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A Comparison of Fresh and Frozen Chops and Roasts from Gilts, Physical Castrates, Entire Males, and Immunologically Castrated Males

A.S. Leaflet R2831

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Summary and Implications

The objective of this study was to evaluate the effect of gender treatment, including immunological castrates, on meat quality and sensory characteristics of fresh and frozen pork. This experiment included gilts (G), physical castrates (PC), entire males (EM), and immunologically castrated males (IC). Pigs were harvested at a BW=145.0 ± 8.6 kg. Loins were collected and cut into roasts and chops. Fresh and frozen chops and roasts were evaluated for meat quality, namely - loin purge %, pH, marbling score, color score, Minolta L*, a*, and b* score, % cook loss, and star probe force. No significant differences ($P < 0.05$) were found among gender treatments in the fresh samples for any of the carcass meat quality criteria evaluated. However, NPPC marbling score was significantly different among treatments in frozen samples (G=1.58^b, PC=2.05^a, EM=1.46^b, IC=1.73^{ab}; $P < 0.005$). A trained sensory panel evaluated samples for boar aroma, juiciness, tenderness, pork flavor, and off flavor. No significant differences were found among genders for juiciness, tenderness, chewiness or off flavor. Boar aroma and pork flavor results are presented in Table 3. These results suggest that gender treatment was similar between fresh and frozen product, and that injection against GnRF (gonadotropin releasing factor) removes aroma and flavor issues associated with meat from intact males.

Introduction

Boar aroma is a major reason for castrating male pigs. A newly approved immunization that binds GnRF and suppresses the onset of puberty in male pigs has been approved by the US Food and Drug Administration – Center for Veterinary Medicine. Using two-2mL doses, according to product label, temporarily immunologically castrates the male pig. The objective of this study was to evaluate the effect of gender treatment, including immunological castrates, on meat quality and sensory characteristics of fresh and frozen pork.

Materials and Methods

This study was conducted at the Iowa State Swine Nutrition Farm under the approval of the Institutional Animal Care and Use Committee (8-11-7189-S).

Each treatment included 11 or 12 pigs and treatments included gilts, physical castrates, entire males, and immunologically castrated males. Pigs selected for the IC treatment were immunized with a GnRF analog (Improvest®; Pfizer Animal Health) at 13 and 18 weeks of age in accordance with the product label. Pigs (BW=145.0 ± 8.6 kg) were harvested six weeks after the 2nd injection. A loin was collected from each pig; aged for 10 d, and, then cut into fresh chops and roasts for immediate sensory evaluation. A contemporary chop and roast was frozen for at least 2 weeks for evaluation at a later time point to compare fresh versus frozen. A trained sensory panel evaluated each sample on an intensity scale, ranging from zero to fifteen. Zero being the lowest and fifteen being the highest score. Meat quality measurements were also collected.

Results and Discussion

Meat quality parameters measured in the study are presented in Table 1 and 2. Boar aroma and pork flavor results are presented in Table 3. There were no significant differences ($P < 0.05$) in the sensory characteristics measured - juiciness, tenderness, chewiness, and off flavor. No significant differences were found in meat quality characteristics in fresh product. In frozen product, marbling score was found to be significant (G=1.58^b, PC=2.05^a, EM=1.46^b, IC=1.73^{ab}; $P < 0.005$). These results suggest that boar aroma is removed by immunizing against GnRF and other sensory and meat quality characteristics are similar in gender treatment between fresh and frozen pork products.

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Table 1. Least square means for the effect of gender treatment for meat quality characteristics on fresh samples.

	Gender treatment ¹				SEM	P-value
	G	PC	EM	IC		
Loin purge, %	0.94	0.68	0.88	1.10	0.169	0.39
pH	5.64	5.68	5.67	5.65	0.018	0.28
Marbling score ²	1.29	1.64	1.29	1.50	0.130	0.12
Color score ³	3.00	3.01	2.96	3.01	0.218	0.99
Minolta L* score	49.02	48.86	47.79	48.85	1.069	0.46
Minolta a* score	14.59	14.93	14.56	14.71	0.201	0.56
Minolta b* score	4.03	4.31	3.93	4.20	0.135	0.20
Chop cook loss, %	16.67	17.38	16.78	14.64	1.170	0.16
Chop average star probe force	5.22	5.13	4.90	5.16	0.427	0.65
Roast cook loss, %	20.79	20.89	20.51	21.17	1.006	0.89
Roast average star probe force	4.85	4.53	4.24	4.50	0.184	0.15

^{abc} Means with differing superscripts within a row differ ($P < 0.05$)

¹ Gender treatments: G=gilt; PC= physical castrate; EM= entire male; IC= immunocastrate male

² Scored on a 1-10 scale

³ Scored on a 1-6 scale

Table 2. Least square means for the effect of gender treatment for meat quality characteristics on frozen samples.

	Gender treatment ¹				SEM	P-value
	G	PC	EM	IC		
Chop purge, %	4.10	3.56	3.57	4.28	1.576	0.60
Roast purge, %	3.08	2.89	2.74	3.09	0.570	0.89
pH	5.68	5.73	5.72	5.68	0.025	0.39
Marbling score ²	1.58 ^b	2.05 ^a	1.46 ^b	1.73 ^{ab}	0.112	0.005
Color score ³	2.75	2.85	2.79	2.76	0.226	0.95
Minolta L* score	48.55	48.52	48.03	48.83	0.917	0.82
Minolta a* score	14.42	14.53	14.14	14.05	0.238	0.325
Minolta b* score	3.80	4.29	4.12	3.94	0.238	0.50
Chop cook loss, %	17.34	16.99	17.03	18.08	1.520	0.79
Chop average star probe force	5.19	5.04	4.88	5.34	0.226	0.35
Roast cook loss, %	21.96	21.07	20.84	21.80	0.61	0.49
Roast average star probe force	5.72	5.54	5.30	5.63	0.246	0.46

^{abc} Means with differing superscripts within a row differ ($P < 0.05$)

¹ Gender treatments: G=gilt; PC= physical castrate; EM= entire male; IC= immunocastrate male

² Scored on a 1-10 scale

³ Scored on a 1-6 scale

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Table 3. Least square means for the effect of treatment on sample boar aroma and pork flavor.

	Gender treatment ¹				SEM	P-value
	G	PC	EM	IC		
Boar aroma						
Fresh chop	1.2 ^b	0.8 ^b	3.2 ^a	1.1 ^b	0.49	0.005
Fresh roast	0.5 ^b	1.0 ^b	3.2 ^a	0.6 ^b	0.49	0.0009
Frozen chop	0.8 ^b	0.7 ^b	3.3 ^a	1.3 ^b	0.43	0.0002
Frozen roast	0.8 ^b	0.6 ^b	4.2 ^a	0.4 ^b	0.60	<0.0001
Pork Flavor						
Fresh chop	3.1	3.5	2.6	3.1	0.25	0.10
Fresh roast	3.5 ^a	3.3 ^{ab}	2.7 ^b	3.5 ^a	0.23	0.03
Frozen chop	3.7 ^a	3.0 ^{ab}	2.5 ^b	3.3 ^{ab}	0.45	0.02
Frozen roast	3.3 ^a	3.3 ^a	2.2 ^b	3.3 ^a	0.28	0.02

^{abc} Means with differing superscripts within a row differ ($P < 0.05$)

¹ Gender treatments: G=gilt; PC= physical castrate; EM= entire male; IC= immunocastrate male