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Effects of Feeding Peroxidized Soybean Oil to Finishing Barrows on the Shelf-Life of Bacon and Loin Chops

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Objectives

Peroxidized lipids are, at times, used in finishing pig diets and have been shown to induce oxidative stress and reduce growth performance. The effects of feeding peroxidized lipids on the shelf-life of pork products is not as clear, as previous research has reported contradictory results. Therefore, the objective of this study was to test the effect of feeding soybean oil (SO) subjected to varying degrees of thermal abuse to finishing pigs on lipid oxidation and sensory attributes of commercially manufactured bacon during 90 d of simulated food-service-style storage; and the color stability and lipid oxidation of pork loin chops during 11 d of simulated retail display.

Materials and Methods

Fifty-five individually housed barrows were randomly allotted to 1 of 4 diets containing 10% SO: 1.) not heated (CON), or heated at 2.) 45°C for 288 h (45C/288h), 3.) 90°C for 72 h (90C/72h), or 4.) 180°C for 6 h (180C/6h), and fed for 81 d. Barrows were slaughtered on d 82 at the University of Illinois. At 24 h postmortem, bellies (NAMP 408) and Canadian back loins (NAMP 414) were removed from carcasses. Two 2.54 cm thick chops were cut from the Canadian back loin and used to determine color stability and thiobarbituric acid reactive substances (TBARS) during simulated retail display. Bellies were skinned (NAMP 409) then processed into sliced bacon at a commercial facility. Bacon was stored at -40°C without an atmosphere barrier to simulate food service storage conditions. Samples were removed on d 0, 30, 60, and 90 for sensory evaluation by 6 trained panelists and analysis of TBARS. Loins were packaged 1 d postmortem in foam trays covered in oxygen permeable overwrap and subjected to an 11 d simulated

retail display at 4°C with full exposure to fluorescent light. Loins were evaluated for CIE L*, a*, and b*, reflectance ratio, and visual discoloration daily. Loin samples were analyzed for TBARS on d 1 and d 10 of display. Data were analyzed as a complete randomized design repeated in time with fixed effects of oil treatment and storage day. Storage location (shelf) served as a random effect for analysis of loin shelf-life. Bacon sensory data were analyzed as a partially balanced incomplete block design repeated in time, with fixed effects of oil treatment and storage time, and sensory session serving as a random effect.

Results

There was no effect of oil treatment on TBARS ($P > 0.90$), oxidized odor ($P = 0.63$), or oxidized flavor ($P = 0.79$) of bacon. As expected lipid oxidation, oxidized odor, and oxidized flavor increased ($P < 0.0001$) over the 90 d storage period. There was no effect ($P > 0.51$) of oil treatment on L*, hue angle, or TBARS of loin chops subjected to a 10 d simulated retail display. However, chops from pigs fed 45C/288h oil were more red (greater a*; $P < 0.01$) and more yellow (greater b*; $P < 0.01$) than the other 3 treatments. Chroma and reflectance were also greater ($P < 0.03$) greater for these same chops; however, the 45C/288h were the most ($P < 0.01$) discolored after 10 d of simulated retail display.

Conclusion

Feeding peroxidized soybean oil did not affect lipid oxidation in either food-service packaged bacon or fresh loin chops. However, feeding the 45C/288h oil (mild thermal abuse) resulted in chops that were more red had more intense color, but also were the most discolored at the conclusion of an 11 d simulated retail display.