128 **The effect of digestible lysine on growth performance and tissue accretion rates in high-lean growth gilts fed from 72.5 to 136 kg.** K.G. Friesen, J.L. Nelssen, J.A. Unruh, R.D. Goodband, M.D. Tokach, D.K Kropf, K.Q. Owen, B.T. Richert, and B.J. Kerr[1]. Kansas State University, Manhattan and [1]Nutri-Quest, Inc., Chesterfield, MO.

One hundred-eight high-lean growth gilts (72.5 kg BW) were used to determine the dietary lysine requirement to optimize growth performance and protein accretion from 72.5 to 104 or 136 kg. The experiment was designed as a randomized complete block (three pigs/pen, six pens/treatment), with digestible lysine ranging from .44 to .94% (.55 to 1.15% total lysine). Dietary lysine was increased by altering the corn-soybean meal ratio. L-lysine-HCl and soybean oil were maintained at .05 and 3.0%, respectively. Diets were formulated using an ideal amino acid ratio, to assure lysine was the first limiting amino acid. When the mean weight for pigs in a pen reached 104 and 136 kg, one pig/pen was randomly slaughtered to determine carcass protein (PA) and lipid (LA) accretion rate. Average daily gain and feed efficiency (G/F) were determined from 72.5 to 104 (period I), from 104 to 136 (period II), and from 72.5 to 136 kg (Overall). Average daily gain was increased for period I (linear, P < .01), period II (quadratic, P < .10) and overall (quadratic, P < .11) as digestible lysine increased. Average daily feed intake was not influenced (P > .10) by dietary treatment. Thus, G/F increased for period I (linear, P < .05), period II (quadratic, P < .10), and overall (quadratic, P < .05). Protein accretion increased numerically, while LA was not influenced by increased digestible lysine during period I. However, overall PA was increased (linear, P < .10) as digestible lysine increased, while LA was not influenced by digestible lysine. In conclusion, these results suggest that high-lean growth gilts require greater dietary lysine than current NRC estimates (26 vs 19 g/d total lysine) to optimize growth performance and protein accretion.

	Digestible lysine, %						
Item	.44	.54	.64	.74	.84	.94	CV
Period I							
ADG, kg[a]	.84	.88	.88	.89	.92	.93	7.2
G/F[b]	.28	.31	.30	.31	.31	.32	7.5
PA, g	92	95	102	105	102	106	17.4
LA, g	167	132	115	153	154	163	32.8
Period II							
ADG, kg[c]	.85	.80	.83	.98	.92	.77	14.2
G/F[d]	.28	.28	.26	.35	.30	.25	14.4
Overall							
ADG, kg[d]	.84	.84	.86	.92	.91	.85	7.1
G/F[e]	.28	.30	.29	.31	.30	.28	7.0
PA, g[f]	86	87	92	92	99	103	21.8
LA, g	153	173	194	167	143	164	31.1

[a]Linear (P < .01). [b]Linear (P < .05). [c]Quadratic (P < .10).
[d]Quadratic (P < .11). [e]Quadratic (P < .05). [f]Linear (P < .10).

KEY WORDS: Pigs, Lysine, Growth

129 **Ideal digestible lysine levels for early and late-finishing swine.** J. D. Hahn* and D. H. Baker, University of Illinois, Urbana.

One hundred ninety-two crossbred (PIC line 26 x Cambough 15) pigs were used in two trials to determine optimal digestible lysine (Lys) levels during early (EF = 50 to 95 kg) and late (LF = 90 to 110 kg) finishing periods. Each trial involved 48 barrows (Ba) and 48 gilts (Gi) that were self fed in sex groups of two. The assay diets for the EF and LF periods were 11% and 10% CP corn-soybean meal diets, respectively, supplemented with threonine, methionine, tryptophan, valine, and isoleucine. Corn-soybean meal positive-control diets were included in each trial (14.5% CP for EF and 13.5% CP for LF). Plateau portions of Lys response curves resulted in performance levels that were equal to or greater than those achieved with pigs fed the positive-control diets. EF pigs responded quadratically (P < .05) to graded doses of digestible Lys (.42 to .72 %) for daily weight gain (g), gain:feed (g/kg), loin-eye area (cm^2), 10th-rib backfat depth (cm), lean gain (g/d), and plasma urea N (mg/dL). EF values corresponding to the plateau portion of the fitted broken lines were: EF Ba = 1089, 313, 33.1, 2.19, 352, and 10.69, respectively, and EF Gi = 972, 346, 34.5, 1.62, 341, and 9.21, respectively. LF pigs responded quadratically (P < .05) to digestible Lys doses (.40 to .70%) for daily weight gain (g), gain:feed ratio (g/kg), and plasma urea N (mg/dL). LF values corresponding to the plateau portion of the fitted broken lines were: LF Ba = 1071, 282, and 12.11, respectively, and LF Gi = 972, 296, and 8.23, respectively. Digestible Lys requirement estimates based upon average plateau points for daily gain, gain:feed, loin-eye area, backfat, lean gain, and plasma urea N were .59% (20.3 g/d) for EF Ba and .65% (18.4 g/d) for EF Gi. Digestible Lys requirement estimates based upon average plateau points for daily gain, gain:feed, and plasma urea N were .53% (19.6 g/d) for LF Ba and .57% (18.7 g/d) for LF Gi. Lysine level influenced (P < .05) loin-eye area and 10th-rib backfat for LF pigs, but responses were erratic. EF and LF gain:feed were negatively correlated (P < .01) with plasma urea N concentration for both Ba and Gi (EF Ba, r^2 =.57; EF Gi, r^2 =.66; LF Ba, r^2 =.46; LF Gi, r^2 =.60). EF lean gain was negatively correlated (P < .01) with plasma urea N for both Ba and Gi (EF Ba, r^2 =.67; EF Gi, r^2 =.71).

Key Words: Lysine, Pigs, Requirement, Urea Nitrogen

130 **Impact of lean growth genotype and dietary phosphorus regimen on rate and efficiency of growth and carcass characteristics of pigs.** M.J. Bertram*, T.S. Stahly, R.C. Ewan. Iowa State University, Ames.

Pigs of a high and a moderate (Mod) lean growth (LG) genotype were utilized to examine the impact of varying dietary concentrations of available phosphorus (AP) on rate, efficiency and composition of growth of pigs fed from 20 ± 2 kg to 109 ± 4 kg and to determine if the phosphorus needs differ among genotypes. In each genotype, six littermate barrows in each of seven litters were randomly allotted to six AP levels (.080, .110, .115, .222, .323, and .475%). Pigs were individually-penned in a building maintained at 24 ± 2°C and allowed to consume diets ad libitum. Diets consisted of a corn-soybean meal mixture (1.15% available lysine) fortified with minerals, vitamins, and an antibiotic. AP levels were achieved by altering the ratio of corn starch, dicalcium phosphate and calcium carbonate. A single source of corn (.03% AP), soybean meal (.17% AP) and dicalcium phosphate (18.61% AP) were used in the trial. Pig weight and feed consumption were recorded at 7-d intervals. Data were analyzed as a split-plot design with genotype as the whole-plot and available phosphorus level as the sub-plot and pig weight as a repeated measure. High LG pigs gained more body weight per unit of feed (GF) and had greater carcass muscle content than Mod LG pigs. Over the duration of the trial, as dietary phosphorus level increased, ADG and GF increased quadratically and carcass muscle content (NPPC, 1983) increased linearly in both genotypes.

		Available Phosphorus Level, %						Prob.		
Item	LG	.080	.110	.155	.222	.323	.475	LG	P	LGxP
ADG,g	High	718	767	838	886	854	892	.29	.01	19
	Mod	769	794	884	869	945	898			
GF	High	.327	.326	.351	.363	.359	.367	.01	.01	.56
	Mod	.306	.306	.326	.324	.347	.342			
Muscle	High	55.5	54.9	55.4	55.6	57.3	57.6	.01	.06	.85
%	Mod	48.1	49.6	50.5	50.3	51.0	51.9			

Response to AP level was dependent (P<.01) on pig weight. Pooled across genotypes, GF of pigs weighing 20 to 65 kg, 65 to 80 kg, 80 to 95 kg, 95 to 110 kg BW was maximized by AP levels of .323, .222, .155 and .110 %, respectively. Based on these data, body muscle content as well as efficiency of growth in pigs are altered by low AP intakes.

Key Words: Pigs, phosphorus, muscle

131 **Effects of porcine somatotropin on the calcium and phosphorus balance of finishing pigs.** **S.D. Carter* and G.L. Cromwell, University of Kentucky, Lexington.**

Six sets of four littermate barrows initially averaging 75.4 kg were equally-fed (within blocks) fortified corn-soybean meal diets (1.30% lysine) containing two levels of Ca (.50 and 1.00%) and P (.45 and .90%) in a 30-d test. One-half of the pigs were injected daily with 4 mg porcine somatotropin (PST, Monsanto, Chesterfield, MO). Pigs were allowed a 7-d adjustment period to the metabolism cages and diets. Total collection of feces and urine was performed during two periods (d 1-10, d 20-30) for the determination of Ca and P digestibility and retention. Pigs were weighed after each period (d 10, 20, 30) for the determination of gain and feed/gain. Feed intake for the 30-d period averaged 2,002 g/d. PST improved (P<.01) daily gain (1,058 vs 690 g/d) and feed/gain (1.92 vs 2.97). Also, feeding the higher Ca/P level improved (P<.05) gain (903 vs 844 g/d) and feed/gain (2.18 vs 2.53). There were no treatment x period interactions, so the digestibility and retention data for both periods were pooled. Ca and P absorption and retention were greater (P<.01) in pigs fed the higher Ca/P level. Within each Ca/P level, PST reduced (P<.01) fecal Ca and P excretion. PST did not affect urinary P excretion, but it increased (P<.03) urinary Ca excretion in pigs fed the low Ca diet. The apparent absorption and retention of Ca and P, both on an absolute basis (g/d) and percentage basis, were increased (P<.01) by PST. However, the increases in Ca retention and in P absorption and retention, on an absolute basis (g/d), in PST-treated pigs were more pronounced when the higher Ca/P level was fed. These results suggest that PST improves the absorption and retention of Ca and P in finishing pigs.

Ca/P (%):	-----.50/.45-----		---1.00/.90----		P<			
PST (mg/d):	0	4	0	4	PST	Ca/P	Int	SE
Ca intake (g/d)	11.92	11.84	21.99	21.71	ns	.01	ns	.99
Ca absorbed (g/d)	5.91	7.43	11.78	13.92	.01	.01	ns	.36
Ca retained (g/d)	5.81	6.96	11.58	13.68	.01	.01	.11	.39
P intake (g/d)	10.23	10.17	19.01	18.79	ns	.01	ns	.48
P absorbed (g/d)	2.97	3.94	7.08	9.41	.01	.01	.02	.35
P retained (g/d)	2.46	3.73	4.80	7.17	.01	.01	.01	.23

Key Words: Pigs, Somatotropin, Calcium, Phosphorus