colorado State University
Ft. Collins, Colorado

The grade of a beef cut sold at retail can be an important selection factor for many consumers. Likewise, the grade of a beef carcass is critical to the beef producer, since the dollar value received is directly dependent upon the grade. Yet consumers and producers alike often are confused as to what grades mean, and how they are determined.

Purpose of Beef Grading

The U.S. Department of Agriculture (USDA) has established Standards for Grades of Slaughter Cattle and Standards for Grades of Carcass Beef (USDA, 1996), which are designed to facilitate beef marketing by separating a highly variable population of live cattle and/or beef carcasses into groups which are more uniform in quality and composition. Beef carcass grading is a voluntary service of the USDA, and the user (the packer) is charged a fee for the service. Grades are determined by an employee of the USDA, working independently of both the producer and packer. The USDA Standards include two separate grade designations — Quality Grades and Yield Grades — and are designated by the stamps shown in Figure 1. A carcass may be either Quality graded, or Yield graded, or both Quality and Yield graded at the same time.

Quality Grading

Beef quality refers to the expected eating characteristics (tenderness, juiciness and flavor) of the cooked product. USDA Quality Grades are used to reflect differences in expected eating quality among slaughter cattle and their carcasses. There are eight USDA Quality Grades for beef:

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

Eating quality generally is most desirable for "Prime beef" and least desirable for "Canner beef". The Quality Grade of a beef carcass is determined by evaluating carcass indicators of physiological maturity and marbling, as reflected in the Official USDA Grading Chart (Figure 2).

Maturity. The age of a beef animal has a direct effect on tenderness of the meat it produces. As cattle mature, their meat becomes progressively tougher. To account for the effects of the maturing process on beef tenderness, evaluations of carcass maturity are used in determining USDA Quality Grades. There are five maturity groupings, designated as A through E. Approximate ages corresponding to each maturity classification are:

A — 9 to 30 months
B — 30 to 42 months
C — 42 to 72 months
D — 72 to 96 months
E — more than 96 months

Figure 1: Quality and Yield Grade Stamps for Beef Carcasses
Table 1: Expected yields of country-trimmed beef grade.

<table>
<thead>
<tr>
<th>Yield Grade</th>
<th>%CTBPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>&lt;45%</td>
</tr>
<tr>
<td>4</td>
<td>45% to 74%</td>
</tr>
<tr>
<td>3</td>
<td>75% to 90%</td>
</tr>
<tr>
<td>2</td>
<td>91% to 95%</td>
</tr>
<tr>
<td>1</td>
<td>&gt;95%</td>
</tr>
</tbody>
</table>

USDA Quality Grade. Visual evaluations of marbling within the lean is the primary determinant of the retail cut, but the amount and distribution of intramuscular fat measured in the carcass determines the yield grade. The Grades: Prime, Choice, Select, Good, and Utility correspond to the yield grades of 1, 2, 3, 4, and 5, respectively. The IMF content, evaluated visually, can vary among carcasses within a single breed and among lots of the same age and gender. The challenges in quality assurance are inherent in the above muscle - how to ensure uniform and consistent quality within the same slaughter lot. The IMF content can vary depending on the part of the carcass, the breed, and the age of the animal. The IMF content in the Ribeye area is higher than in the Sirloin area.

Figure 2: USDA Beef Cuts.

The A category portion of the Ribeye is the only portion applicable to Choice carcasses. The B category portion of the Ribeye is applicable to the Prime category. The C category portion is applicable to the Choice category. D and E category portions are applicable to Select, Good, and Utility carcasses. The IMF content, evaluated visually, can vary among carcasses within a single breed and among lots of the same age and gender. The challenges in quality assurance are inherent in the above muscle - how to ensure uniform and consistent quality within the same slaughter lot. The IMF content can vary depending on the part of the carcass, the breed, and the age of the animal. The IMF content in the Ribeye area is higher than in the Sirloin area.
Yield Grading

USDA Yield Grades estimate beef carcass cutability, which is defined as the combined yield of closely trimmed, boneless retail cuts (% CTBRC) from the round, loin, rib and chuck. This is an estimate of the relative amount of lean, edible meat from a carcass. The five Yield Grades for slaughter cattle and beef carcasses are:

USDA Yield Grade 1  
USDA Yield Grade 2  
USDA Yield Grade 3  
USDA Yield Grade 4  
USDA Yield Grade 5

The lower the numerical value of the USDA Yield Grade, the higher the yield of closely trimmed, boneless retail cuts (Table 1).

The Yield Grade of a beef carcass is determined by evaluating the following factors: (1) external fat thickness over the ribeye, (2) ribeye area, (3) estimated percentage of kidney, pelvic and heart fat (% KPH), and (4) hot carcass weight.

Fat Thickness. Fat thickness is measured at a point three-fourths of the distance of the length of the ribeye from its chine bone side (Figure 4). This single measurement is a reasonably accurate predictor of overall carcass fatness; however, to improve the accuracy of the predictions of overall carcass fatness, the fat thickness measurement usually is adjusted up or down by the grader to account for visible differences in the distribution of external fat in other areas of the carcass.

Ribeye Area and Carcass Weight. The relationship between ribeye area and carcass weight is used in Yield Grading beef carcasses to reflect differences in cutability stemming from carcass musculature. Ribeye area normally ranges from about 9 to 17 square inches among carcasses of common weights and can be measured using a plastic grid (Figure 5).

Kidney, Pelvic and Heart Fat Percentage (%KPH). Fat deposits around the kidney and heart, and in the pelvic cavity, typically are left in the carcass during the slaughter process and affect carcass cutability. Most carcasses have 1% to 4% of the carcass weight represented as kidney, pelvic and heart fat.

Determining USDA Yield Grades. The formula for calculating Yield Grade is:

\[ YG = 2.5 + (2.5 \times \text{adjusted fat thickness, in.}) + (0.20 \times \text{KPH\%}) - (0.32 \times \text{ribeye area, sq. in.}) + (0.0038 \times \text{hot carcass weight, lbs.}) \]

While the USDA Grader may use this equation occasionally, most determinations are based upon
the Grader's experience and training, checking occasionally with the formula when requested to do so. The same holds true for the Grader's determination of the USDA Quality Grade.

Summary

Consumers and producers often do not have a clear understanding of beef grading. Beef grades are of two types, Quality Grades and Yield Grades. Most consumers are familiar with the names of several Quality Grades and may use them as a selection criterion when purchasing at retail. However, Yield Grades have less direct impact on consumer selection decisions. Producers, on the other hand, depend greatly on both Quality and Yield Grades as a marketing tool for beef cattle and carcasses.

USDA Quality Grades are used to predict the palatability of meat from a beef animal or carcass, using carcass physiological maturity and marbling to determine the USDA grade. USDA Yield Grades are used to estimate the expected edible lean meat, with a USDA YG 1 being the leanest and a USDA YG 5 being the fattest.

References


This fact sheet was authored and reviewed by members of the American Meat Science Association.

For more information, contact:

Center for Quality
National Cattlemen's Beef Association
444 North Michigan Avenue
Chicago, Illinois 60611
(312) 467-5520

This fact sheet was developed by the Center for Quality of the National Cattlemen's Beef Association as part of a coordinated effort with State Beef Councils and the Beef Board.