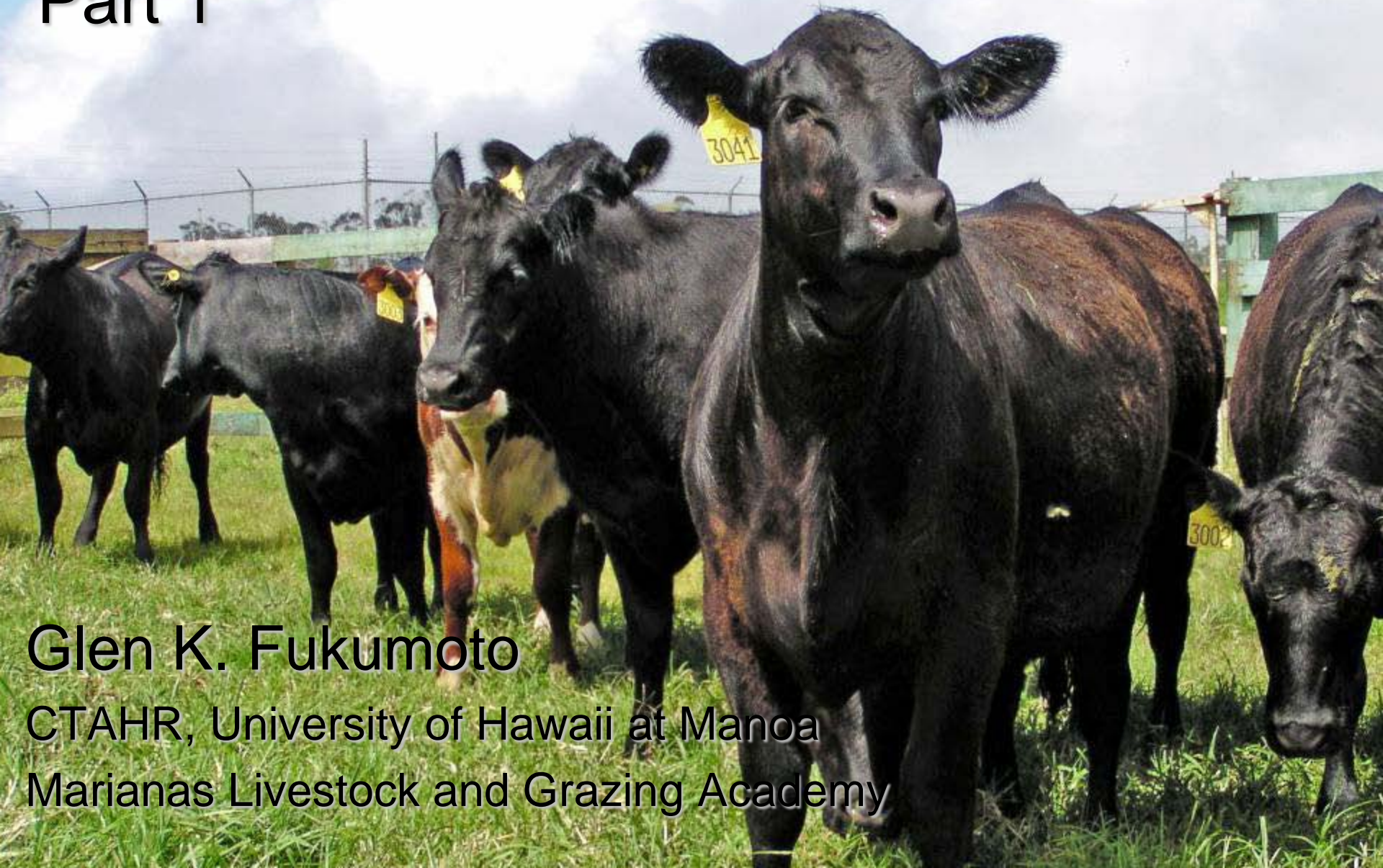


# Beef Quality and Marketing

## Part 1



Glen K. Fukumoto

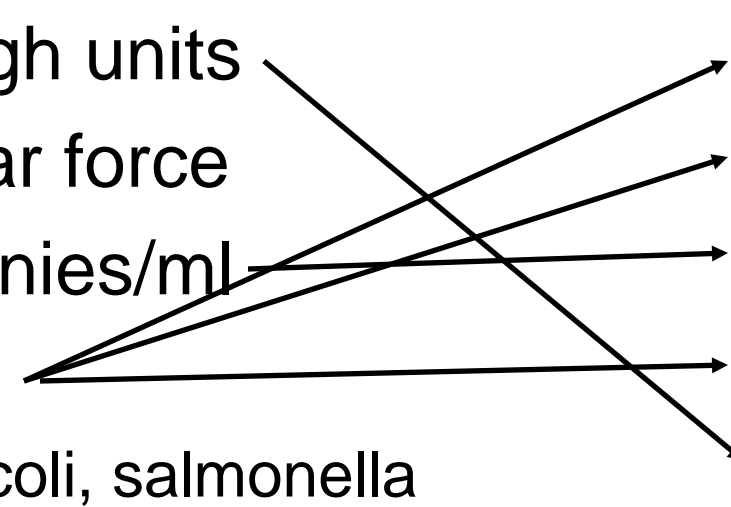
CTAHR, University of Hawaii at Manoa

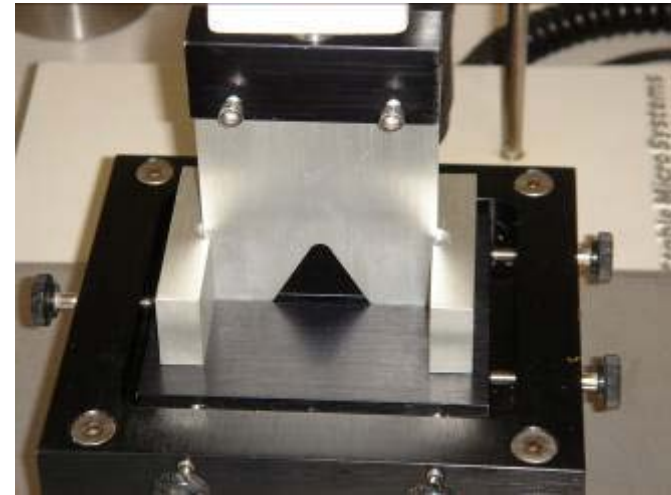
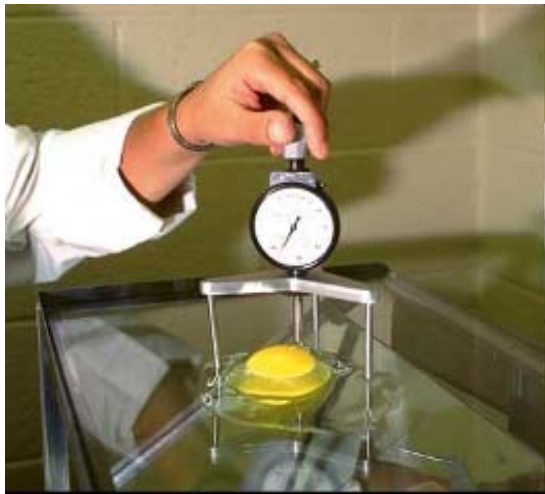
Marianas Livestock and Grazing Academy

# Outline

- What is beef quality
- Hawaii Meat Science Research
  - Carcass Characteristics
  - Tenderness
- Building Capital in the Marianas

# How is Quality Measured?

- Haugh units
  - Shear force
  - Colonies/ml
  - CFU
    - e.coli, salmonella
- Beef
  - Pork
  - Dairy
  - Broiler
  - Eggs
- 



How is beef quality measured?

# National Beef Quality Audit

- Given criteria of Flavor, Juiciness and Tenderness, What is primary determinant of eating satisfaction among beef consumers?

FLAVOR

JUICINESS

TENDERNESS

# National Beef Quality Audit

- Given criteria - flavor, juiciness, tenderness, consumers want tender beef.
- **TENDERNESS !!**
- Shear force and Consumer satisfaction
  - Research by Miller, et al. (2001), strip loin steak
  - 4.3 kg = 86%
  - 4.0 kg = 94%
  - 3.4 kg = 99%

# USDA Beef Quality Grading

- USDA Grades
  - Prime, Choice, Select, Standard
- Determining Factors
  - Marbling
  - Physiological Age (relates to bone ossification)

# Sacral Vertebra



Yearling



30-month

# Thoracic Vertebra



Yearling



Cull



30-month

# Marbling Cards, Quality Grade

RELATIONSHIP BETWEEN MARBLING, MATURITY, AND CARCASS QUALITY GRADE<sup>1</sup>

Degrees of Marbling	Maturity <sup>2</sup>				
	A <sup>3</sup>	B	C	D	E
Slightly Abundant	PRIME				
Moderate			COMMERCIAL		
Modest	CHOICE				
Small					
Slight	SELECT		UTILITY		
Traces					
Practically Devoid	STANDARD			CUTTER	

<sup>1</sup>Assumes that firmness of lean is comparably developed with the degrees of marbling and that the carcass is not a "dark cutter."

<sup>2</sup>Maturity increases from left to right (A through E).

<sup>3</sup>The A maturity portion of the Figure is the only portion applicable to bullock carcasses.

# USDA Beef Quality Grading

Does an increased level of marbling in a steak, result in improved beef tenderness?

YES

NO

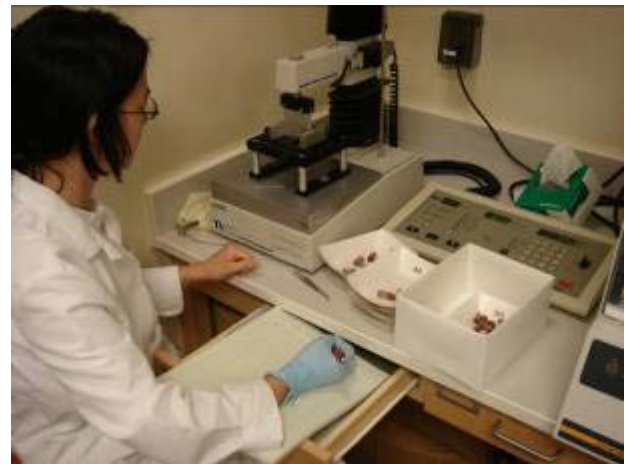
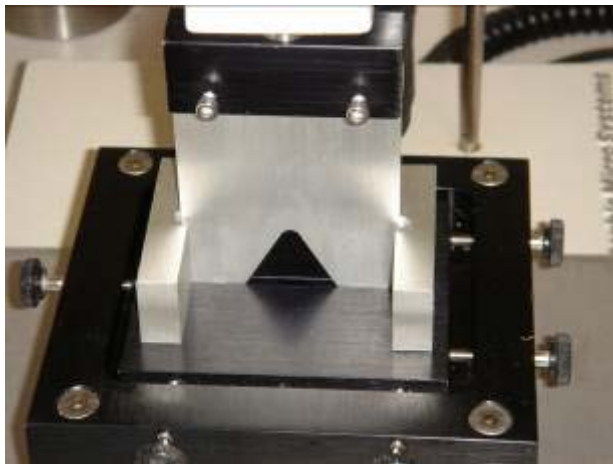
# USDA Beef Quality Grading

- Quality grade is a poor predictor of tenderness!
  - (Wheeler, et.al., 1994, Wulf et. al, 1997)
- National Beef Quality Audit 2005 ...
  - Recommends adoption/implementation of instrument grading due to inconsistencies in current USDA grading system.

# How is beef tenderness measured?

- **WBSF**
  - Warner-Bratzler Shear Force
- **SSF**
  - Slice Shear Force  
(U.S. Meat Animal Research Center, Meat Quality Protocols)

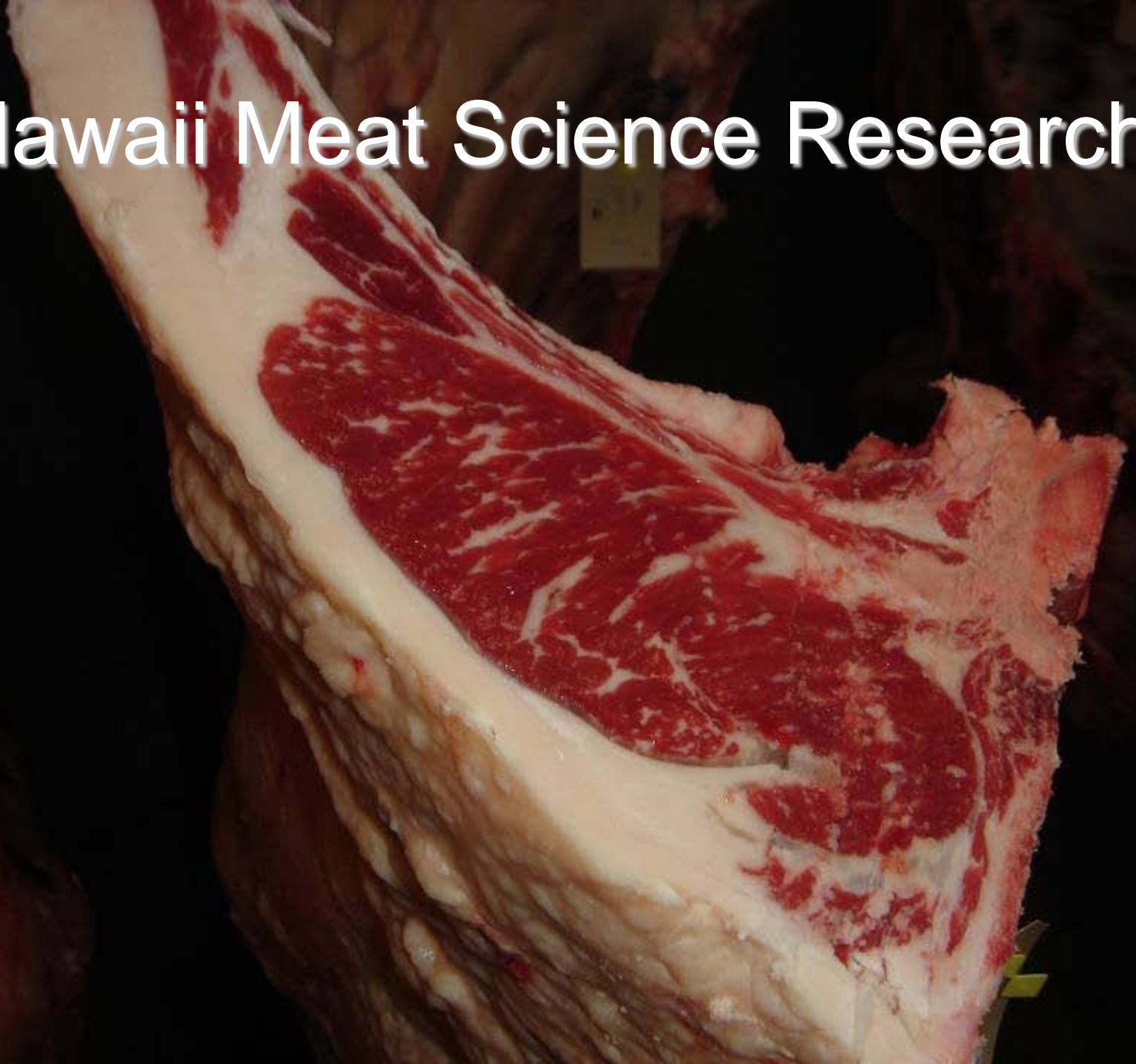
# WBSF



# SSF



# Hawaii Meat Science Research



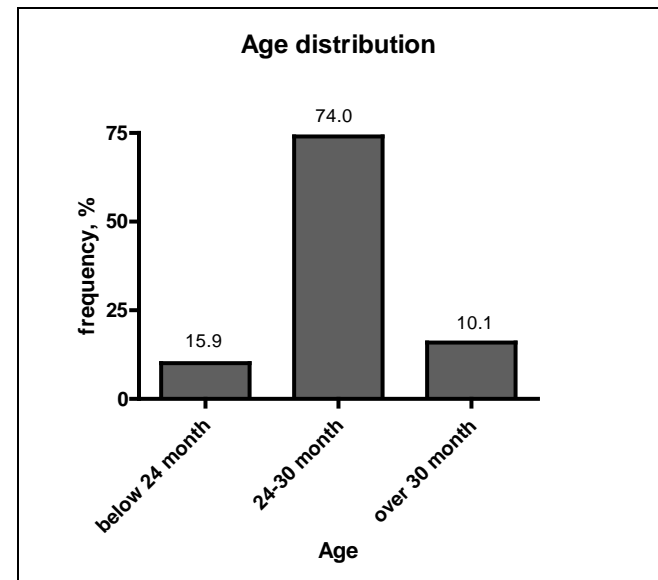
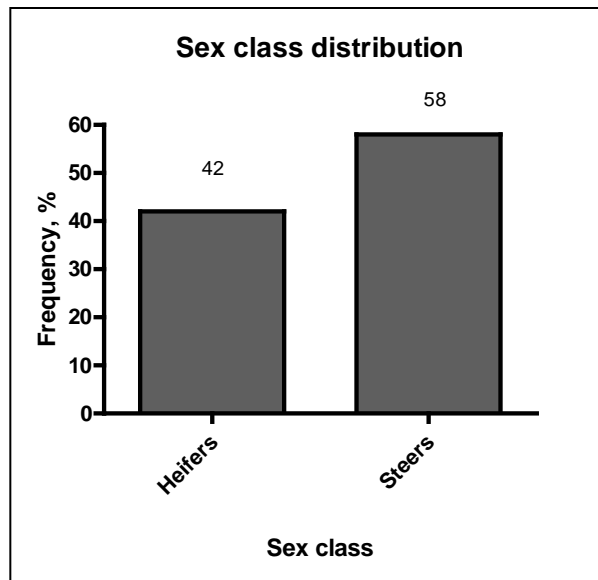
# Hawaii Forage-finish Carcass Characteristics Study

- Goal: Find out the quality of carcasses produced on the Big Island.
- 1996-1998 (HNM)
- n = 386 carcasses evaluated from 22 ranches.
- Refer to publication
  - <http://www.ctahr.hawaii.edu/oc/freepubs/pdf/FST-25.pdf>

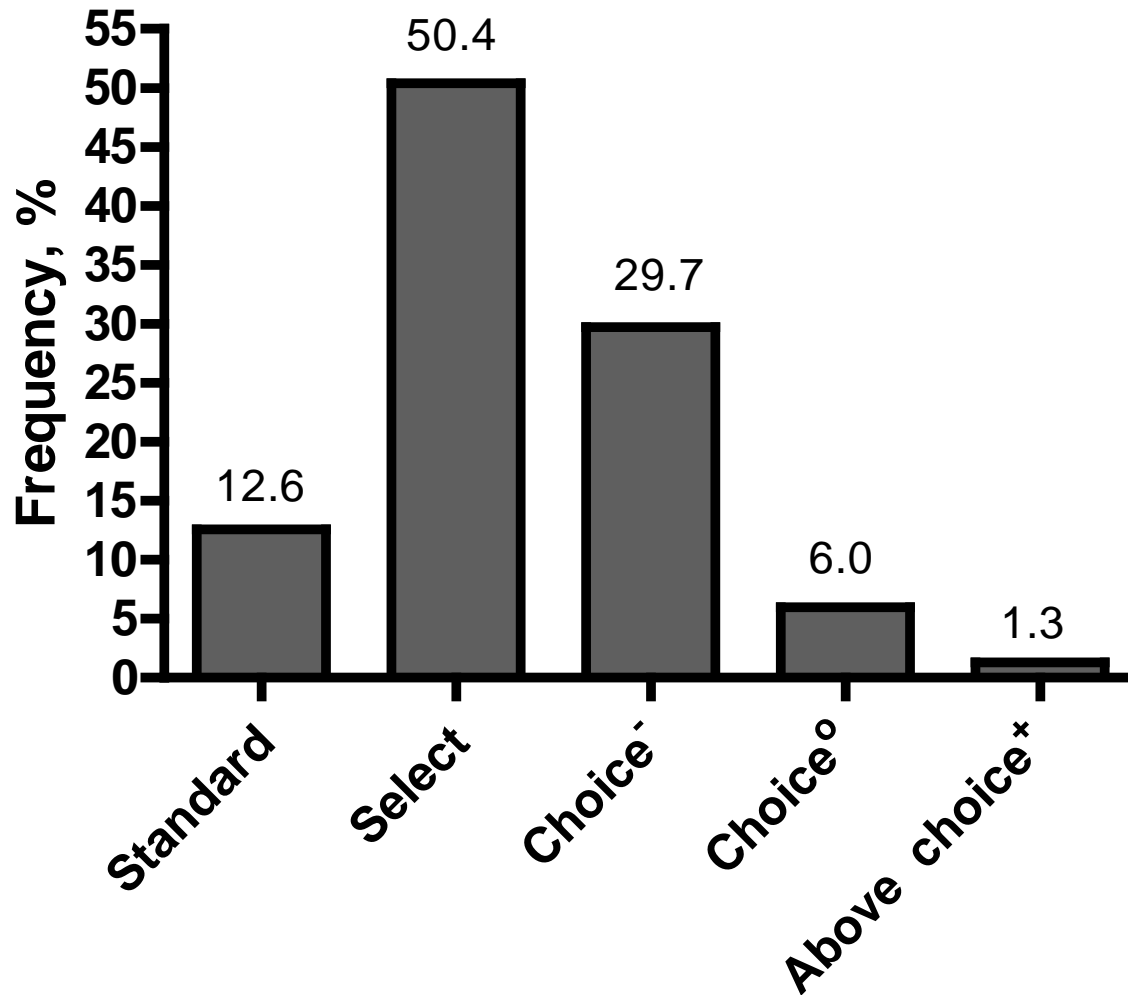
# Carcass Traits of Forage-Finished Beef in Hawaii

Trait	Mean $\pm$ SD	Range
Carcass wt, lbs. (n=386)	620.9 $\pm$ 75.1	477 - 871
Ribeye area, in <sup>2</sup> . (n=311)	11.5 $\pm$ 1.5	6.5 - 16.8
Backfat, in. (n=374)	0.27 $\pm$ 0.14	0.05 - 1.2
Marbling score (n=384)	Slight 80	Tr – SIAb
Maturity (n=386)	A 80	
Quality Grade Eq. (n=381)	Mid-Select	

# Sex classification and Age



# Quality grade distribution



# Finding ...

- We can produce high Select to low Choice beef on pasture based on USDA Quality Grading criteria.
- Big BUT ... what about tenderness?

# Hawaii Forage-finish Beef Tenderness Study

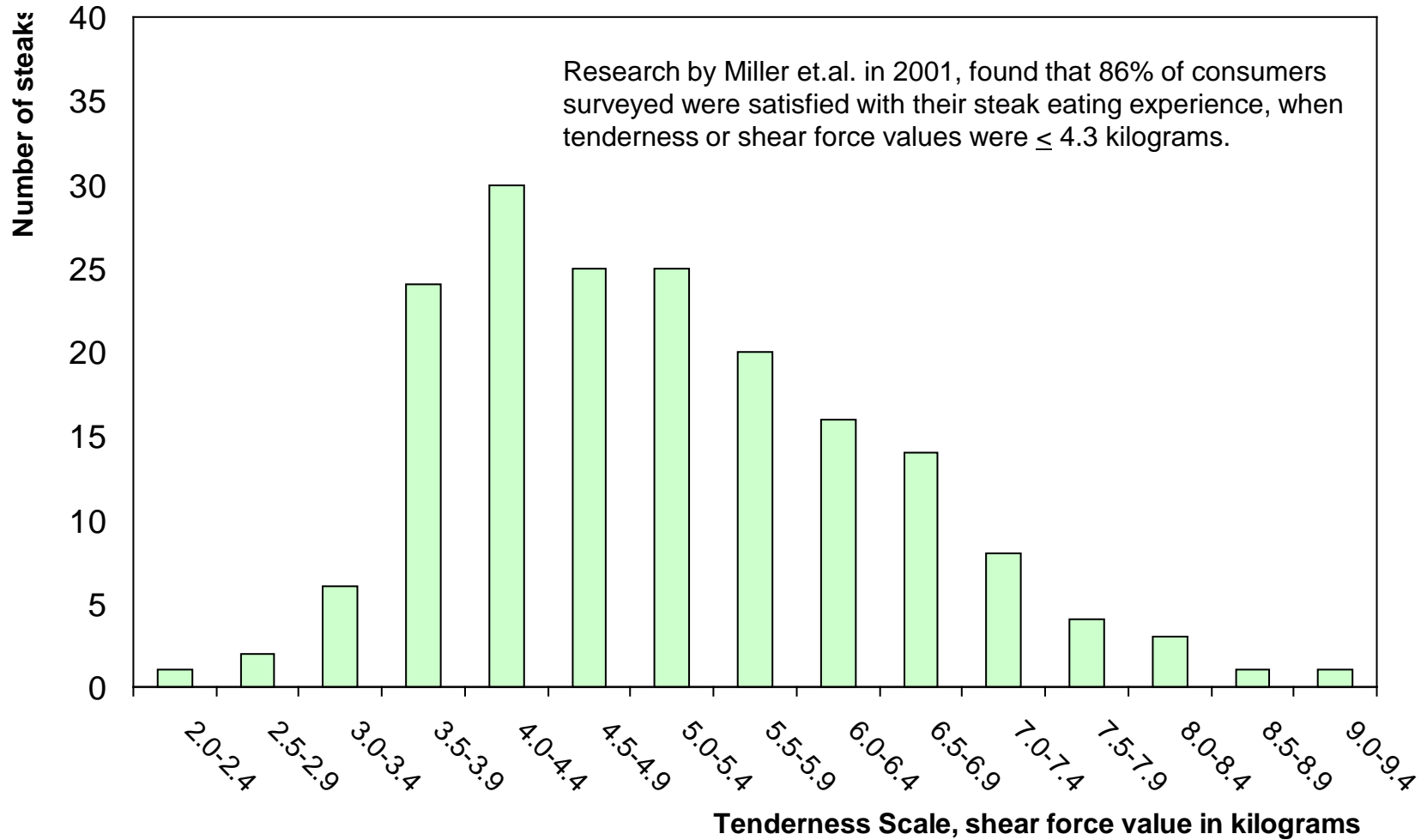
- Goal: Determine the tenderness of forage-finished beef in the marketplace (Hawaii Island).
- 2004-2006
- Rib samples from 191 carcasses from 45 different ranches.
- CTAHR Beef Initiative Program
- Refer to publication
  - <http://www.ctahr.hawaii.edu/oc/freepubs/pdf/FST-27.pdf>

# Findings ...

What about tenderness?

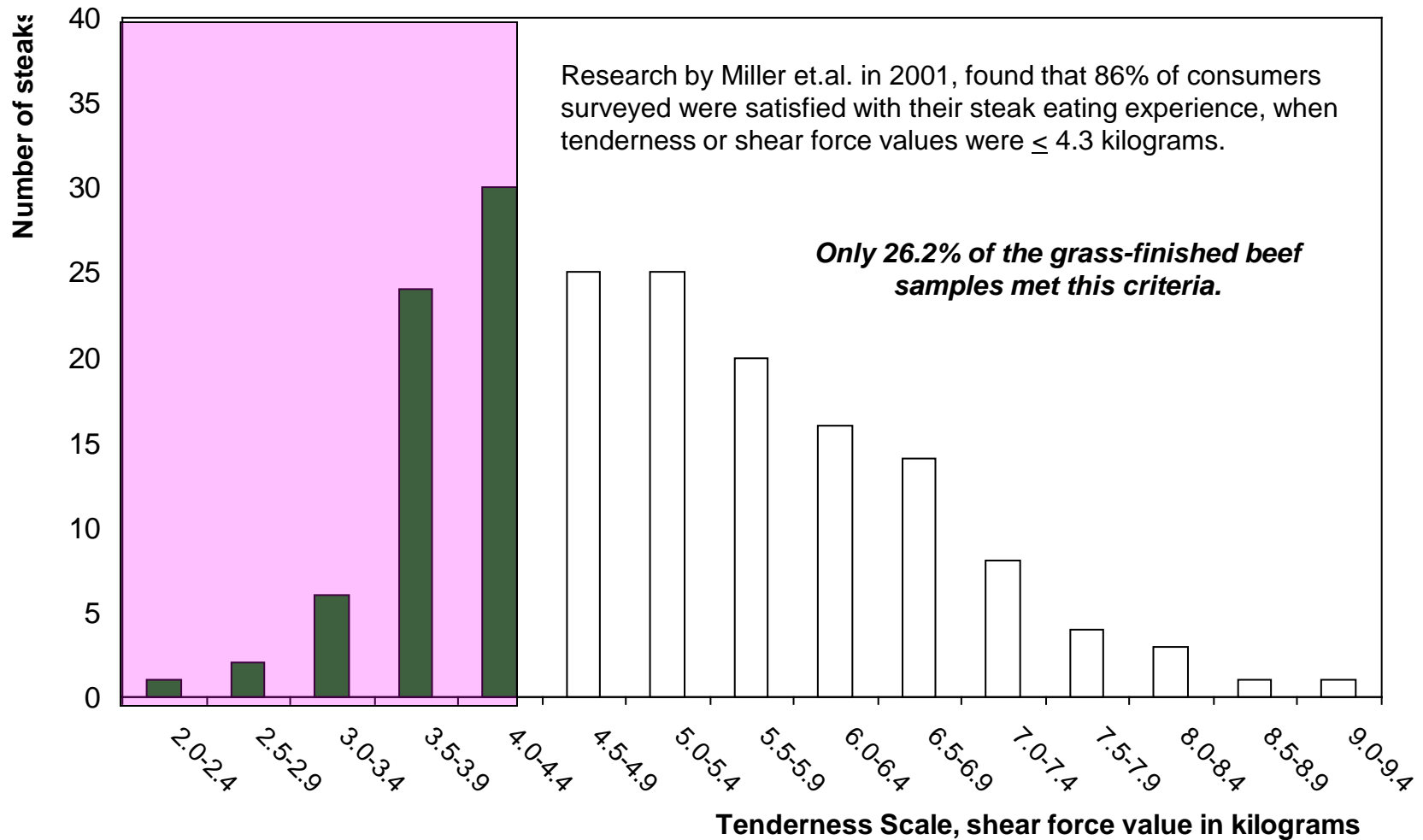
- Using shear force value of 4.3 kg as the cut-off value, we would achieve ??% consumer satisfaction?

# Tenderness Distribution of Grass-Finished Beef in Hawaii, n = 187



**Average Shear Force = 5.21 kg**

# Tenderness Distribution of Grass-Finished Beef in Hawaii, n = 187



**Average Shear Force = 5.21 kg**

# Profile of animals < 4.3

- n = 49 (26.2%)

- SEX

Steers 21, Heifers 14, n.d. 14

- AGE

<30 mo 22, >30 16, n.d. 11

< 30 mo: steers 11, heifers 6, n.d. 5

<36 mo 31, >36 7, n.d. 11

< 36 mo: Steers 14, heifers 11, n.d. 6

# Tenderness ...

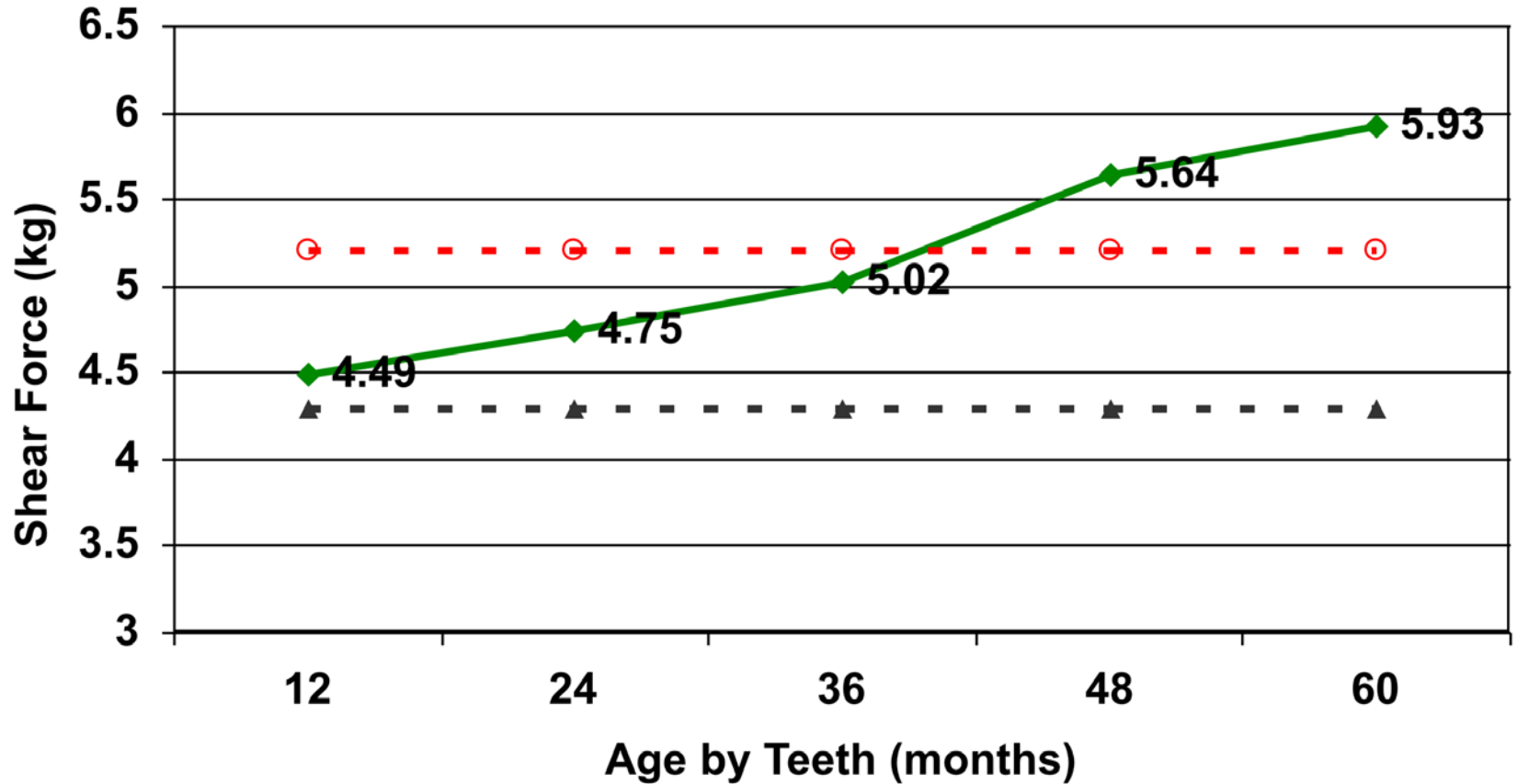
## By Sex

- Heifers (n = 84)
  - 5.33 kg
- Steers (n = 69)
  - 5.06 kg

## By Age

- 12-mo (n = 10)
  - 4.49 kg
- 24-mo (n = 52)
  - 4.75 kg
- 36-mo (n = 28)
  - 5.02 kg
- 48-mo (n = 24)
  - 5.64 kg
- 60-mo (n = 28)
  - 5.93 kg

# Tenderness by Age



[Teeth Chart](#)

# Tenderness ...

## By Breed

- Angus (n = 111)
  - 5.14 kg
- Hereford (n = 22)
  - 6.18 kg
- B. taurus X (n = 11)
  - 4.86 kg
- Other (n = 36)
  - 4.93 kg

# Building Capital in the Marianas

- Beef productivity data
  - Beef quality
  - Carcass data
  - Tenderness data
- 
- Need information to develop pricing structure and market segments

# Items to consider ...

- Documentation and Verification
  - Better record keeping by ranchers
    - Breeds, animal age, location
  - Better record keeping by processors
    - Sex, teeth age, carcass data
  - Development of Rancher Agreements
  - Rancher Incentives \$\$\$, data based [T-Dist](#)

# Questions and Discussion



