

## The Significance of Beef Tenderness to Consumers

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## Consumer Perception of Tenderness

- Wheeler et al., 2004
- Determine the accuracy and repeatability of untrained consumer panelists in detecting differences in beef tenderness

## Statements Supported by Research

- Tenderness is the most important factor influencing consumer satisfaction
- Inconsistent tenderness is a major industry issue
- Consumers can detect differences in tenderness
- Consumers are willing to pay a premium for tender beef

## Materials & Methods

- 68 untrained consumer panelists
- 54 strip loins
- Steaks were classified according to slice shear force data:
  - Tender (7 to 14.9 kg)
  - Intermediate (15 to 26.9 kg)
  - Tough (27 to 42 kg)

## Boleman et al., 1997

- Consumers were able to detect differences between all three categories of tenderness
  - Red (very tender) steaks were evaluated as most tender and most commonly selected at \$1.10/kg price differential.

Percentage and price of beef strip loin steaks purchased by consumers

Steak	WBS Range		Phase III	
	Min.	Max.	%	Price (\$/kg)
Red (very tender)	2.27	3.58	94.6	\$13.20
White (intermediate)	4.08	5.40	3.6	\$12.10
Blue (tough)	5.90	7.21	1.8	\$11.00

## Results & Discussion

- 0.8 repeatability of consumer tenderness ratings on duplicate steaks

## Consumer Satisfaction

- Huffman et al., 1996
- Determine the consumer acceptability of beef tenderness in the home and a “white table cloth” restaurant

## Consumer Tenderness Threshold

- Shackelford et al. (1991) were first to publish consumer threshold data at 4.6 kg WBS

## Materials & Methods

- 739 consumer participants
- All strip loins aged for 7 d then distributed
  - Home Phase: 8 strip loins/household
  - Restaurant Phase:
    - Steak served with vegetable medley, roasted new potatoes, and freshly baked bread after dinner salad
    - Evaluation form completed at end

## Miller et al., 2001

- USDA Select strip loins
- Average WBS used to classify steaks
  - Tender (1.62 to 2.29 kg)
  - Intermediate (3.92 to 4.50 kg)
  - Tough (5.42 to 7.42 kg)

## Results & Discussion

Tenderness rating	Home		Retail	
	WBS (kg)	%	WBS (kg)	%
3	5.2	36	4.8	17
4	4.4	89	4.6	63
5	4.2	92	4.2	95
6	4.1	99	4.1	98

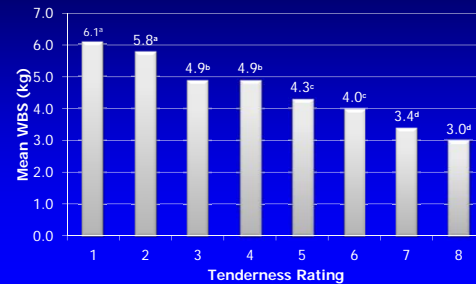
## Materials & Methods

- 734 consumer participants
- Five diverse metropolitan areas
- Consumed samples from each of the three tenderness category
  - Evaluated for overall and tenderness acceptability
  - Asked willingness to pay for steaks

## Results & Discussion

- Tenderness acceptability by consumers increased as tenderness ratings increased ( $P < 0.05$ )
- Transition in consumer perception from tender to tough beef occurred between 4.3 and 4.9 kg of WBS
- 78% of consumers would purchase steaks if the retailer guaranteed them to be tender

## Relationship of WBS values and price relationships of steaks to tenderness ratings by consumers



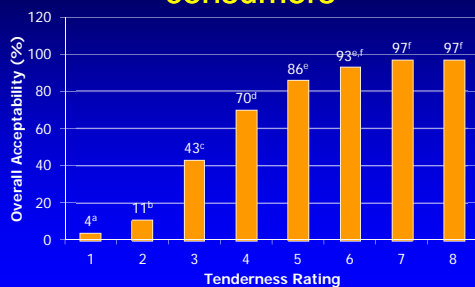
## Results & Discussion

WBS Tenderness Values	Customer Satisfaction
< 3.0	100%
3.4	99%
4.0	94%
4.3	86%
> 4.9	25%

## Consumer Willingness to Pay

- Platter et al., 2005
- Measure effects of change in marbling score and WBS on consumer purchasing behavior and willingness to pay for beef strip loin steak

## Percentage of steaks rated acceptable in overall palatability by consumers



## Materials & Methods

- 14 d aged strip loins (541)
- Steaks were classified according to WBS
  - Very tender (< 3.4 kg)
  - Slightly tender (3.41 to 4.40 kg)
  - Slightly tough (4.41 to 5.4 kg)
  - Very tough (>5.4 kg)
- 489 consumer participants

## Results & Discussion

- Marbling score alone accounted for only 3% of observed variation in average bid price for steaks
- Tough steaks were discounted when compared to slightly tender steaks
  - Slightly tough (-\$1.26/kg)
  - Very Tough (-\$1.72/kg)

## Summary

- Tenderness is important and consumers can detect tenderness differences
- Consumers are willing to pay for a tenderness assurance
- Cutoff values of 4.4 and 3.9 WBS are appropriate
- These cutoff values will partition the general population into tenderness groups

## Mean bid price for steaks stratified by WBS marketing classes

WBS Classification	WBS Value (kg)	Price (\$/kg)	Price Differential
Very Tender	< 3.4	\$7.20	
Slightly Tender	3.4 to 4.4	\$6.37	\$0.83
Slightly Tough	4.4 to 5.4	\$5.11	\$1.26
Very Tough	> 5.4	\$4.65	\$0.46



## Tenderness Distribution in Validation Study

