

Sensory, Color, and Tenderness Characteristics of Processed Hams from Pigs Supplemented with Conjugated Linoleic Acid

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Summary and Implications

Hams were collected from conjugated linoleic acid (CLA) fed market barrows from 40 kg to 115 kg of body weight. No treatment differences were observed in a sensory panel (texture, flavor, saltiness, and overall acceptability), objective (Hunter) color scores, and tenderness for the Star Probe and Warner Bratzler Shears (WBS). Supplementation of CLA in swine finishing diets does not compromise processed ham-quality characteristics.

Materials and Methods

Whole bone-in hams from 25 Yorkshire × Landrace × Duroc × Hampshire barrows were used in this phase of the CLA project at ISU. Twelve hams were from a control diet and 13 hams were from pigs supplemented with CLA at 0.75% in the finishing diet. Every pig started their respective diets at 40 kg of body weight. All the pigs were transported to Hormel in Austin, MN, in two different slaughter groups. All pigs averaged 115 kg of body weight at slaughter. Whole bone-in hams were removed from the left side of the carcass at 24-h postmortem. Hams were boxed and sent to ISU Meat Laboratory under refrigerated conditions. At 48-h postmortem hams were deboned and the semimembranous muscle was removed from each ham. The semimembranous was weighed and pumped to 25% of the green weight. The brine was a 100-lb solution and consisted of 80.2 lb of water, 11.0 lb of salt, 6.6 lb of sugar, 2.2 lb of phosphate, 28.3 g of sodium nitrite, and 99.8 g of sodium erythroate. The semimembranous muscles were injected using a Townsend Injector Model #1400 (Townsend Engineering, Des Moines, IA). They were then

tumbled under vacuum pressure. The hams were individually packed in a cellulose casing, then weighed before processing and smoked in an Alkar Thermal Processing Unit (Alkar, Inc., Lodi, WI). Each ham muscle was weighed for a final cooked weight to calculate a yield. Hams were sliced into two 2.54-cm-thick slices and were used for a sensory evaluation. One of the slices was cut into 2.54-cm cubes and served to a sensory panel. The sensory panel consisted of seven people who evaluated the ham cubes for texture, flavor, salt, and overall acceptability on a 10 point scale. Ham cubes were warmed in a Faberware convection oven to 65°C. A second slice was used to determine L*, a*, and b* color values using a Hunter lab system. Also, Star Probe and Warner Bratzler Shears (WBS) were used to determine tenderness of the second slice. Statistical analysis was performed using the GLM procedure of SAS. The model included fixed effects of treatment and replication for objective color, tenderness, and sensory panel for processed ham. Means were considered different of a preset P-value of 0.05 or less.

Results and Discussion

Least squares means and standard errors for yield, Warner Bratzler Shears, and Star Probe for processed hams are shown in Table 1. No treatment differences were observed for yield. Warner Bratzler Shears did not show any significant differences. Furthermore, all ham tenderness was considered acceptable for all treatments.

Table 1. Least squares and standard errors for yield, WBS, and Star Probe for processed hams.

	Control	CLA
Yield ^a	0.88	0.86
SE	0.01	0.01
WBS	1.22	1.34
SE	0.10	0.95
Star Probe	3.17	3.58
SE	0.25	0.24

^aYield is the pumped weight divided by the processed weight.

Table 2 shows least squares means and standard errors for sensory panel evaluation of processed ham attributes. No treatment differences were observed for texture, flavor, salt, and overall acceptability. All processed hams were considered acceptable for sensory panel attributes, regardless of treatments.

Table 2. Least squares means and standard errors of sensory panel attributes for processed hams.

Attributes	Control	CLA
Texture	4.37	4.70
SE	0.30	0.29
Flavor	4.68	4.72
SE	0.32	0.30
Salt	4.96	4.91
SE	0.23	0.22
Overall Acceptability	4.81	4.87
SE	0.30	0.29

Table 3 shows least squares means and standard errors for Hunter L*, a*, and b* color values. No statistical differences were observed for any of the Hunter color values. These observations were for all processed hams

independent of treatment. Again, all processed hams were considered acceptable for Hunter L*, a*, and b* color values regardless of treatments.

Table 3. Least squares means and standard errors for Hunter L*, a*, and b* color values.

Hunter Values	Control	CLA
L*	62.82	62.60
SE	0.74	0.72
b*	8.57	8.76
SE	0.27	0.26
a*	8.91	8.76
SE	0.72	0.69

Conclusions

We suggest that the lack of differences in yield, WBS, Star Probe, sensory panel attributes, and Hunter values of hams are positive for the use of CLA in swine diets because processing attributes are not compromised. These results on quality of hams coupled with improvements in growth and performance characteristics of pigs fed CLA is very useful.