NE basis when replacing 100% corn with wheat. Adding wheat to the diet did not influence G:F, but improved (linear, $P<0.05$) ME caloric efficiency. Increasing SBM in the wheat diets tended to improve ($P<0.07$) G:F and improved ($P<0.03$) NE caloric efficiency (Trt 3vs4). In Exp. 2, 288 pigs (72.5 kg BW) were used in a 61-d finishing study. Pens (8 pigs/pen) were randomly allotted by initial BW to diets with 9 replicate pens. Increasing wheat reduced ADG (linear, $P<0.04$) and worsened G:F (linear, $P<0.003$), but also reduced (linear, P<0.001) jowl fat iodine value. Replacing corn with wheat tended to improve (linear, $P<0.08$) caloric efficiency on an ME basis, but not on an NE basis. In summary, wheat can be used to replace 50% of corn in diets without negatively affecting growth performance. Use of high levels of crystalline amino acids in wheat-based diets did not significantly influence growth of nursery or finishing pigs.

Exp. 1 Treatment:	1	2	3	4	SEM
ADG, kg	0.550[ab]	0.554[a]	0.525[b]	0.542[ab]	0.009
G:F	0.636[a]	0.636[a]	0.629[a]	0.648[a]	0.007
Exp. 2					
ADG, kg	0.833[a]	0.824[ab]	0.793[b]	0.788[b]	0.01
G:F	0.307[a]	0.303[a]	0.295[b]	0.297[b]	0.003
Caloric efficiency, Mcal/kg					
ME	10.92[a]	10.77[ab]	10.69[ab]	10.66[b]	0.09
NE	8.18[a]	8.15[a]	8.15[a]	8.09[a]	0.07
Carcass yield, %	73.4[a]	73.6[a]	73.4[a]	73.1[a]	0.2
HCW, kg	91.8[a]	91.8[a]	90.0[a]	89.7[a]	1.1
Jowl fat iodine value	68.9[a]	67.7[b]	67.1[b]	67.5[b]	0.2

Key Words: crystalline amino acids, nursery pig, wheat

NONRUMINANT NUTRITION: NURSERY PIG NUTRITION AND MANAGEMENT

O089 **Effects of increasing wheat middlings (midds) and NE formulation on nursery pig growth performance.** J. A. De Jong*, J. M. DeRouchey, M. D. Tokach, R. D. Goodband, S. S. Dritz, J. L. Nelssen, *Animal Science, Kansas State University, Manhattan.*

A total of 210 pigs (PIC 327 × 1050, 6.87 kg BW) were used in a 29-d trial to evaluate the effects of dietary midds and NE formulation on nursery pig performance. Pens of pigs were balanced by initial BW and randomly allotted to 1 of 5 dietary treatments (6 pens/treatment and 7 pigs/pen). Wheat midds (0, 10, or 20%) were added to the first 3 diets without balancing for energy. The last 2 diets contained 10 and 20% midds but were balanced to contain the same NE (INRA, 2004) as the positive control (0%) midds by adding soybean oil (1.4 and 2.8%). Overall (d 0 to 29), no midds × fat interactions were observed ($P>0.34$). Pigs fed increasing midds tended to have poorer (linear; $P<0.07$) G:F and ME caloric efficiency, but when balanced on NE, increasing midds had no effect on pig performance. Regardless of formulated energy value, caloric efficiency and G:F were poorer ($P<0.01$) on an ME basis as midds increased from 10 to 20% of the diet. However no differences were observed for energetic efficiency on an NE basis. This suggests that ME values slightly overestimated the energy value of the soybean oil or midds and that the NE values provided by IRNA (2004) are a closer approximation of the true energetic value of the feed ingredients. In summary, 10% midds can be added to nursery diets without influencing performance. Formulating on an equal NE basis did not improve growth; however, energetic efficiency values indicate that NE may value the energy content in midds more appropriately. (See table below.)

Key Words: net energy, nursery pig, wheat middlings

O089 Table

Treatment:	1	2	3	4	5					
Midds, %:	0	10	20	10	20				Midds	
Item, Fat, %:	0	0	0	1.4	2.8	SEM	Midds x Fat	Lin	Quad	10 vs 20%
ADG, g	442	440	425	454	440	9.30	0.95	0.41	0.25	0.12
ADFI, g	690	683	698	705	701	14.6	0.54	0.60	0.96	0.71
G:F	0.641	0.645	0.610	0.644	0.627	0.01	0.34	0.06	0.11	0.01
Caloric efficiency, mcal/kg										
ME	5.17	5.09	5.33	5.20	5.40	0.08	0.82	0.06	0.11	0.01
NE	3.74	3.62	3.74	3.73	3.81	0.06	0.76	0.64	0.17	0.11

O090 **Effects of dietary oxidized lipid on the growth performance and metabolic oxidative status of nursery pigs.** A. R. Hanson[1,*], L. J. Johnston[2], S. K. Baidoo[3], J. L. Torrison[4], C. Chen[5], G. C. Shurson[1], [1]*Animal Science, University of Minnesota, St Paul,* [2]*West Central Research and Outreach Center, University of Minnesota, Morris,* [3]*Southern Research and Outreach Center, University of Minnesota, Waseca,* [4]*Veterinary Diagnostic Laboratory,* [5]*Department of Food Science and Nutrition, University of Minnesota, St Paul.*

Dietary inclusion of oxidized lipids (Ox-L) can reduce ADFI and ADG, and reduce antioxidant status of pigs. Levels of Ox-L in dried distillers grains with solubles (DDGS) vary, but some sources have higher levels than corn as measured by the thiobarbituric acid reactive substances (TBARS) and peroxide value (PV) assays. This experiment evaluated if dietary inclusion of DDGS high in Ox-L (Ox-DDGS) compromised vitamin E (VE) and Se status (as measured by serum and liver concentrations) and increased incidence of Mulberry Heart Disease (MHD). Sows (n = 12) were fed corn-soybean meal diets (0% DDGS) or diets with DDGS (40 and 20% in gestation and lactation, respectively) for 3 parities. In the third parity, 108 weaned pigs were penned (2 littermates/pen) and fed 1 of 3 nursery diets (ND): 1) 0% DDGS, 2) 30% Ox-DDGS, and 3) 30% Ox-DDGS with 5x NRC (1998) level of VE for 7 wks, in a 2 x 3 factorial arrangement (n = 9 pens/treatment). Diets were formulated to contain similar SID Lys:ME. Concentrations of TBARS and PV in the Ox-DDGS source used were 25 and 27 times greater, respectively, than corn. Data were analyzed using the MIXED procedure of SAS for a split plot design with repeated measures in time when appropriate. Several 2-way and 3-way interactions were observed. No evidence of MHD was found. Inclusion of DDGS in sow diets reduced ($P < 0.01$) VE in pig serum at weaning (5.6 vs. 6.7 ± 0.1 µg/mL) compared with 0% DDGS. Glutathione peroxidase activity and TBARS concentration of pig serum were not affected by ND ($P > 0.05$). The concentration of sulfur amino acids (SAA) in serum from pigs fed ND 2 or ND 3