Feeder Cattle Grades, Carcass Grades, & Meat Palatability

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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

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<tr>
<th>FRAME</th>
<th>STEERS</th>
<th>HEIFERS</th>
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<td>Large +</td>
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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.
CARCASS

GRADES

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)

Carcass Measurements
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

Quality Grades

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
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.

Richard J. Epley (Univ. of Mn);
D. Koochmarae (USDA MARC)

Meat tenderness - factors

• Genetics (h² ~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 → 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.