

EFFECT OF REPLACING COTTONSEED MEAL AND SORGHUM GRAIN WITH CORN DRIED DISTILLERS GRAINS WITH SOLUBLES IN LAMB FEEDLOT DIETS ON VOLATILE AROMA COMPOUNDS OF LAMB CHOPS

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I. OBJECTIVES

The objective of this project was to examine the presence or absence of volatile aroma compounds in lamb chops from lambs fed diets differing in percentage of dried distillers grains with solubles (DDGS).

II. MATERIALS AND METHODS

Frozen *Longissimus* muscles ($n=45$) were received from lambs fed one of 5 different treatment diets: cotton seed meal, sorghum grain, and cotton seed hulls, but no DDGS (CNTL), and 4 treatment diets that were similar to CNTL but did not contain cotton seed meal where corn DDGS replaced 0% (0DDGS), 33% (33DDGS), 66% (66DDGS), or 100% (100DDGS) of the sorghum grain in the treatment diets (9 lambs/treatment). Each frozen loin was cut into 2.54-cm chops and stored at -10°C until cooking. Chops were thawed (4°C) for 12 to 24 h, then cooked on a 2.54-cm-thick flat-top grill set at $177^{\circ}\text{C} \pm 2.8^{\circ}\text{C}$. Chops were cooked until the internal temperature reached 35°C , were turned, and continued cooking to a final internal temperature of 71°C . Chops were cut into cubes ($1.3\text{ cm} \times 1.3\text{ cm} \times$ chop thickness), trimmed of excess fat and connective tissue, frozen in liquid nitrogen, and stored at -80°C until volatile analysis. Samples were placed in a glass jar with a Teflon lid, placed in a water bath (60°C), and thawed for 60 min. Then, a solid-phase micro-extraction portable filed sampler was placed in the headspace for 2 h to collect volatile compounds. The solid-phase micro-extraction was then injected into a multidimensional gas chromatographer/mass spectrometer that desorbed, separated, and identified each volatile compound. Data were analyzed using JMP version 14.0 (SAS Institute Inc., Cary, NC) using model fitment for a completely randomized design with finishing diet as fixed effects. Treatments were testing using one of the following: orthogonal contrasts of CNTL versus 0DDGS; or linear or quadratic effects of 0DDGS, 33DDGS, 66DDGS, and 100DDGS diets with the highest order relationship (linear or quadratic; $P \leq 0.05$) discussed.

III. RESULTS

The volatile aroma compounds 2-heptenal (fried, buttery), heptanal (fatty), and 2-pentyl furan (caramel-like) linearly increased ($P < 0.03$) as DDGS increased. Conversely, 2-butanone (fruity) linearly decreased ($P = 0.004$) as DDGS increased. Furthermore, 2-heptanone (banana, fruity aroma) tended ($P = 0.065$) to increase linearly with increasing DDGS. 2-(hexyloxy)-ethanol had a quadratic decrease with up to 33DDGS in the diet and then an increase to 100DDGS in the diet ($P = 0.005$); however, 2,3-octanedione and methyl pyrazine

quadratically increased to 33DDGS then decreased to 100DDGS ($P < 0.05$). 2-ethyl-5-methyl pyrazine tended ($P = 0.089$) to increase quadratically to 33DDGS then decrease as DDGS increased above that, and 2,5-dimethyl pyrazine tended ($P = 0.089$) to decrease with increasing DDGS in the diet. Decanal (orange, citrus flavor) tended ($P = 0.054$) to be lower in the CNTL diet when contrasted with the 0DDGS diet.

IV. CONCLUSION

Replacing cottonseed meal with dried distillers grains in lamb feedlot diets alters the composition of volatile compounds of lamb chops. Aromatic compounds that are perceived as fried, fatty, and caramel aromas increased as DDGS increased, suggesting that higher levels of 33% to 66% DDGS may improve flavor in lamb chops.

Keywords: gas chromatography/mass spectrometry, lamb, volatile compounds