

## High sulfur content in dried distillers grains with solubles (DDGS) protects against oxidized lipids in DDGS by increasing sulfur-containing antioxidants in nursery pigs

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Some sources of DDGS contain relatively high amounts of oxidized lipids produced from PUFA peroxidation during the production process. These oxidized lipids may negatively affect growth performance and metabolic oxidation status of pigs. The objective of this study was to understand the effects of feeding corn-soybean meal diets (CON) or diets containing 30% DDGS with 3 levels of vitamin E ( $\alpha$ -tocopherol acetate): none supplemented, NRC level (11 IU/kg), and 10X NRC (110 IU/kg) on oxidative status of nursery pigs. The DDGS source used in this study contained the highest thiobarbituric acid reactive substances (TBARS) value, peroxide value, and total S content (5.2 ng/mg oil, 84.1 meq/kg oil, and 0.95%, respectively) among 30 other DDGS sources sampled (mean values = 1.8 ng/mg oil, 11.5 meq/kg oil, and 0.50%, respectively). Barrows ( $n = 54$ ) were housed in pens and fed the experimental diets for 8 wk after weaning and transferred to individual metabolism cages for collection of feces, urine, blood, and liver samples. Total S content was higher in DDGS diets than CON (0.39 vs. 0.19%). Although pigs were fed highly oxidized DDGS in this study, serum TBARS were the same between DDGS and CON treatments (3.6 vs. 3.6  $\mu$ M). There was no significant interaction between dietary DDGS and vitamin E level for TBARS in serum. Serum  $\alpha$ -tocopherol increased by feeding DDGS diets compared to CON (2.25 vs. 1.56  $\mu$ g/mL,  $P < 0.001$ ). Pigs fed DDGS diets had higher concentrations of S-containing AA, particularly methionine ( $P < 0.001$ ) and taurine ( $P = 0.002$ ) in serum of fed pigs, and a higher level of taurine in serum of fasted pigs ( $P = 0.006$ ) compared with pigs fed CON. Liver glutathione concentration was higher in pigs fed DDGS diets than CON (56.3 vs. 41.8 nmol/g). The elevated level of S-containing antioxidants (methionine, taurine, glutathione) *in vivo* may protect pigs against oxidative stress present when feeding highly oxidized DDGS. Therefore, increasing levels of vitamin E in diets containing DDGS with oxidized lipids may not be necessary to reduce metabolic oxidative stress.

**Key words:** DDGS, lipid peroxidation, sulfur-AA, vitamin E