Carcass quality characteristics from swine fed hempseed meal as primary protein source

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Objectives: Compare quality traits of pork carcasses from barrows fed hempseed meal (HSM) or soybean meal (SBM) as the primary protein source in the diet. Assess tenderness, water-holding capacity, and shelflife differences utilizing ribeye and New York chops.

Materials and Methods: Barrows (*n* = 19 HSM and *n* = 20 SBM) were fed during the grow-finish stage (approx. 90 days) then harvested during a 5-day window. Pork loins, bone-in were collected from the carcasses (*n* = 19 HSM; *n* = 20 SBM) for analysis. Drip loss was conducted on a 2.54-cm sample removed from the 10th rib following methods described by Honikel (1998). The remaining portion of the loins (*n* = 39) were sliced into 2.54-cm thick, ribeye chops, boneless and New York chops, boneless (*n* = 5 per loin or *n* = 205 total per cut). Chops were randomly assigned to retail shelf-life, Warner Bratzler Shear (WBS) force, or proximate analysis, vacuum-packaged, and stored frozen (-40°C) until analyses. Chops were thawed at 4°C for 48 h prior to analysis. Chops as- signed to shelf life were re-packaged on a foam tray with an absorbent pad, overwrapped in oxygen-permeable polyvinylchloride film, and placed in a retail display case. Chops were analyzed for color, pH, and aerobic plate counts (APC) on days 0, 2, 4, 6, and 7 (*n* = 16 chop per day). Additionally, 8 chops per day were randomly selected for lipid oxidation analysis and evaluated using the Oxidative Rancidity Rapid, Wet method protocol (American Meat Science Association, 2012). WBS force chops were cooked on grated electric char-broilers, placed on trays, covered with plastic wrap, and chilled at 4°C for 12 to 18 h. After chilling, chops equilibrated to room temperature and at least three cores (1.3-cm) were removed from each chop parallel to the muscle fibers. Each core then was sheared once, perpendicular to the muscle fibers. Peak force (N) was recorded, and a mean for each chop calculated. Proximate analysis chops were homogenized, one-gram samples were weighed and assigned to total fat content analysis following methods by Folch, Lees, and Stanely (1956). Additional 50 grams of each homogenized sample were sent to NP Analytical Laboratories (St. Louis, MO) for protein, moisture, and ash analysis.

Results and Discussion: SBM chops had less (P = 0.0438) drip loss and were more (P = 0.0145) tender than HSM chops. Lightest and darkest lean color was significant ($P < 0.05$) due to the interaction between diet and chop type on days 2, 6, and 7 and days 0, 4, 6, and 7, respectively. Additionally, HSM chops had darker ($P < 0.0001$) and more ($P < 0.05$) discoloration than SBM chops on days 6 and 7. No differences ($P > 0.05$) were found for instrumental color between the two diets. HSM chops had higher ($P < 0.05$) aerobic plate counts (APC) on days 4 and 6. TBARS values on days 2, 4, 6, and 7 were higher for HSM chops, regardless of chop type. However, previous studies found that high levels of unsaturated fatty acids in finisher swine diets did not have a significant affect on fresh pork oxidation from days 0 to 7 (Leick et al., 2010; Rhee, Ziprin, Ordonez, & Bohac, 1988). Proximate analysis results showed that SBM rib chops had higher ($P < 0.05$) protein, fat, and moisture content compared to HSM rib chops. Similarly, higher concentration of unsaturated fatty acids from DDGS in swine diets affected percent moisture or lipids in fresh pork (Leick et al., 2010).

Conclusions: Differences were seen between diets for carcass quality traits. Shelf-life analysis, primarily subjective color and APC, and tenderness analyses had the most significant differences across the study. More research is needed to fully understand these differences and determine if HSM has the potential to be a sustainable protein source in swine diets.

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