Economically important traits for beef cattle evaluation that will be discussed are: 1) live weight; 2) dressing percent; 3) muscling; 4) fat thickness; 5) yield grade; and 6) quality grade.

**Live Weight** – Beef Cattle have a wider range of market weights than other species due to differences in type and maturity.

- Normal Range: 950-1500 lb.
- Average: 1150 lb.

**Dressing percent** – Dressing percent is important because it reflects the amount of carcass in relation to the animal’s live weight. Dressing percent is calculated by using the following formula:

\[
\text{Dressing \%} = \frac{\text{Hot Carcass Wt.}}{\text{Live Animal Wt.}} \times 100
\]

Dressing percent is affected by the fill, finish, muscling, sex, type, and if the animal is pregnant or not.

- Normal Range: 55-67% for steers and heifers
- Average: 62% for Choice steers and heifers

**Muscling** – Muscling can be estimated visually by a number of traits. A good indication of total carcass muscle is the ribeye. Generally, an average beef steer has approximately 1.1 sq. in. of ribeye area per 100 lb. live weight. For example – a 1,000 lb. steer should have an 11.0 sq. in. ribeye.

- Normal Range: 10 – 18.0 in²
- Average: 12.6 in² for a 1150 lb. steer; 11.6 in² for a 1150 lb. heifer

**Fat Thickness** – The primary estimate of fatness is fat thickness at the 12th rib. It is used to assess total fat on the carcass.

- Normal Range: .15 -.8 in.
- Average: .5 in.

**Yield Grade** – Yield Grade is an estimate of percent retail yield of the four primal cuts of beef (chuck, rib, loin, and round) and is also known as cutability. Yield Grade identifies the difference in the yield of lean red meat to waste fat.

- USDA 1 – Most desirable, trim
- USDA 2
- USDA 3 – Industry average
- USDA 4
- USDA 5 – Least desirable, excessively fat

Yield grade is based on the four following traits:

1) hot carcass weight
2) fat thickness at the 12th rib
3) percent of kidney, heart, pelvic fat
4) ribeye area
The following is a three-step method for calculating yield grade:

1) A preliminary yield grade is first determined solely on 12th rib fat thickness. PYG = 2.0 + (2.5 x fat thickness)

<table>
<thead>
<tr>
<th>Thickness of Fat Over Ribeye, in.</th>
<th>Preliminary Yield Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>.2</td>
<td>2.5</td>
</tr>
<tr>
<td>.4</td>
<td>3.0</td>
</tr>
<tr>
<td>.6</td>
<td>3.5</td>
</tr>
<tr>
<td>.8</td>
<td>4.0</td>
</tr>
<tr>
<td>1.0</td>
<td>4.5</td>
</tr>
<tr>
<td>1.2</td>
<td>5.0</td>
</tr>
<tr>
<td>1.4</td>
<td>5.5</td>
</tr>
</tbody>
</table>

2) Adjust the preliminary yield grade using the estimates of ribeye area and carcass weight. Carcass weight of the animal can be calculated by estimating the animal’s dressing percent and multiplying it by the live weight of the animal.

<table>
<thead>
<tr>
<th>Carcass Wt. (lb.)</th>
<th>Required Ribeye Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>9.8</td>
</tr>
<tr>
<td>550</td>
<td>10.4</td>
</tr>
<tr>
<td>600</td>
<td>11.0</td>
</tr>
<tr>
<td>650</td>
<td>11.6</td>
</tr>
<tr>
<td>700</td>
<td>12.2</td>
</tr>
<tr>
<td>750</td>
<td>12.8</td>
</tr>
<tr>
<td>800</td>
<td>13.4</td>
</tr>
</tbody>
</table>

Adjust the preliminary yield grade by 0.3 for every 1.0 sq. in. change in ribeye from the size given for a particular carcass weight. If you estimate an animal to be above average in muscling, the adjustment is subtracted from preliminary yield grade; if below average in muscling, then the adjustment is added.

PYG Adj. = (Required REA – Actual REA) x 0.3

3) Estimation of percent kidney, pelvic and heart fat (KPH%) in live steers is extremely difficult to assess with consistent success. The average KPH% for an average steer is 2.5%. Thus, the adjustment for every 1.0% change above or below 3.5% is .2 of a yield grade. If internal fat is above 3.5%, the adjustment factor is added; if below, the adjustment factor is subtracted.

PYG Adj. = (Actual KPH – 3.5) x .02

Example:
Fat Thickness = 0.2 in. Preliminary Yield Grade = 2.5
Ribeye Area = 14.5 sq. in Adjustment for REA = -.7
(Live wt. = 1,130 lb., dressing percent is estimated at 62%, thus carcass wt. = 700 lb.)
Percent Internal Fat = 2.5% Adjustment Factor = -.2
Final Yield Grade = 1.6
**Quality Grade** – Quality is important in meat products to insure customer satisfaction. Quality can be identified as those factors that affect the palatability of tastefulness, flavor and juiciness of the meat. Quality grading of beef carcasses is determined by two subjectively scored factors in all cases where color, texture, and firmness of lean are normal.

**Maturity** – is the physiological age of the carcass. Maturity is important since the tenderness of lean muscle decreases as the animal advances in age. It is measured by the degree of ossification of the vertebrae.

<table>
<thead>
<tr>
<th>Approximate Age (months)</th>
<th>9 – 30</th>
<th>30 – 42</th>
<th>42 – 72</th>
<th>72 – 96</th>
<th>&gt;96</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maturity</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>Classification</td>
<td>Young Cattle</td>
<td>Mature Cattle</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Marbling** – The amount of fat within the muscle is known as marbling or intramuscular fat. The marbling is scored in the ribeye muscle at the 12th rib. There are nine degrees of marbling and they are listed from the least amount to the highest.

1. Practically Devoid
2. Traces
3. Slight
4. Small
5. Modest
6. Moderate
7. Slightly Abundant
8. Moderately Abundant
9. Abundant

Maturity and marbling are evaluated and combined to determine the final quality grade. These eight quality grades of beef are shown below.

The quality grading chart (Figure 1) shows that carcasses of A and B maturity are eligible for the Prime, Choice, Select, Standard and Utility quality grades. Older carcasses of C, D and E maturity qualify only for the Commercial, Utility, Cutter and Canner grades.

![Relationship between marbling, maturing and carcass quality grade](image)

Figure 1. Relationship between marbling, maturing and carcass quality grade*.

*Assumes that firmness of lean is comparably developed with the degree of marbling and that the carcass is not a "dark cutter."

**Maturity increases from left to right (A through E).

***The A maturity portion of the figure is the only portion applicable to bullock carcasses.
Cattle Quality Grades
Cattle Yield Grades

YIELD GRADE 1

YIELD GRADE 2

YIELD GRADE 3

YIELD GRADE 4

YIELD GRADE 5