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Effects of Blast Chilling on Fresh Pork Quality in Chops from the Longissimus Dorsi

Aaron M. Blakely
Iowa State University, ablekely@iastate.edu

Edward M. Steadham
Iowa State University, steadham@iastate.edu

Kenneth J. Prusa
Iowa State University, kprusa@iastate.edu

Christine A. Fedler
Iowa State University, cfedler@iastate.edu

Elisabeth J. Huff-Lonergan
Iowa State University, elonerga@iastate.edu

See next page for additional authors

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Authors
Aaron M. Blakely, Edward M. Steadham, Kenneth J. Prusa, Christine A. Fedler, Elisabeth J. Huff-Lonergan, and Steven M. Lonergan

Effects of Blast Chilling on Fresh Pork Quality in Chops from the *Longissimus Dorsi*

A.S Leaflet R2938

Aaron Blakely, Graduate Student, Department of Animal Science; Edward Steadham, Research Associate, Department of Animal Science; Kenneth J. Prusa, Professor, Department of Food Science and Human Nutrition; Christine A. Fedler, Research Associate, Department of Food Science and Human Nutrition; Elisabeth Huff-Lonergan, Professor, Department of Animal Science Steven M. Lonergan, Professor, Department of Animal Science

Summary and Implications

Carcasses (n=40) with defined fat free lean and carcass weight were selected 45 minutes postmortem. Carcasses were split, and sides subjected to conventional or blast chilling regimens. Sides that were blast chilled had *Longissimus dorsi* (LD) chops with slower pH decline, greater cook loss and greater Warner-Bratzler Shear force than chops from conventionally chilled sides. These results demonstrate that current blast chilling practices have the potential to negatively impact pork tenderness.

Introduction

To maintain production efficiency and ensure the production of microbiologically safe products, fresh pork processing facilities maintain the use of blast chilling regimens in the processing of pork carcasses. It has been documented that with the use of blast chilling, severe cases of rapid pH decline leading to pale soft and exudative pork defects may are avoided. Improvements in color, reduced purge and cook loss, and more uniform product are achieved with the use of Blast Chilling (BC). Current industry practices and the use blast chilling may be having a detrimental effect on fresh pork tenderness. This study compared the effect of blast chilling within carcasses on fresh pork sensory characteristics in chops from the *Longissimus dorsi*.

Materials and Methods

Carcasses were selected approximately 45 minutes postmortem on the production floor. Carcasses were selected based on carcass weight (CWT) (86 to 91 kg) and fat free lean (FFL) (54 to 57% lean). Carcasses were selected in groups of ten on four nonconsecutive slaughter dates. Carcasses were split and alternating sides were assigned either blast chill (BC) or conventional chill (CC) treatment. BC sides were chilled at -32°C for 90 minutes while CC sides while CC sides were spray chilled and held at 2°C. *Longissimus Dorsi* (LD) temperature was continuously recorded in twos sides from each treatment per slaughter. Additional LD temperatures were taken at the tenth rib upon entering the chilling treatment, exiting the chilling treatment, approximately 4, and 30 hours postmortem, additional pH measurements were taken entering the chilling treatment, approximately 4, and 30 hours postmortem. The LD was collected approximately 30 hours postmortem. Fresh pork sensory analysis was conducted on LD chops aged 10 days, at which time ultimate pH was recorded. A trained sensory panel (n=4) evaluated LD chops for tenderness, juiciness, chewiness, flavor and off flavor. A ten point scale was used to measure sensory traits with lower values corresponding to a lesser intensity of the trait and a higher values corresponding to a greater intensity of the trait (1=less tender, 10=extremely tender). Instrumental measurements of tenderness were collected to determine treatment effect on Warner-Bratzler Shear (WBS) force and star probe analysis. Color scores (National Pork Board standard six point scale, 1=pale pinkish gray to white; 6= dark purplish red) marbling scores (National Pork Board standard ten point scale, 1= 1.0% Intramuscular Fat; 10= 10.0% Intramuscular Fat) were assigned to chops, Hunter L a* b* values were also collected. Statistical analysis were conducted using SAS Enterprise Guide 5.1 using PROC MIXED with Treatment, Harvest and Treatment*Harvest as fixed effects and Animal as a random effect.

Results and Discussion

Temperature and pH results are summarized in Table 1. As can be expected, LD temperature in BC sides exiting chilling treatment was lower (21.8°C CC, 9.7°C BC). Treatment effect was also seen in 4 hour LD temperature (13.3°C CC, 3.8°C BC) and 30 hour LD temperature (0.4°C CC, -0.2°C BC). Chilling slowed pH decline in BC sides with LD's from BC sides having a higher 4 (6.09 CC, 6.34 BC) and 30 hour (5.81 CC, 5.89 BC) pH. Rate of pH decline in combination with temperature decline has been shown to have an effect on proteolysis and resulting fresh pork tenderness and water holding capacity. This may help explain the treatment effect on percent cook loss with LD chops from BC sides having greater loss (18.73 CC, 20.60 BC). LD chops from BC sides also had a greater shear force value (2.84 CC, 3.14 BC). No further treatment effect was observed. Sensory traits are summarized in Table 2.

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Table 1. Temperature and pH decline of *Longissimus dorsi*

	CC	BC	SE	p-value
Time postmortem		**pH**		
Entering Cooler	6.57	6.52	0.22	0.44
4 hours	6.09	6.34	0.07	<.0001*
30 hours	5.81	5.89	0.02	0.01*
Ultimate	5.68	5.68	0.02	0.86
		Temperature		
Entering Treatment	37.9°C	38.0°C	0.97	0.75
Exiting Treatment	21.8°C	9.7°C	2.45	<.0001*
4 hours	13.3°C	3.8°C	1.48	<.0001*
30 hours	0.4°C	-0.2°C	0.07	<.0001*

Table 2. Effect of Blast Chilling on Chops from the *Longissimus dorsi*

Trait	CC[1]	BC[1]	SE	*P-value*
Purge Loss %	2.21	2.28	0.23	0.83
Cook Loss %	22.37	24.24	2.47	0.02*
Marbling Score	2.30	2.30	0.17	0.74
Color Score	3.10	3.10	0.37	0.92
Hunter L	49.07	49.10	0.38	0.95
Hunter a*	13.67	13.79	0.13	0.60
Hunter b*	2.90	2.99	0.18	0.43
Star Probe (Kgf)	5.45	5.69	0.33	0.21
WBS (Kgf)	2.00	2.30	0.48	0.05*
Juiciness	7.10	7.00	0.15	0.75
Tenderness	7.00	6.60	0.20	0.20
Chewiness	3.70	4.00	0.24	0.35
Flavor	3.60	3.60	0.11	0.94
Off Flavor	1.50	1.30	0.12	0.18

[1]Least square means reported for each trait