

Graduate Student Oral Competition–PhD

25 High sulfur content in dried distillers grains with solubles (DDGS) protects against oxidized lipids in DDGS by increasing sulfur-containing antioxidants in nursery pigs. R. Song^{*1}, C. Chen¹, L. J. Johnston², B. J. Kerr³, T. E. Weber³, and G. C. Shurson¹, ¹University of Minnesota, St. Paul, ²West Central Research and Outreach Center, Morris, MN, ³USDA-ARS-NLAE, Ames, IA.

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 (α -tocopheryl 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. There was no interaction between dietary DDGS and α -tocopherol concentration of TBARS in serum. Serum α -tocopherol increased by feeding DDGS diets compared with CON (2.25 vs. 1.56 μ 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 those 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 when feeding highly oxidized DDGS. Therefore, increasing levels of α -tocopherol in diets containing DDGS with oxidized lipids may not be necessary to protect pigs from metabolic oxidation stress.

Key Words: DDGS, lipid peroxidation, sulfur-AA, vitamin E

26 Effect of sample size and method of sampling pig weights on the accuracy of estimating the mean weight of the population. C. B. Paulk^{*}, G. L. Highland, M. D. Tokach, J. L. Nelssen, S. S. Dritz, R. D. Goodband, and J. M. DeRouchey, *Kansas State University, Manhattan.*

An accurate estimate of the mean weight of a pig population is critical for producers to maximize profit when marketing pigs. Using a computer program developed in R (R Foundation for Statistical Computing, Vienna, Austria), 10,000 sample means were generated to simulate different methods of sampling a pig population using 2 different data sets. Sampling methods evaluated were: 1) completely random samples of 10 to 200 pigs from the barn, 2) an increasing number of pigs per pen from 1 to 15 or the entire pen, and 3) increasing the number of pens sampled until all pens had been sampled. Data set A consisted of 1,260 individually weighed pigs with 23 to 28 pigs per pen in 48 pens. The mean, median and SD of the population were 114.8, 115.2, and 14.9 kg, respectively. Data set B consisted of 1,261 individually weighed

pigs with 56 to 81 pigs per pen in 19 pens. The mean, median, and SD of the population were 96.9, 97.1, and 9.8 kg, respectively. Increasing the number of random pigs sampled or increasing the number of pens sampled decreased the 95% confidence interval about the mean (CI; Table 1); however, 130 and 60 pigs had to be sampled to achieve a 95% CI of less than 5 kg for the 2 data sets respectively. For a defined sample size (ex. Thirty pigs), CI was reduced as the number of pens sampled was increased for both data sets. In conclusion, increasing the number of pigs sampled and increasing the number of pens sampled for a fixed number of pigs improves accuracy of estimating the mean weight of pigs in a population.

Table 1. Effect of sampling on range between the upper and lower 95% CI

Pigs	Completely random		Increasing the number of pens			
	A	B	Pigs	Pens	A	B
10	18.6	12.0	15	2	14.5	11.9
30	10.4	6.8	10	3	13.0	10.0
50	8.1	5.3	6	5	12.1	8.4
70	6.8	4.6	5	6	11.7	7.9
90	5.8	3.9	3	10	11.1	7.1
110	5.3	3.5	2	15	10.7	6.7
130	4.9	3.2	1	30	10.5	N/A

Key Words: finishing pig, mean estimation, sample size

27 Effect of corn processing on feedlot steers fed sugar beet pulp. C. A. Nichols^{*1}, M. K. Luebke², K. H. Jenkins², G. E. Erickson¹, S. A. Furman², and T. J. Klopfenstein¹, ¹University of Nebraska, Lincoln, ²University of Nebraska-Lincoln Panhandle Research and Extension Center, Scottsbluff.

A finishing trial was conducted to evaluate feeding 0, 10, or 20% beet pulp (DM basis) in either dry-rolled corn (DRC) or steam-flaked corn (SFC) finishing diets. The study utilized 432 yearling British \times Continental steers (314 ± 25 kg) in a randomized complete block design with a 2×3 factorial treatment structure with 6 replications for each simple effect. All diets contained 20% wet distillers grains plus solubles, 15% corn silage, and 6.0% liquid supplement (DM basis). No significant corn processing \times beet pulp interaction was detected ($P > 0.05$) for finishing performance and carcass data. Final BW, DMI, and ADG decreased linearly ($P < 0.01$) with increasing levels of beet pulp in both DRC and SFC diets, however, G:F was not different ($P = 0.49$) among levels of beet pulp in the finishing diet. The inclusion of 20% beet pulp in DRC based diets decreased ADG by 9.1% compared with diets without beet pulp. In SFC based diets the inclusion of 20% beet pulp decreased ADG 4.2%. The lack of difference in G:F is because the change in magnitude for DMI (9.8 and 4.6%, for DRC and SFC, respectively) was similar to the change noted for ADG when 20% beet pulp was included. Hot carcass weight, YG, and 12th rib fat thickness decreased linearly ($P < 0.01$) as level of beet pulp increased in the diet. Beet pulp inclusion did not affect marbling score or LM area ($P = 0.20$). Cattle fed DRC based diets had greater DMI ($P = 0.03$) compared with cattle fed diets containing SFC. Feeding SFC improved ($P < 0.01$) G:F compared with diets with DRC as the grain source. Average daily gain was not different ($P = 0.42$) between the 2 different corn processing methods. Corn processing method did not affect carcass characteristics ($P > 0.17$). In summary, there was no beet pulp by corn