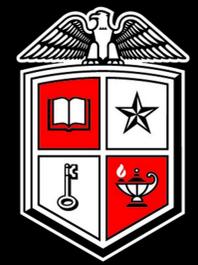


Effects of finishing mode on consumer assessment of beef from mature cull

COWS



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Introduction

- Since 1990, the typical culling rate of cowherds has been 14.1 percent in the United States (BeefTalk, 2010).
- Mature cull cows are associated with decreased tenderness and juiciness, increased flavor intensity and a higher incidence of flavors described as “painty,” “fishy,” and “grassy (Hilton et al, 1998)
- The increased fat level in beef strip steaks positively affects tenderness, juiciness, flavor liking, and overall liking of beef strip steaks. Moreover, flavor liking is the most highly correlated palatability trait with overall liking. (O'Quinn et al, 2011)

Objective

- To compare consumer sensory perceptions of grain-finished cull cow beef and non-fed cull cow beef, as compared to grain-finished A maturity beef.

Methods

- Beef strip loins from two marbling score groups (slight (SL) and traces/practically devoid (TR/PD)) across three beef carcass types (young fed (YF), mature fed (MF), and mature unfed (MU)) were collected in commercial processing facilities.
- Subprimals were fabricated into 2.5 cm thick steaks. Steaks were vacuum packaged and aged for 21 days before freezing at -10°C until further evaluation.
- Proximate analysis was performed on 1 steak from each subprimal to determine fat, protein, and moisture values.
- Consumer panelists (n = 120) were used to determine palatability of cooked steaks. Steaks were cooked to an internal temperature of 71°C using a model IRB-36 Imperial gas radiant broiler (Imperial Commercial Cooking Equipment, Corona, CA). After cooking, each steak was cut into 8 equal pieces with each consumer receiving 1 piece. A 100 mm line scale verbally anchored at both ends was used to evaluate samples for tenderness, juiciness, beef flavor liking, overall liking, and off flavor intensity.
- Data were analyzed using the GLIMMIX procedure of SAS. The experiment was set up as a completely randomized design with treatment as the fixed effect.

Results

Table 1. Least squares means for carcass maturity and marbling scores from mature beef carcasses commercially identified as fed or unfed and young fed carcasses of varying marbling scores

	Lean Maturity ¹	Skeletal Maturity ¹	Overall Maturity ¹	Marbling Score ²
Slight				
Young Fed	184.00 ^c	158.67 ^b	169.33 ^b	354.67 ^a
Mature Fed	178.00 ^c	548.00 ^a	448.00 ^a	353.33 ^a
Mature Unfed	242.67 ^b	550.00 ^a	454.67 ^a	351.33 ^a
Traces/Practically Devoid				
Young Fed	168.00 ^c	142.67 ^b	152.67 ^b	226.00 ^c
Mature Fed	182.00 ^c	544.67 ^a	446.67 ^a	266.67 ^b
Mature Unfed	284.67 ^a	552.67 ^a	458.67 ^a	210.67 ^c
SE ³	7.21	15.12	13.04	9.40
P - value	<0.0001	<0.0001	<0.0001	<0.0001

^{a-c}Least squares means in the same column without a common superscript differ ($P < 0.05$)

¹100 = A⁰⁰; 200 = B⁰⁰; 300 = C⁰⁰; 400 = D⁰⁰; 500 = E⁰⁰

²200 = traces⁰⁰; 300 = slight⁰⁰

³Pooled SE of least squares means

Table 2. Least squares means for percentage of fat, moisture, and protein for beef strip steaks from mature beef carcasses commercially identified as fed or unfed and young fed carcasses of varying marbling scores determined by proximate analysis

	Fat, %	Moisture, %	Protein, %
Slight			
Young Fed	4.33 ^a	71.14 ^{cd}	23.44 ^b
Mature Fed	4.41 ^a	70.38 ^d	23.56 ^{ab}
Mature Unfed	4.16 ^a	72.26 ^b	22.54 ^c
Traces/Practically Devoid			
Young Fed	2.40 ^b	72.38 ^b	24.10 ^a
Mature Fed	3.80 ^a	71.85 ^{bc}	23.41 ^b
Mature Unfed	2.15 ^b	74.00 ^a	22.79 ^c
SE ¹	0.37	0.35	0.20
P - value	<0.0001	<0.0001	<0.0001

^{a-c}Least squares means in the same column without a common superscript differ ($P < 0.05$)

¹Pooled SE of least squares means

Table 3. Least squares means of consumer (n = 120) sensory scores¹ for palatability traits of beef strip steaks from mature beef carcasses commercially identified as fed or unfed and young fed carcasses of varying marbling scores

	Tenderness	Juiciness	Flavor Liking	Overall Liking	Off Flavor Intensity
Slight					
Young Fed	58.91 ^a	57.47 ^{ab}	52.90 ^{abc}	54.29 ^a	11.55
Mature Fed	56.20 ^{ab}	53.50 ^{ab}	53.93 ^{ab}	54.62 ^a	11.29
Mature Unfed	52.93 ^{abc}	62.29 ^a	56.42 ^a	56.27 ^a	11.86
Traces/Practically Devoid					
Young Fed	53.82 ^{abc}	47.55 ^{bc}	51.20 ^{abc}	54.29 ^a	6.48
Mature Fed	46.28 ^{bc}	41.27 ^c	46.74 ^{bc}	46.70 ^b	14.99
Mature Unfed	44.22 ^c	48.24 ^{bc}	45.40 ^c	44.52 ^b	12.38
SE ²	3.60	4.02	2.93	2.91	2.55
P - value	0.0362	0.0058	0.0427	0.0064	0.1493

^{a-c}Least squares means in the same column without a common superscript differ ($P < 0.05$)

¹Sensory scores: 0 = not tender/juicy, dislike flavor/overall extremely, extremely bland; 100 = very tender/juicy, like flavor/overall extremely, extremely intense

²Pooled SE of least squares means

Table 4. Percentage (\pm SEM) of samples for tenderness, juiciness, flavor, and overall liking rated as acceptable by consumers (n = 120) for beef strip steaks mature beef carcasses commercially identified as fed or unfed and young fed carcasses of varying marbling scores

	Tenderness	Juiciness	Flavor Liking	Overall Liking
Slight				
Young Fed	79.59 ^a (± 0.04)	71.91 ^a (± 0.04)	70.23 ^{ab} (± 0.05)	68.68 ^{abc} (± 0.05)
Mature Fed	77.09 ^a (± 0.04)	69.73 ^{ab} (± 0.04)	77.83 ^a (± 0.04)	79.40 ^a (± 0.04)
Mature Unfed	69.80 ^{ab} (± 0.05)	79.21 ^a (± 0.04)	73.32 ^a (± 0.04)	70.36 ^{ab} (± 0.04)
Traces/Practically Devoid				
Young Fed	75.99 ^a (± 0.04)	57.60 ^b (± 0.05)	72.75 ^a (± 0.04)	76.23 ^a (± 0.04)
Mature Fed	58.18 ^{bc} (± 0.05)	44.45 ^c (± 0.05)	59.46 ^b (± 0.05)	60.03 ^{bc} (± 0.05)
Mature Unfed	54.67 ^c (± 0.05)	59.29 ^b (± 0.05)	58.40 ^b (± 0.05)	57.26 ^c (± 0.05)
P - value	0.0001	<0.0001	0.0092	0.0028

^{a-c}Least squares means in the same column without a common superscript differ ($P < 0.05$)

Discussions

- Proximate analysis showed SL steaks had higher ($P < 0.05$) fat content than TR/PD steaks.
- Consumer tenderness ratings for YF-SL steaks were higher ($P < 0.05$) than MF-TR/PD and MU-TR/PD steaks. YF-SL and MU-TR/PD samples were rated highest ($P < 0.05$) and lowest ($P < 0.05$), respectively, for tenderness.
- SL steaks were rated higher than TR/PD for juiciness. Consumers rated MU-SL and MF-TR/PD samples highest ($P < 0.05$) and lowest ($P < 0.05$), respectively, for juiciness.
- Both MF-TR/PD and MU-TR/PD treatments scored lower ($P < 0.05$) than all other treatments for flavor liking and overall liking.
- No differences were observed for off flavor intensity among treatments.
- Acceptability scores were similar ($P < 0.05$) between SL steaks and YF-TR/PD steaks for tenderness, flavor liking, and overall liking, however, MF-SL and YF-SL scored higher ($P < 0.05$) for juiciness acceptance.
- TR/PD consumer acceptance scores for tenderness, flavor liking, and overall liking decreased ($P < 0.05$) as maturity increased and as carcasses were identified as unfed.

Conclusions

No statistical differences in consumer ratings or acceptance were observed between SL steaks. Among TR/PD treatments, MF and MU steaks were rated lower in consumer acceptance for tenderness, flavor liking, and overall liking. These results suggest that strip steaks from mature carcasses with slight marbling scores could be a more affordable alternative to steaks from young carcasses without sacrificing eating quality.

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