Purpose

• Review the USDA “standards”, which reflect the value of cattle and meat
  – Grades of Feeder Cattle and Grades of Meat

• Review “Tenderness” of meat

• Consider how these affect your production goals.

• Focus points
  – Muscle Thickness & Frame Sizes
  – Yield Grades & Quality Grades
  – Factors which affect tenderness
Feeder Cattle Grades

- Muscle Thickness (four categories)
- Frame Score (three categories)

Muscle Thickness (1-4)

#1 Moderately Thick
#2 Tends to be slightly thick
#3 Thin
#4 Less thickness than minimum for #3
Frame Size

- Two scales
  - 1 to 9 scale for BIF (Beef Improvement Federation)
  - Small, medium and large frame (USDA scale)

Tables convert
Hip height for age $\rightarrow$ frame score

See Frame Score and Feeder
Cattle Grades (CL775)
Related to the weight an animal will produce a carcass of grade “Choice”

Feeder Cattle Grades

• Muscle Thickness (four categories)
• Frame Score (three categories)
  – 12 Combinations of grades for thrifty cattle (3 frame size and 4 muscle thickness)
    For example:
    medium frame, #2 steer
    large frame, #1 steer
  – Inferior Grade for unthrifty animals
Frame Size & Expected Weight to Grade Choice

<table>
<thead>
<tr>
<th>FRAME</th>
<th>STEERS</th>
<th>HEIFERS</th>
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<tbody>
<tr>
<td>Large +</td>
<td>↑ 1250#</td>
<td>↑</td>
</tr>
<tr>
<td>Large</td>
<td>↑</td>
<td></td>
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<tr>
<td>Large -</td>
<td>1150#</td>
<td></td>
</tr>
<tr>
<td>Medium +</td>
<td>↑</td>
<td>↑</td>
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<tr>
<td>Medium</td>
<td>↑ 1100#</td>
<td>↑</td>
</tr>
<tr>
<td>Medium -</td>
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</tr>
<tr>
<td>Small +</td>
<td>↑ 1100#</td>
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<tr>
<td>Small</td>
<td>↓</td>
<td>↓</td>
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<tr>
<td>Small -</td>
<td>1000#</td>
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</table>

Small, medium, and large frame steers.
To yield high and grade choice, each size must be fed to a different weight.
If cattle are fed to the weight represented by the middle line, the small-framed cattle are overdone, the medium-framed cattle are about the right finish, and the larger-framed cattle are underfinished.

Small, medium, and large frame steers. To yield high and grade choice, each size must be fed to a different weight.
Yield Grade (YG)

- **YG** = yield (cutability)
  - Percent of boneless, closely trimmed retail cuts
  - Greatly affected by amount of excess trimmable fat and muscling

- Scores range from 1 to 5

- 1 is the highest YG, 5 is the lowest YG
Yield Grade 1 & 2: Desirable

Yield Grade 4 or 5: Over-Finished

All grades are possible on grain and/or grass rations, depending on feed quality, amount fed, and time on feed.

Yield Grade From Carcass Measurements

- Amount of fat, measured in tenths of inches, over the rib-eye muscle (back fat or BF).
- Kidney, pelvic, & heart (KPH) fat, which is estimated as a percentage of carcass weight.
- Area of the rib-eye muscle, which is measured in square inches (REA).
- Hot carcass weight. Carcass weight reflects the amount of inter-muscular fat.
Yield Grade =

= 2.50 + 2.50 (inches of fat at 12th & 13th rib) + 0.20 (% kidney, heart & pelvic fat) + 0.0038 (lb hot carcass weight) - 0.32 (square inches of rib eye muscle)
BF = Back fat measured at the 12th & 13th rib (tenths of an inch)

Rib-eye area = REA (sq. in.)

KPH = % kidney, pelvic, and heart fat
Quality Grades

- Prime
- Choice
- Select
- Standard
- Utility

Indicating characteristics are

- Maturity
  - A < 30 months of age
  - B from 30-42 months of age
- Marbling
- Texture of the lean
- Firmness of the lean & fat
- Color of the lean & fat
Quality Grading Chart

<table>
<thead>
<tr>
<th>Degrees of Marbling</th>
<th>A+++</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Degrees of Maturity</th>
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<tbody>
<tr>
<td>Slightly Abundant</td>
<td>Prime</td>
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<td></td>
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<td>Traces</td>
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<tr>
<td>Practically Devvoid</td>
<td>Standard</td>
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<td></td>
<td>Practically Devvoid</td>
</tr>
</tbody>
</table>

The chart illustrates the grading of meat based on marbling and maturity, with categories ranging from 'Prime' to 'Practically Devvoid.'
Palatability of Meat
(not in official grade)

- Tenderness, juiciness, and flavor (eating quality)
- Tenderness has the most variability among steaks
- Amount and solubility of connective tissue, and amount of intramuscular fat (marbling), have been associated with meat tenderness.

Meat tenderness - factors

- Genetics (h^2 ~45% of the variation) ★★★
- Age of the animal
  - collagen ↑ complexity and strength with age
  - > 30 mo, more pronounced
- Not a function of feed type
  - grain vs. grass
  - indirect effect of age at harvest
Measuring Meat Tenderness

- Warner-Bratzler Shear force
  - Core and shear cooked meat
  - Measure force to shear
- Trained panels

Meat tenderness - factors

- Location of the cut
  - Tenderloin vs. fore shank
  - Connective tissue needed for locomotion
- Processing
  - Tenderness improves with postmortem storage
  - Amount of stretch or tension upon hanging
  - Hind leg, pelvic or hip bone methods
  - Electrical stimulation
  - Chilling rate
Meat tenderness - factors

• Chill Rate
  – tender beef $\rightarrow$ rigor mortis meat (6 – 12 hr)
  – “cold shortening” - chill to < 60° F before rigor
  – “thaw rigor” - frozen before rigor
  – <0.5” back fat – problems with chill rate

• Aging
  – Done after rigor mortis, natural enzymatic process, improves tenderness
  – Complete at 35°, for 7 – 10 days post slaughter

Meat tenderness - factors

• Pre-cooking and Cooking
  – Dissolves/degrades collagen and elastin (connective tissue proteins)
  – Slow thawing, grinding, chemicals (salting, marinating, vegetable enzymes), etc…

• Method of cooking and Degree of doneness
  – Quality grades (marbling) and cuts of meat need to be considered.