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Meat Quality Assessment of Pork from Pigs Fed Poultry Fat, Flaxseed Oil, and Supplemented With Vitamin E

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Objectives

The objective of the this project was to determine the meat quality characteristics of pork from pigs fed a combination of poultry fat, flaxseed oil and supplemented with vitamin E.

Materials and Methods

Yorkshire pigs ($N = 96$) weighing approximately 50 kg were allocated to pens based on weight and sex, over 2 trials. Pigs within each trial were born in the same farrowing groups and each pen was allotted 2 gilts or 2 barrows. Each pen was randomly assigned to 1 of 8 dietary treatments in a 4 × 2 factorial. Corn-soybean meal finisher diets ($N = 2$; 1: 50 to 80kg, 2: 80 to 110kg) were formulated to contain 0, 2, 4 or 6% lipids and 11 (NRC, 2012) or 220 IU Vitamin E/kg. Flaxseed oil was included at 1% and the remaining lipids supplied by poultry fat. Pigs were harvested ($N = 8$ groups) at an average pen weight of 110 ± 3 kg. Following harvest, hot carcass weight (HCW) was recorded. At 24 h post mortem carcasses were evaluated for last rib fat thickness (LRFT), tenth rib fat thickness (TRFT), loin eye area (LEA), muscle score (MS), percent fat free lean (%FFL), color values (L*, a*, b*), ultimate pH of the ham (pHH) and loin (pHL), and National Pork Producers Council (NPPC) color (NPPCCol) and marbling score (NPPCMar). TRFT, LEA, L*, a*, b*, pHH, NPPCCol, and NPPCMar were determined on the loin eye at the 10th/11th rib interface after chilling, prior to carcass fabrication. Eight 2.54-cm thick pork chops were fabricated, individually vacuum packaged, and frozen (–20 ± 2°C) for further analysis. Belly firmness, skin-side up (SSU) skin-side down (SSD), and thickness (BT) were determined after fabrication. Chops were thawed at 4 ± 2°C for analysis of drip loss (DL), vacuum purge loss (VP), marinade uptake (MU), marinade cook loss (MCL), cook loss (CL), Warner-Bratzler Shear Force (WBS), proximate analysis (PA), and thiobarbituric acid reactive substances (TBARS). Sensory evaluation was performed. Statistical analysis was conducted using the GLM procedure in SAS (SAS Inst. Inc., Cary, NC). Carcass was the experimental unit.

Results

The main effect(s) of lipid content, vitamin E concentration, and sex had no effect ($P > 0.05$) on, HCW, LEA, %FFL, a*, b*, NPPCCol, pHH, pHL, MS, SSD, SSU, BT, DL, VP, MU, MCL, WBS, % fat, % moisture, % collagen, % protein, % salt, and TBARS. Vitamin E affected ($P < 0.05$) LRFT, TRFT, and NPPCMar; values for LRFT (23.19 vs. 21.41), TRFT (21.62 vs. 19.26), and NPPCMar (1.87 vs. 1.41) were greater for 220 IU vitamin E. Sex had an effect ($P < 0.05$) on L* and CL; males had a great L* (61.50 vs. 58.86) and CL (17.14 vs. 14.89). There was a Lipid × Vitamin E interaction for TRFT ($P = 0.0015$), %FFL ($P = 0.0028$). A Trial × Vitamin E interaction was present for TFRT ($P = 0.03$), %FFL ($P = 0.0350$), MS ($P = 0.0304$), SSD ($P = 0.0042$), SSU ($P = 0.0079$), DL ($P = 0.0490$), VP ($P = 0.0418$), and Collagen % ($P = 0.0225$). There was a Trial × Sex interaction for LRFT ($P = 0.0034$), VP ($P = 0.0286$), and % Moisture ($P = 0.0390$). A lipid × sex interaction for LRFT ($P = 0.0031$), %FFL ($P = 0.0164$), MS ($P = 0.0362$), and SSU ($P = 0.0335$) and a sex by vitamin E for LRFT ($P = 0.0206$), SSD ($P = 0.0003$), and SSU ($P = 0.0018$).

Conclusion

A feeding program utilizing poultry fat in combination with flaxseed oil, and Vitamin E at these levels will not negatively affect the variables for carcass composition or meat quality assessed in the project. Further analysis of fatty acid composition assessment is needed.

