Quality grade's prediction of tenderness

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Carcass grading

- Grading has two measures
  - Quality grade
    - **Tenderness**, juiciness, and flavor
  - Yield grade
    - Cutability of a carcass…how much from the round, loin, chuck, and rib

Background carcass grading

- Original system designed in 1916 – used WWI
  - First fee for service grading in 1927
  - First mandatory grading was in WWII

- System has constantly evolved
  - 1939 configured the system to include cows, steers, and heifers – 1941 added bulls
  - 1965 - cutability (yield) grades were incorporated
  - 1965 – all carcasses must be ribbed for grading

Carcass grading history

- 1975 – added marbling to the A maturity requirements
- 1976 – eliminated conformation as part of grading
- 1987 – changed good to select
- Finally, 1989 allowed yield and quality grade to be viewed separately
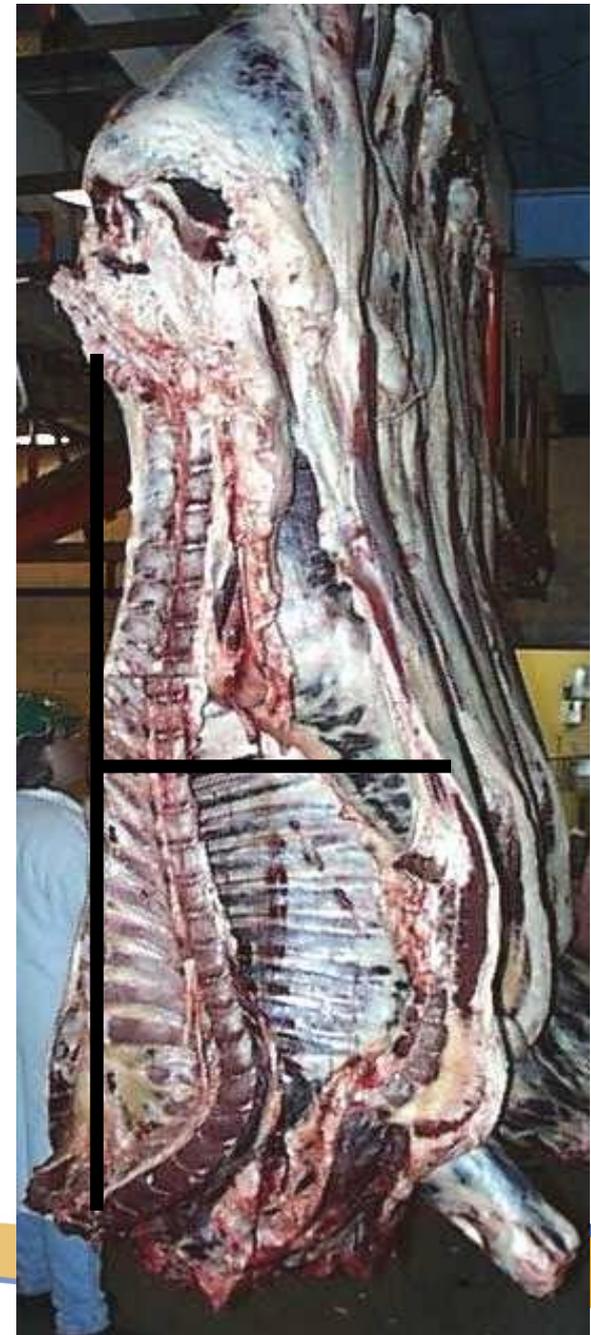- Current restrictions of maturity and marbling in each grade were made in 1997

Relationship Between Marbling, Maturity, and Ca...

Degrees of Marbling

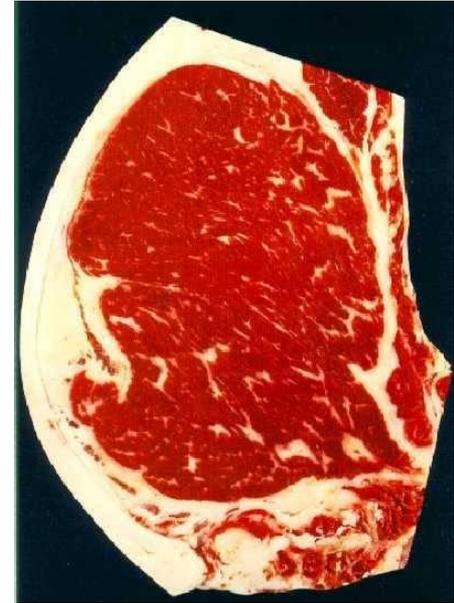| Maturity Group	Age
A	9 to 30 months
B	30 to 42 months (2.5 to 3.5 years)
C	42 to 72 months (3.5 to 6 years)
D	72 to 96 months (6 to 8 years)
E	Over 96 months (over 8 years)

How do we look at them?

Carcass Quality
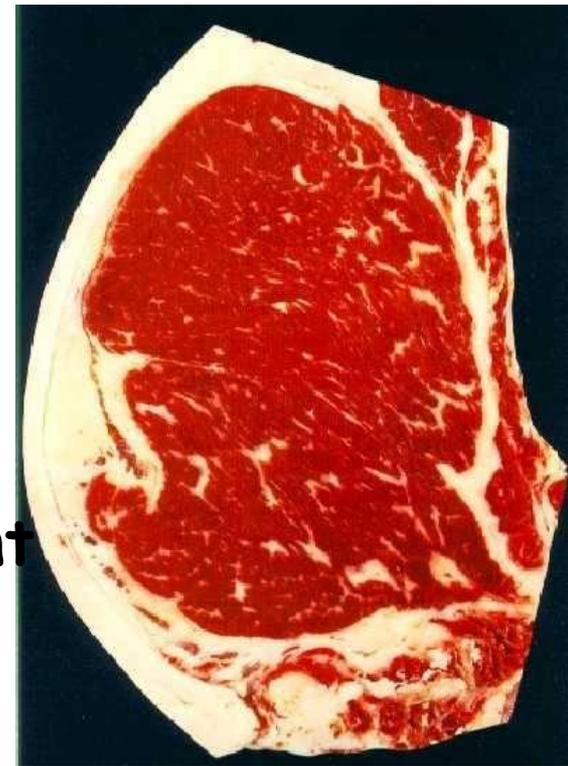
- Maturity
- Color
- Firmness
- Texture
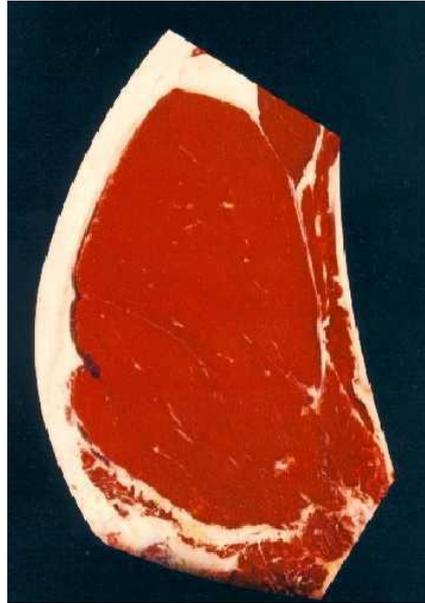
• <u>Marbling</u>


Slight

Slightly Abundant

Marbling

Slightly Abundant

- What does marbling tell us?

- The amount of fat within the muscle.
  - Intramuscular fat

Percent Intramuscular Fat	Quality Grade	Marbling Degree	Marbling Score
2.3 - 3.0	Select -	Slight 0 - 40	4.0 - 4.4
3.1 - 3.9	Select +	Slight 50 - 90	4.5 - 4.9
4.0 - 5.7	Choice -	Small 0 - 90	5.0 - 5.9
5.8 - 7.6	Choice o	Modest 0 - 90	6.0 - 6.9
7.7 - 9.7	Choice +	Moderate 0 - 90	7.0 - 7.9
9.9 - 12.1	Prime -	Slightly Ab 0 - 90	8.0 - 8.9
12.3 -	Prime o	Moderately Ab 0 -	9.0 -

Choice -
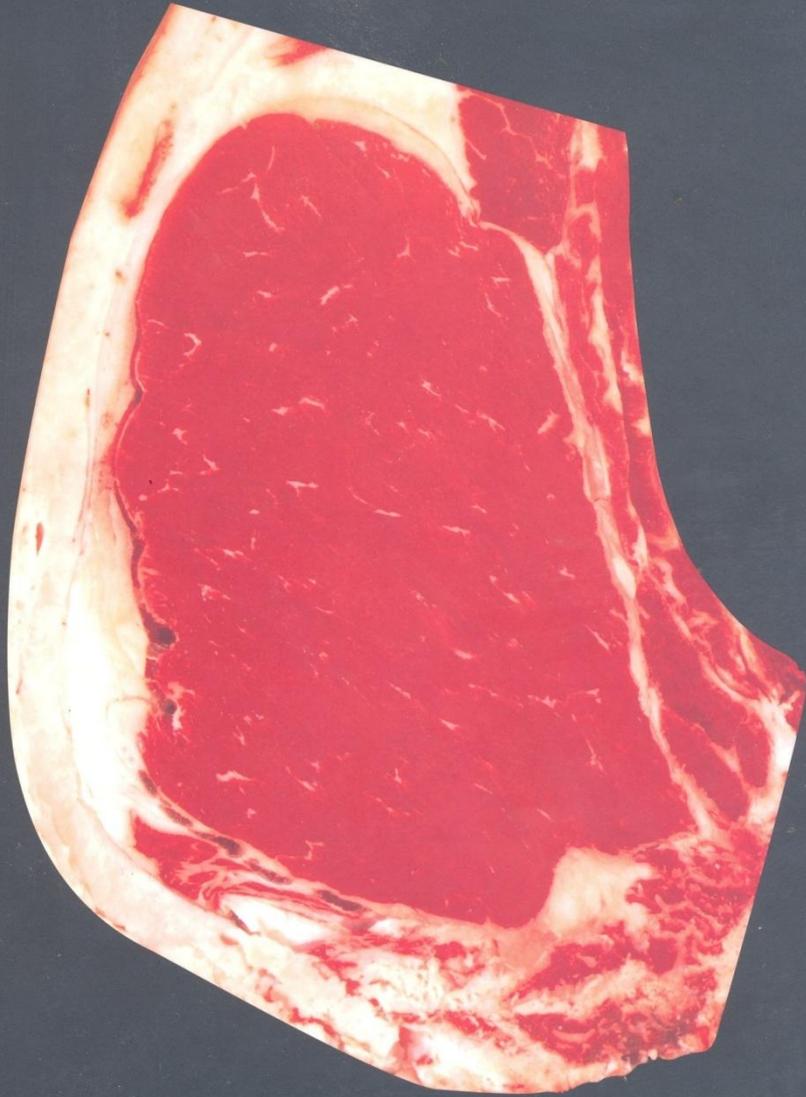
Choice -

Small (Sm⁰)

Small (Sm⁵⁰)

Choice average

Choice +

Modest (Mt°)

Moderate (Md°)

How well does it work?

- **Beef Customer Satisfaction: Role of Cut, USDA Quality Grade, and City on In-Home Consumer Ratings (Neely et al. 1998)**

  - Quality grade correlated with overall likableness but...

    - **It depended on specific cut**
      - **No difference for top sirloin cut**
      - **Could pick out high choice for the round**
      - **Top loin was picked out by all quality grades used**
        - » **(high choice) (low choice/high select) (low Select)**
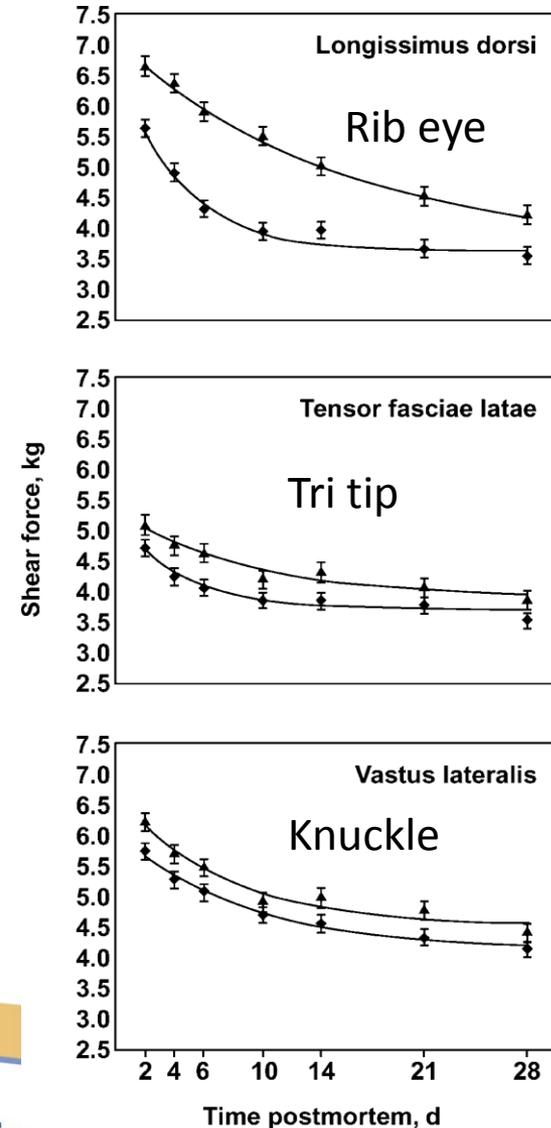
Quality grade vs. Shear force?
(Lorenzen et al. 2003)

Cut	Top Choice	Low Choice	High Select	Low Select
Top loin	2.6^g	2.6^g	2.8^f	2.7^f
Top sirloin	3.1^e	3.2^d	3.2^d	3.3^d
Top round	3.8^b	3.7^c	4.0^a	4.0^a

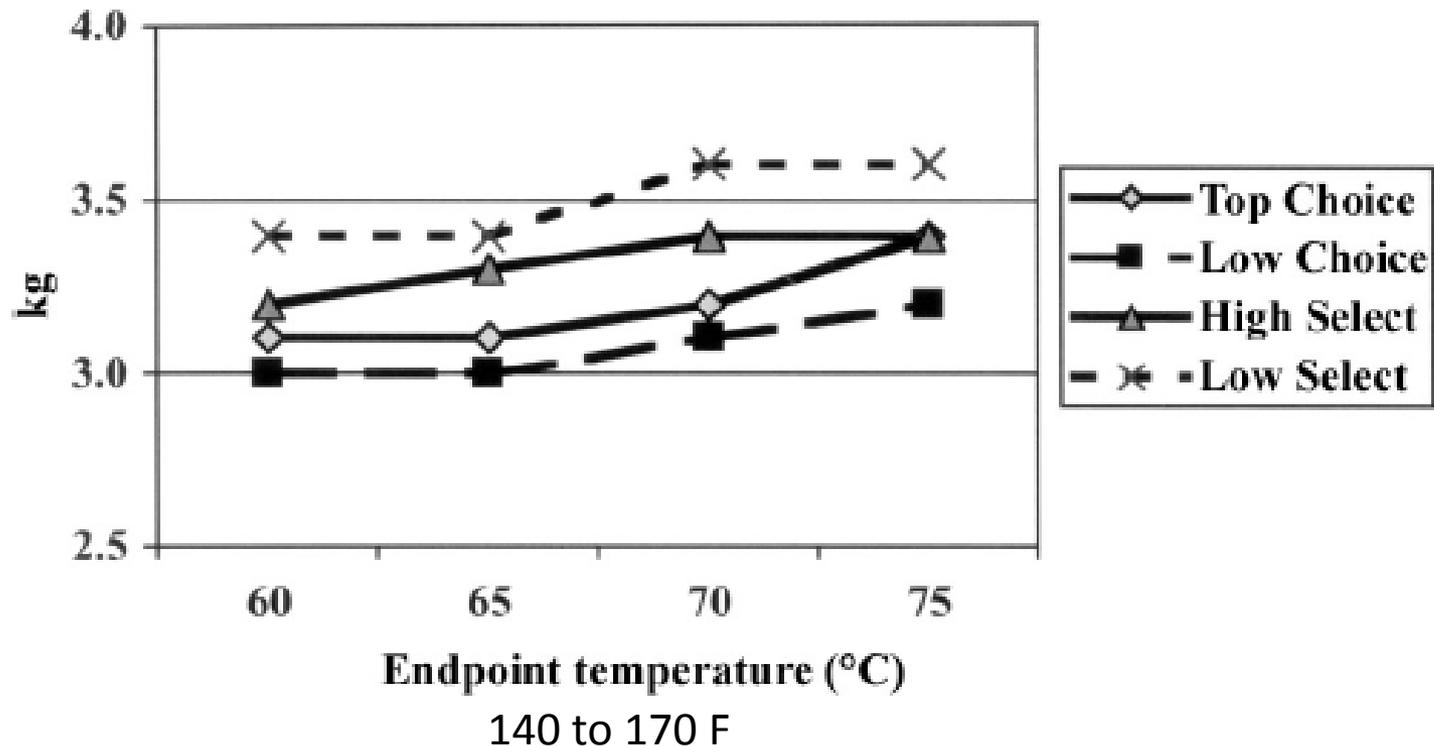[a,b,c,d,e,f,g]Means lacking a common superscript letter differ ($P < 0.05$).

- **Top loin was picked out by all quality grades used**
  - **(high choice) (low choice/high select) (low Select)**
- **No difference for top sirloin cut**
- **Could pick out high choice for the round**

Taking it one step further

- Gruber et al. 2006
  - Found three factors affected tenderness
    - Individual cut
    - Quality grade
    - Time the cut was aged

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Quality grade vs. Shear force?
(Lorenzen et al. 2003)

140 to 170 F

Summary

with input from (Shackelford et al. 1995)

- Rib eye shear force does not correlate with other cuts

- Its not bad on predicting each cut

- Genetic selection for rib eye tenderness will not help overall carcass tenderness

- For now, shear force will not likely be mass used to replace fat measurement (quality grade)

- Still used on individual cuts (research)