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LOIN QUALITY MEASUREMENTS IN PORK FROM GILTS HARVESTED AT DIFFERENT TIMES POST SECOND DOSE OF IMPROVAC®

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I. INTRODUCTION

Pork loins that have increased intramuscular fat are more desirable as it increases palatability. Gilts immunized against gonadotropin-releasing factor (GnRF; Improvac) had loins that had enhanced markers of palatability in a trained sensory taste panel (1). We also have previously reported that there is an increase in scores for marbling, color, and firmness (2). Our objective was to determine if the anti-GnRF immunization impacted other parameters of meat quality in loins from gilts at differing times post second dose (PSD).

II. MATERIALS AND METHODS

Gilts (fattening female pigs) were either administered anti-GnRF product (Improvac®; IMV) or not administered IMV (CON) at 9 and 19 weeks of age. The heaviest gilts from each pen (n = 10/pen) were marketed at 18-, 25-, 32, and 39- days post second dose (PSD; marketing event (ME) 1). The remaining gilts were marketed at 39-, 46-, 53-, and 60- days PSD of anti-GnRF (ME 2). There were ~50 carcasses randomly selected for performing primal cutouts and of these, bone-in loins were collected. Bone-in loins were fabricated into strap-off, boneless loins. At the time of fabrication, objective L*, a*, and b* color evaluations were conducted using a Minolta CR-400 Chroma Meter (Konica Minolta Sensing Americas, Ramsey, NJ, USA) with a D65 light source, 2° observer, and 8-mm aperture.
From the center of each boneless loin, a 10-cm section was removed, vacuum packaged, shipped with ice packs to a lab, and stored at 4°C. At 13 d postmortem, loin sections were weighed in the bag, removed from the bag, and re-weighed (Final Loin Weight). Each week, ten bags were weighed, and an average bag weight was calculated for the week and subtracted from each in-bag loin weight to determine the Initial Loin Weight of each section. Purge loss was then calculated as Purge Loss = ((Initial Loin Weight – Final Loin Weight) / Initial Loin Weight) × 100. If there was a calculated purge loss less than 0, it was adjusted to be 0 in the data analyses. A 2.5 cm chop was removed from the anterior end of the loin section, trimmed free of subcutaneous and intermuscular fat and accessory muscles surrounding the longissimus dorsi, and intramuscular fat percentage was determined using a Bruker MPA Multi-Purpose FT-NIR Analyzer (Bruker Optics, Billerica, MA, USA). Another 2.5-cm chop was then removed for the evaluation of cook loss and tenderness through slice shear force. The raw chop was weighed (Initial Chop Weight), then cooked on a belt grill until reaching an internal temperature of 63°C. The peak internal temperature for each chop was recorded, and cooked chops were weighed. Cooking loss was calculated as Cook Loss = ((Initial Chop Weight – Cooked Weight)/Initial Chop Weight) × 100. Slice shear force was then conducted on the cooked chop according to procedures described by Shackelford et al. (3), using a slice shear force kit from G-R Electric Manufacturing Company, LLC (Manhattan, KS). Data were analyzed by a generalized linear mixed model approach with a model that considered the fixed effect of treatment and the random effects of block, block (room) and residual error. Measurements expressed as a percentage were transformed by the arcsine square-root transformation for analysis and LSMeans were back-transformed when presented in the tables below.

III. RESULTS AND DISCUSSION

At ME1 and ME2, hot carcass weights from IMV-treated gilts were heavier ($P < 0.01$) than CON (ME1: 104.8 vs 103.8 ± 0.4 kg; ME2: 109.6 vs 107.5 ± 0.3 kg); and there was increased ($P < 0.01$) backfat (ME1: 16.1 vs 15.1 ± 0.2 mm; ME2: 17.5 vs. 15.6 ± 0.1 mm). There was a treatment by day interaction ($P = 0.04$) for loin depth for ME1 where there was similar depth on day 18, 25, and 39, but IMV gilts had more loin depth than CON on day 32 (data not shown). There was no effect of treatment for ME2. After the loins were dissected several meat quality attributes are depicted in Tables 1 and 2. Due to the increased backfat of IMV gilts, when loins were trimmed, there was a decreased weight during ME2, and a reduced loin yield at each ME. Cook loss was reduced in IMV gilts compared to CON. There were treatment by day interactions for L* and cook loss at ME2. Minolta L* was greater on day 39 in IMV vs CON gilts, but similar thereafter. There was a greater percentage cook loss on day 39, but it was less on day 46 for IMV vs CON gilts, being similar at 53- and 60- days post second dose. Intramuscular fat was increased in IMV vs CON gilts in ME2.

Table 1. Carcass characteristics from control (CON) and Improvac (IMV) treated gilts from the first marketing event (18-, 25-, and 32- days post second dose of Improvac) and second marketing event (39-, 46-, 53-, and 60- days post second dose of Improvac.

	Marketing event 1		P value	Marketing event 2		P value
	CON	IMV	Trt	CON	IMV	Trt
Trimmed loin wt, kg	3.96±0.03	3.91 ± 0.03	0.206	4.14±0.07[a]	4.05±0.07[b]	**0.017**
[†]Loin yield, %	7.79±0.05[a]	7.64±0.04[b]	**0.018**	7.68±0.04[a]	7.42±0.04[b]	**<0.001**
Minolta L*	48.50±0.24	48.29±0.23	0.537			
Minolta a*	5.17±0.08	5.05±0.08	0.320	4.60±0.13	4.50±0.14	0.603
Minolta b*	3.25±0.07	3.19±0.07	0.553	2.95±0.06	2.94±0.06	0.916
[†]Purge loss, %	1.22±0.14	1.04±0.13	0.124	1.93±0.13	1.71±0.12	0.185
[†]Cook loss, %	11.1±0.2[a]	11.7±0.2[b]	**0.013**			
Sliced shear force, kg	11.89±0.32	11.43±0.32	0.154	10.94±0.25	10.91±0.24	0.9095
[†]Loin chop intramuscular fat, %	1.59±0.04	1.61±0.04	0.687	1.87±0.04[a]	2.06±0.04[b]	**0.002**

[†]Back-transformed LSMeans ± SEM presented
[abc]LSMeans ± SEM within a row and main effect with different superscripts, differ; P ≤ 0.05
Trt*day interactions were ≥ 0.13 for all variables; interactive means for Minolta L* and cook loss are presented in Table 2.

Table 2. Interactive least squares means for carcass characteristics from control (CON) and Improvac (IMV) treated gilts from the second marketing event on 39-, 46-, 53-, and 60- days post second dose of Improvac.

		Minolta L*	[†]Cook loss, %
Day 39	CON	47.01±0.51[a]	13.13±0.36[a]
	IMV	48.28±0.53[b]	14.2±0.41[b]
Day 46	CON	51.78±0.51[c]	12.95±0.37[a]
	IMV	50.71±0.54[c]	11.96±0.39[c]
Day 53	CON	47.90±0.55[ab]	13.62±0.43[ab]
	IMV	47.24±0.52[a]	13.53±0.37[b]
Day 60	CON	48.39±0.55[b]	11.27±0.30[c]
	IMV	48.74±0.54[b]	11.39±0.30[c]
P values	Trt	0.920	0.925
	Day	<0.001	<0.001
	Trt×Day	0.042	0.045

[†]Back-transformed LSMeans ± SEM presented.
[abc]LSMeans ± SEM within a column with different superscripts, differ; P ≤ 0.05

IV. CONCLUSION

While we have reported increased intramuscular fat in loins from IMV treated gilts, some other aspects of loin meat quality are dependent upon the time when gilts are marketed post second dose. Use of IMV in fattening gilts does appear to have limited impact on other aspects of meat quality and additional studies could be done to work on how the timing of IMV administration could further improve meat quality parameters.

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