Comparing the consumer perception of palatabilty traits of strip loin steaks from young cattle and grain-fed cull cows of varying marbling scores

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Introduction

- Every year, the price of beef increases because of the cost of cattle production including everything from feed costs to transportation costs.
- Consumers determined steaks of young A maturity to be more tender and had a higher overall acceptability rating than C maturity or greater cattle (Smith et. al., 1982).
- Flavor is considered an important quality characteristic of meat. Feeding cull cows with a high-energy ration of grain will improve the eating experience of mature cattle (Berry et. al., 1980).

Objective

- To measure the effects of varying marbling and maturity levels on beef strip loin palatability, determining the impact of feeding cull cows a high energy diet.

Materials and Methods

- Trained Texas Tech University personnel selected strip loins (n=150) from a packing plant in Omaha, NE.
- Strip loins consisted on comparing young cattle to mature fed cows, 15 strip loins of A maturity and 15 strip loins of C maturity or greater were selected to correlate to USDA Prime, Top Choice (upper 2/3), Low Choice (lower 1/3), Select, and Standard marbling scores.
- Subprimals were aged 21 d under vacuum at 2-4^{0}C.
- All subprimals were cut into 2.5 cm thick steaks and cooked on an open flame grill to a medium degree of doneness (71°C).
- Each steak was cut into eight equal parts and served to the panelists.
- Consumers (n=120) were screened for preference of beef and randomly fed one of each of the treatments.
- Each sample was evaluated for tenderness, juiciness, flavor identity, flavor liking, and overall liking on a 1-10 cm verbally anchored line-scale.
- Acceptability of tenderness, juiciness, flavor liking, and overall liking were also rated. Finally, consumers characterized each sample as premium, better than everyday, everyday, or unacceptable quality.

Table 1. Least squares means for consumer ratings[1] of the palatability traits of grilled beef strip loin steaks of varying quality treatments

Treatment	Tenderness	Juiciness	Flavor	Overall Liking
Young Prime	70.90^{a}	66.13^{a}	63.33^{a}	63.02^{a}
Old[2] Prime	59.59^{bc}	62.32^{ab}	52.11^{cd}	57.39^{ab}
Young Top Choice	66.70^{ab}	58.55^{abc}	61.88^{ab}	62.68^{a}
Old[2] Top Choice	55.86^{c}	50.76^{cde}	53.37^{bc}	54.53^{b}
Young Low Choice	54.39^{cd}	50.43^{bcd}	50.35^{cde}	52.30^{bc}
Old[2] Low Choice	51.89^{cd}	52.53^{bcde}	51.06^{cd}	53.39^{bc}
Young Select	58.15^{c}	54.33^{bcd}	51.06^{cd}	55.64^{ab}
Old[2] Select	46.26^{de}	45.97^{de}	43.55^{de}	45.87^{cd}
Young Standard	53.59^{cd}	50.67^{cde}	46.24^{cde}	50.12^{c}
Old[2] Standard	42.45^{e}	43.42^{e}	41.63^{e}	41.79^{d}
SEM[3]	3.38	3.96	3.43	2.97
P-value	<0.0001	<0.0001	<0.0001	<0.0001

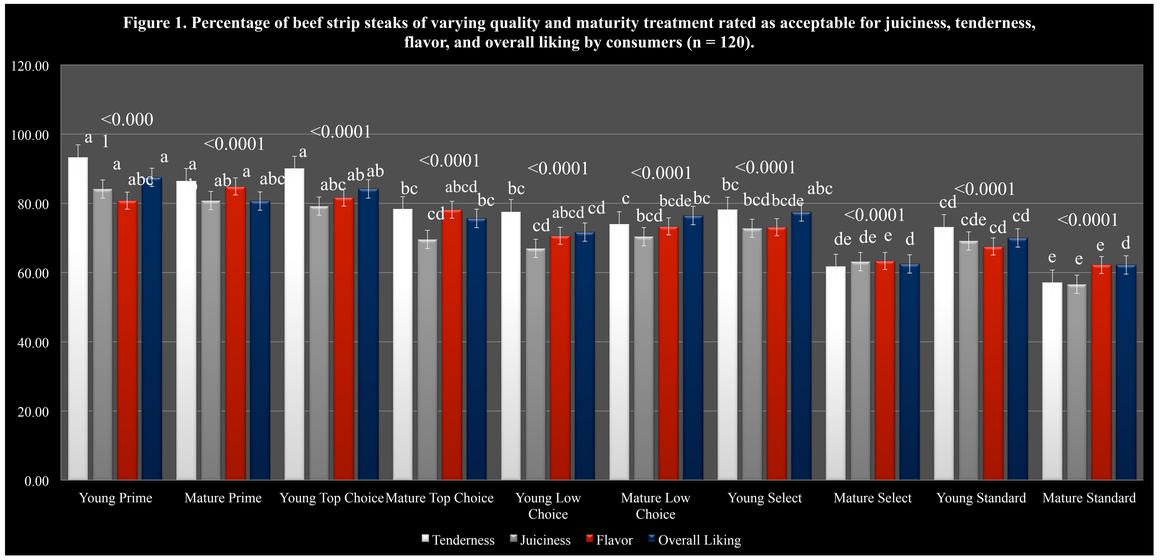
[1]Sensory scores: 0 = extremely dry/tough/unbeef-like, dislike extremely; 100 = extremely juicy/tender/beef-like, like extremely.
[2]Old= Strips from C, D, and E maturity cattle with equivalent marbling scores
[3]SE (largest) of the least squares means.
[abcde]Least squares means in the same column without a common superscript differ ($P < 0.05$).

Statistical Analysis

- Statistical analyses were conducted using the procedures of SAS (Version 9.3; SAS Inst. Inc., Cary, NC). Treatment comparisons were tested for significance using PROC GLIMMIX with $\alpha = 0.05$.
- Sensory data was analyzed as a non-factorial to effectively compared interactions across all ten treatments (USDA Marbling Score and Maturity)
- Acceptability data for each palatability trait was analyzed with a model that included a binomial

Results

Figure 1. Percentage of beef strip steaks of varying quality and maturity treatment rated as acceptable for juiciness, tenderness, flavor, and overall liking by consumers (n = 120).



[1]Old= Strips from C, D, and E maturity cattle with equivalent marbling scores
[abcde] Percentages in the same column without a common superscript differ ($P < 0.05$).

Conclusion

- Mature Prime and Mature Top Choice cattle were rated as good or better than Young USDA Low Choice and Select for consumer acceptability and tenderness.
- With further research, cull cows can effectively be marketed to consumers and in the food service industry

References

Berry, B. W., J. A. Maga, C. R. Calkins, L. H. Wells, Z. L. Carpenter, and H. R. Cross. "Flavor profile analyses of cooked beef loin steaks." Journal of Food Science 45.5 (1980): 1113-1115.

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