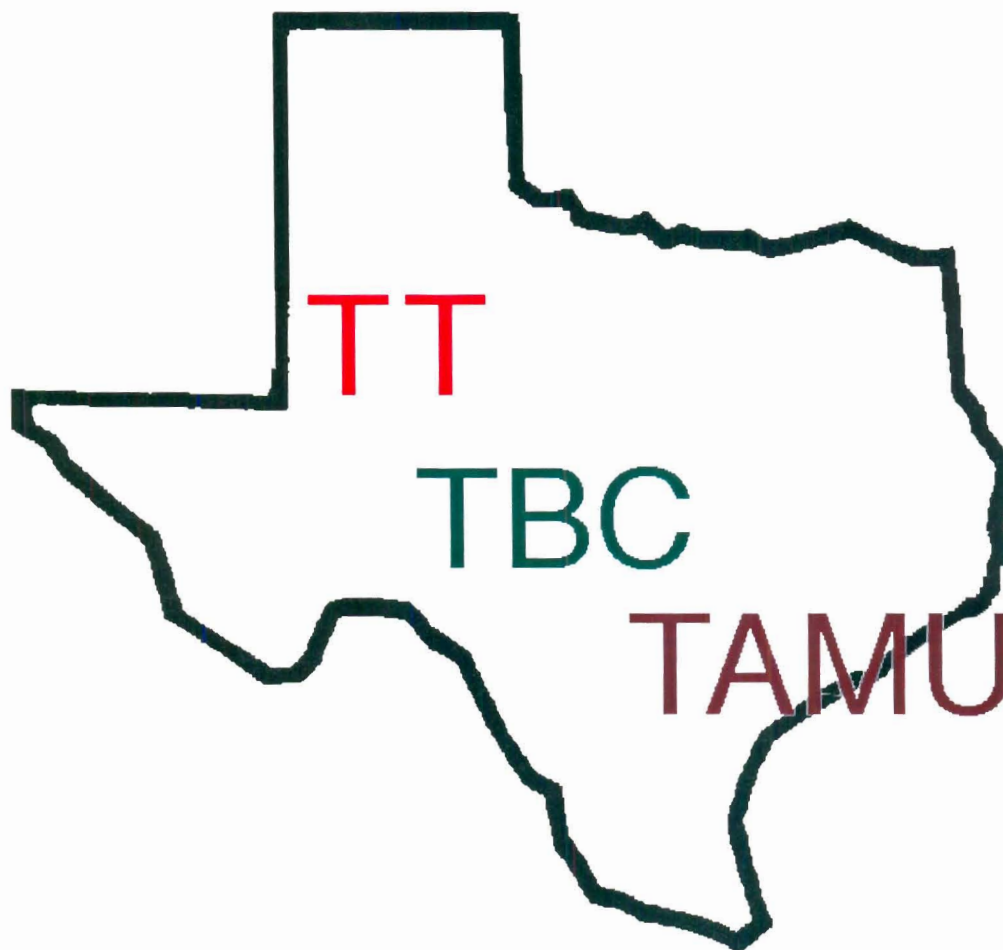

Texas Perception Study

Evaluating Beef Based on Geographic Origin



August 1996

Texas A&M University
Texas Tech University
USDA-ARS

Texas Perception Study

Evaluating Beef Based on Geographic Origin

A Report to

The Texas Beef Council
Austin

From the

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Texas A&M University
College Station

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INTRODUCTION

Cattle fed, slaughtered, and fabricated in Texas are being discriminated against due to negative connotations and perceptions of tenderness of meat from these plants. Food service and some retail companies specify that the product they purchase come from "northern" plants. Some even state "any plant but Texas plants." Rib and loin cuts from Texas may be priced \$.05 per pound lower than similar cuts from other geographic regions. This translates to a possible \$3 to \$5 per head disadvantage. If this discount affects even half of the over 5 million head fed annually in Texas, a substantial loss is being incurred. This prevailing idea that cattle from Texas plants are less tender, possibly due to a higher percentage Brahman influence in the cattle slaughtered by Texas plants, must be addressed. There is no quantification of this decrease in tenderness, nor is there available data to disprove this perception.

EXECUTIVE SUMMARY

Six hundred beef loin, strip loin samples were obtained from six major packing plants, three of which were located in the state of Texas and three from outside of Texas. Fifty samples from USDA Choice and 50 from USDA Select were selected from each site (n=100 per plant). Strip samples were aged for 14 days and then frozen before being cut into 1 inch beef loin, strip loin steaks for Warner-Bratzler shear force determination.

Key Findings

- The interaction between plant Location and USDA Quality Grade was found to be significant. There was no difference detected between Texas Select, Texas Choice, and Out of Texas Select for Warner-Bratzler shear values. Out of Texas Choice was more tender than both Texas treatments, but was not different in tenderness than Out of Texas Select.
- Least squares means for all treatment groups were found to be well within the acceptable range of tenderness with the highest value being for Texas Choice at 7.24 lb and the lowest for Out of Texas Choice at 6.41 lb.
- When considering the distribution of shear values over 8.5 lb, 12.8% of all steaks fell into this range. The highest percentage of these were found in the Texas Choice with 41.33%, followed by both Texas Select and Out of Texas Select with 22.67%, and finally Out of Texas Choice with 13.3%.

Implications

- Of the four groups evaluated, Texas Choice was the least desirable in terms of tenderness as determined by Warner-Bratzler shear force. However, it is important to remember that overall eating satisfaction is made up of more than just this one component. Juiciness, flavor, and other eating characteristics also play an important role in the overall acceptability of beef steaks.
- Although statistical differences were found between the different treatment groups, the entire range of least squares means (.816) shows very little practical difference. In the case of Texas Select and Out of Texas Select, less than 1/4 of a pound shear value separates the least squares means. In addition, in these two groups, very similar distributions of Warner-Bratzler shear force values can be seen.

Implications (cont'd)

- Out of Texas Choice was found to be more tender than Texas Choice and Texas Select, but all other treatments were found not to differ in terms of tenderness. When coupled with the fact that 84% of all steaks evaluated from Texas fell into a range of 8.5 lb or less (91% of Out of Texas were in this same range), labeling all Texas product “Tough”, nor all Out of Texas “Tender”, is not valid.
- The majority of the steaks coming from Texas are acceptable in tenderness. The challenge is to identify those outliers which are unacceptably tough and eliminate them from the system.
- A tenderness-based classification system would eliminate problems with the perception of tenderness by identifying the actual tenderness and enabling it to be marketed as such.

MATERIALS AND METHODS

- Six beef packing plants were used as testing sites, three within the state of Texas and three outside of Texas.
- Cooperating universities in this study, Texas A&M University (TAMU) and Texas Tech University (TTECH), were each assigned specific plants for responsibility in collection of product. Plants were assigned to best fit logistically in terms of location and concurrent activities.

Texas		Out of Texas	
Sam Kane Beef Processors	TAMU	EXCEL Dodge City	TTECH
EXCEL Friona	TTECH	EXCEL Schuyler	TAMU
EXCEL Plainview	TTECH	EXCEL Ft. Morgan	TTECH

- From each plant 100 carcasses were selected, 50 from the Select grade and 50 from the Choice grade. Not more than 5 head per grade were selected from any one lot of cattle. Carcasses were distributed throughout the marbling scores corresponding to the two quality grades as follows:

SELECT	CHOICE	# of head/quality grade
Slight ⁰⁻²⁰	Small ⁰⁻²⁰	10
Slight ²¹⁻⁴⁰	Small ²¹⁻⁴⁰	10
Slight ⁴¹⁻⁶⁰	Small ⁴¹⁻⁶⁰	10
Slight ⁶¹⁻⁸⁰	Small ⁶¹⁻⁸⁰	10
Slight ⁸¹⁻¹⁰⁰	Small ⁸¹⁻¹⁰⁰	10

- An approximately 3 lb portion was cut from the rib end of the short loin, vacuum packaged, and sent to TAMU Rosenthal Meat Science and Technology Center.
- Upon arrival at TAMU, the 3 lb portion of short loin was placed in an aging cooler until the designated aging time of 14 days had been reached. The whole sample was then frozen (-40° F).
- After all samples were collected, aged, and frozen, the samples were removed from the freezer and one 2.54 cm steak was taken from the sample after facing.
- Steaks were assigned randomly to cooking groups for Warner-Bratzler shear force determination. Warner-Bratzler shear force determination was made on each steak according to the standard operating procedure of the TAMU Sensory Testing Facility.
- Analysis was performed to compare steaks from Texas versus Out of Texas plants. Steaks were grouped into categories based on their Warner-Bratzler shear force value (WBS). Steaks were assigned to the following groups: WBS <8.6 lb, WBS from 8.6-10.0 lb, or WBS >10.0 lb.

RESULTS

Data were analyzed for the main effects of Location (Texas or Out of Texas), USDA Quality Grade (Choice or Select), and the interaction between Location and USDA Quality Grade.

Reduced model analysis of variance for Warner-Bratzler Shear Force

Model/source of variation	df	SS	F ratio	Prob>F
-----R ² = .0302-----				
Location	1	40.4698	13.4975	.0003
Grade	1	.6116	.2040	.6517
Location X Grade	1	13.4944	4.5007	.0343

- The interaction between Location and Grade was found to be significant.
- A very low R-square value was found meaning Location and Grade explained very little of the variation in shear force.

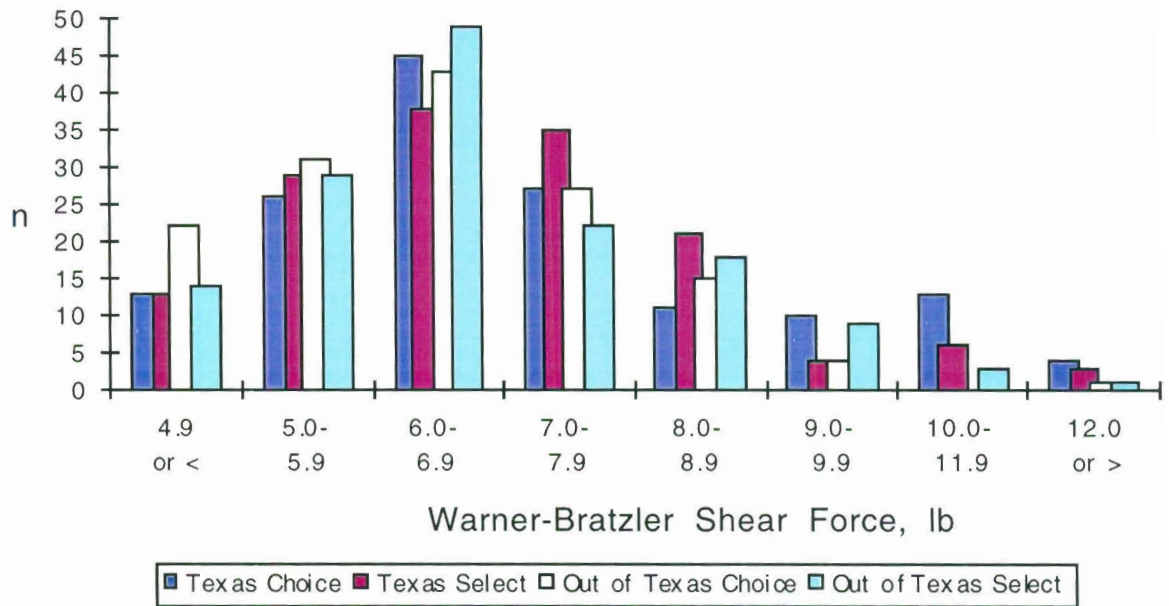
Least squares means and Standard Errors for Location by USDA Quality Grade effects on Warner-Bratzler Shear Force (lb)

	USDA Quality Grade			
	<u>Choice</u>		<u>Select</u>	
Location	Mean	Std Err	Mean	Std Err
Texas	7.24 ^a	2.01	7.00 ^a	1.81
Out of Texas	6.41 ^b	1.43	6.78 ^{ab}	1.61

^{ab}Least squares means with different superscripts differ (P < .05).

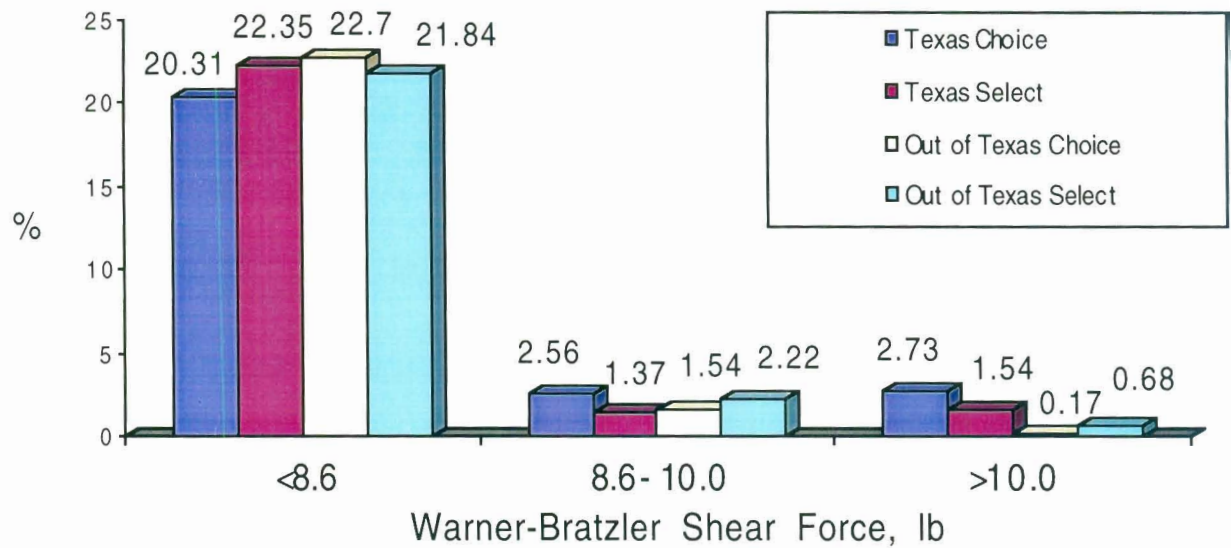
- Using Tukey-Kramer HSD means separation test, Texas Select, Texas Choice, and Out of Texas Select did not differ. Out of Texas Choice was more tender than either of the Texas treatments, but was not different than Out of Texas Select.
- All least squares means were found to be under 8.0 lb of Warner-Bratzler shear force.

Distribution of Warner-Bratzler Shear Force by Location and Grade



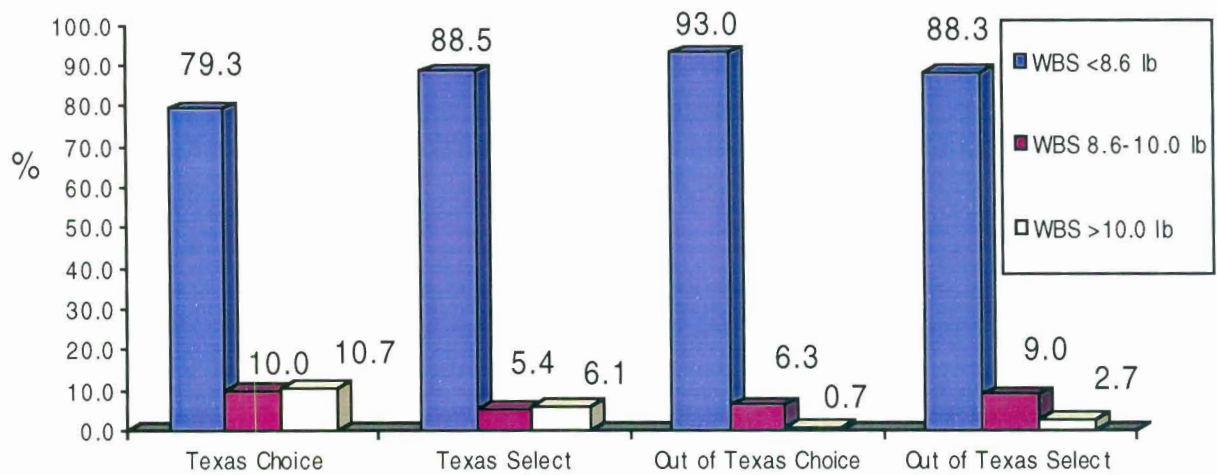
- Of all steaks evaluated, 79% were less than 8.0 lb in shear value, denoting that they should probably be tender.
- A larger percentage of shear force values that exceed 10 lb can be found from the Texas steaks, especially Texas Choice (2.73%); less than 1% of steaks from Out of Texas had a shear value greater than 10 lb.
- Texas Select and Out of Texas Select are comparable in their distribution of shear values.

Distribution of Location and Grade by Warner-Bratzler Shear Force Groups



- Of all steaks evaluated, 87.2% fell into the <8.6 lb category and 7.7% fell into the 8.6-10.0 lb category, accounting for a total of 94.9% of all steaks being 10.0 lb or less in shear force.
- Of all steaks evaluated from Texas, 84% fell into the range of 8.5 lb or less, while 91% of Out of Texas were in this same range.
- In the more tender category (WBS <8.6 lb), Out of Texas Choice and Out of Texas Select have the highest number of steaks.

Distribution of Warner-Bratzler Shear Force Groups within Location and Grade



- Most of the steaks, from all treatment groups, fall into the lower shear force category (WBS <8.6 lb).
- In both of the Out of Texas groups, there are not as many steaks that fall in the higher shear force categories, as seen in the two Texas groups. However, every treatment group has steaks in all of the shear force categories described.