Comparing the difference in eating quality from hot-boned and conventionally chilled bovine muscles

M. Toro SOWER Scholar, R. D. Crownover, A. J. Garmyn and M. F. Miller Ph.D.

Department of Animal and Food Sciences, Texas Tech University, Lubbock, TX 79409

INTRODUCTION

- Chilling freshly harvested beef carcasses is necessary for food safety and quality purposes (Savell, 2012) .
- Biochemical processes and structural changes that occur in muscles during the first 24 h postmortem play a great role in the ultimate quality and palatability of meat and are influenced by chilling processes that carcasses are subjected to after slaughter (Savell, 2005) .
- Carcass chilling systems require major capital expenditure and take up much space. They typically account for 40% of the electrical power consumption in slaughterhouses (Savell, 2012) .

OBJECTIVE

- The objective of this research was to evaluate beef quality from hot-boned muscles when compared to chilled muscles.

METHODS

- Carcasses (n = 40) were cut in half and each side was randomly assigned as hot or cold carcass treatment.
- Cold carcass muscle treatments were chilled prior to boning for 24 h and hot carcass muscle treatments were boned within 1.5 h after slaughter.
- Muscles collected included *Longissimus thoracis* (LT*), Semimembranous* (SM)*, Gluteus medius* (GM*), Longissimus lumborum* (LL*) and Psoas major* (PM) for both treatments.
- Muscles were fabricated into 2.5 cm thick steaks, aged for 7, 21 or 35 days at 0-4ºC and frozen (-20ºC).
- Steak samples were thawed at 2-4ºC for 24 hours prior to consumer evaluation, were cooked on a Silex clamshell grill
- Consumer panelists (n = 1,200) were recruited from Lubbock, Texas. Each consumer evaluated samples that represent both chilling treatments (hot and cold), five muscles (LL, LT, PM, GM, and SM), and three postmortem aging periods (7, 21, or 35 d).
- Consumers rated tenderness on 100-mm line scale on a paper ballot. The zero anchors were labeled as not tender and 100 anchors were labeled as very tender.
- Consumer Data were analyzed using the GLIMMIX procedure of SAS as a completely randomized design with an alpha level of 0.05.

RESULTS

Table 1. The effects of chilling and postmortem aging on consumer ratings of tenderness of five beef muscles.

	Treatment									
	Cold			Hot				*P*-Value[3]		
	7	21	35	7	21	35	SEM	C	A	C × A
LT	67.29^{z}	69.80^{y}	70.21^{y}	57.60^{z}	63.54^{y}	68.29^{y}	2.10	< 0.01	< 0.01	0.10
GM	57.80	60.78	60.96	55.32	56.89	61.38	2.52	0.20	0.10	0.53
LL	60.80^{z}	64.98^{y}	70.06^{x}	60.99^{z}	67.30^{y}	70.06^{x}	2.00	0.47	< 0.01	0.66
PM	80.16	82.00	81.30	69.71	73.41	72.51	1.98	< 0.01	0.34	0.84
SM	30.45^{z}	35.01^{y}	38.17^{y}	33.47^{z}	40.72^{y}	43.55^{y}	1.82	< 0.01	< 0.01	0.69

[1]:LT- longissimus thoracis; GM - gluteus medius; LL - longissimus lumborum; PM - psoas major; SM - semimembranosus.

[2] Pooled (largest) SE of least squares means.

[3]Observed significance levels for main effects of chilling, aging and the chilling x aging interaction by muscle.

[x-z] Within a row, least squares means without a common superscript differ (*P* <0.05) due to aging.

CONCLUSION

Chilled LT and PM were rated more tender(*P* < 0.01) than hot-boned LT and PM for tenderness showing that chilling is functional for improving tenderness in these muscles; however, US consumers did not detect tenderness difference between chilled vs hot-boned treatments in GM and LL muscles. Lastly, the hot boned SM was more tender (*P* < 0.01) compared to chilled SM according to consumers. Therefore, these results indicate a muscle specific response to hot boning in how consumers perceive tenderness of five beef muscles.

REFERENCES

° Jeffrey W. Savell. 2012. Beef Carcass Chilling: Current Understanding, Future Challenges.

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