8 Impact of immune system activation on the amino acid needs of pigs. N.H. Williams*, T.S. Stahly, D.R. Zimmerman and M. nnemuehler. Iowa State University, Ames.

ty-eight crossbred barrows from a common origin were utilized to evaluate impact of immune system (IS) activation and dietary amino acid regimen on rate and efficiency of growth of pigs from 26 to 59 d of age. The low and h IS activation groups consisted of pigs derived from a medicated-early-aning (prepartum sows vaccinated for prevalent antigens in herd, pigs treated h antibiotics from d 1 to 11, pigs weaned to an isolated nursery at d 11) or ıventional weaning (sows and pigs not treated, pigs weaned to an occupied sery at d 19) system. All pigs received a milk diet to d 19 and a basal diet ısisting of a 1.5% lysine (L), corn-soy, 20% dried whey and 5% dried skim k mixture fortified with vitamins and minerals from d 19 to 25. In each IS ıup at d 26 (6 ± .5 kg), four individually penned pigs in each of six sets of ermates were randomly allocated to one of four dietary L levels (.6, .9, 1.2 d 1.5%). The L levels were achieved by altering the ratio of corn (.25% L) and nulled soybean meal (3.12% L) in the basal diet. Microfluorometric analysis of kocyte surface antigens for T helper cells (CD4) and T suppressor-cytotoxic ls (CD8) was used to determine IS activation. Pigs in the low IS group had a ıher proportion (P<.01) of CD8 cells indicating a lower level of IS activation. ıs in the low IS group consumed more feed, gained faster (DG) and required s feed per unit of body weight gain (F/G) and weighed 3 to 8 kg more at d 59 VF). Responses to dietary amino acid regimen were dependent on IS tivation. Rate and efficiency of gain improved (P<.01) linearly with increasing ıtary L level in the low IS group. Whereas, rate and efficiency of gain improved <.01) quadratically with increasing L level in the high IS group, with the timum response achieved at 1.20% L. Based on these data, pigs with low IS ıel have a greater capacity for body tissue growth and a greater dietary amino id need than those with a high IS activation.

	LOW				HIGH				PROBABILITY		
SINE,%	.6	.9	1.2	1.5	.6	.9	1.2	1.5	IS	L	ISxL
ntake,g/d	5.9	10.0	13.2	16.5	4.1	7.9	11.2	11.7	.01	.01	.06
3, g/d	416	619	644	675	253	427	529	427	.01	.01	.45
G	2.21	1.81	1.71	1.63	2.90	2.06	1.77	1.86	.01	.01	.01
VF, kg	21.0	26.6	27.5	28.8	14.6	20.5	24.3	20.4	.01	.01	.50

Key Words: pigs, immune response, amino acid

10 The effects of diets formulated on an ideal protein basis on carcass characteristics and accretion rates of finishing gilts housed n a hot diurnal environment. J. Lopez*[1], R. D. Goodband[2], G. W. Jesse[1], . L. Nelssen[2], M. D. Tokach[1], D. Spiers[1], and B. A. Becker[1]. University ıf Missouri-Columbia[1] and Kansas State University, Manhattan[2].

Forty-eight finishing gilts (initial BW = 70.6 kg) were randomly assigned to ıne of eight experimental treatments in a 2 × 2 × 2 factorial to determine he effects of dietary lysine (.60 vs 1.00%), source of amino acid fortification intact protein vs synthetic amino acids formulated on an ideal protein basis) ınd environmental temperature (thermoneutral: 20°C vs hot, diurnal: 27.7 to 35°C) on carcass characteristics and accretion rates. The ideal protein diets were formulated by using corn and soybean meal to meet the 5th limiting ımino acid *with additions of synthetic* lysine, threonine, tryptophan, nethionine or isoleucine to meet the pigs estimated requirement. The ratios of other total amino acids relative to lysine were: threonine 66%, tryptophan 17%, methionine and cystine 56% and isoleucine 63%. Gilts were slaughtered at a mean weight of 104 kg and standard carcass measurements were recorded. In addition, the left side of each carcass was ground to determine percentage CP, lipid, moisture, and ash. Accretion rates were calculated from initial chemical composition of eight gilts slaughtered at the start of the experiment. Gilts fed 1.00% lysine had less average and 10th rib backfat thickness, leaf fat, and larger longissimus muscle area (P<.05) than gilts fed .60% lysine. Neither temperature nor amino acid source influenced carcass characteristics. A dietary lysine × amino acid source interaction (P<.07) was observed for average backfat thickness and percentage carcass CP and lipid. Gilts fed .60% lysine ideal protein diets had greater average backfat thickness and carcass lipid but decreased percentage CP than gilts fed intact protein; however, the opposite response occurred in gilts fed 1.00% dietary lysine. Gilts fed 1.00% dietary lysine tended to have greater CP (P=.15) and decreased lipid (P<.08) accretion rates than gilts fed .60% lysine. Longisimus color, marbling, and firmness were unaffected by experimental treatment (P>.10). These results suggest that dietary lysine improved carcass leanness in gilts; however, no improvements in carcass characteristics were observed by feeding ideal protein diets.

Key Words: Pigs, Lysine, Carcass Characteristics, Heat Stress

109 The effects of diets formulated on an ideal protein basis on growth performance and thermal balance of finishing gilts housed in a hot diurnal environment. J. Lopez*[1], R. D. Goodband[2], G. W. Jesse[1], J. L. Nelssen[2], M. D. Tokach[2], D. Spiers[1], and B. A. Becker[1]. University of Missouri-Columbia[1] and Kansas State University, Manhattan[2].

Forty-eight finishing gilts (initial BW=70.6 kg) were randomly assigned to one of eight experimental treatments in a 2 × 2 × 2 factorial arrangement to determine the effects of dietary lysine (.60 vs 1.00%), source of amino acid fortification (intact protein vs synthetic amino acids formulated on an ideal protein basis) and environmental temperature (thermoneutral (TN): 20°C vs hot, diurnal (HS): 27.7 to 35°C) on growth performance. The ideal protein diets were formulated by using corn and soybean meal to meet the 5th limiting amino acid with additions of synthetic lysine, threonine, tryptophan, methionine or isoleucine to meet the pigs estimated requirement. The ratios of other total amino acids relative to lysine were: threonine 66%, tryptophan 17%, methionine and cystine 56% and isoleucine 63%. Average daily gain (.80 vs .83 kg), ADFI (2.57 vs 2.62 kg), and feed efficiency (G/F:.31 vs .32) were similar for gilts fed the intact and ideal proteins diets (P>.50), respectively. There were no interactions observed between temperature, source of amino acids, or dietary lysine for ADG and ADFI (P>.10). Gilts in the HS environment ate less feed and had decreased ADG than gilts at TN (P<.11). A temperature × lysine interaction was observed (P<.02) for G/F. Increasing dietary lysine had no effect on G/F of gilts in the TN environment (.32 vs .32), but improved G/F of gilts in the HS environment (.28 vs .33). Gilts fed the intact protein diets had higher (P=.01) plasma urea concentrations on d 28 compared with gilts fed ideal protein diets. With the exception of plasma lysine, gilts fed the ideal protein diets had lower (P<.05) plasma essential amino acids. Rectal temperature was higher (P=.04) for gilts in HS than at TN (39.58 vs 39.26°C). Amino acid source did not have an influence on rectal temperature; however, skin temperature (35.69 vs 35.47°C) and ear temperature (35.43 vs 35.07°C) tended (P<.10) to be higher for the gilts consuming ideal vs intact protein diets, respectively. In conclusion, increased dietary lysine improved G/F in gilts to a greater extent in HS than TN environments. However, no improvements in growth performance were observed by feeding ideal protein diets.

Key Words: Pigs, Lysine, Growth, Heat Stress

111 Response of crowded pigs to diet modifications within seasons of the year. M. C. Brumm* and B. J. Kerr, University of Nebraska, Concord, 68728 and Nutri-Quest Inc., Chesterfield, MO, 63017

A 2 x 2 x 4 factorial experiment utilizing a total of 768 commingled feeder pigs was conducted over a two year period to determine if an interaction existed between space allocation, diet and season (i.e. temperature). Treatments were: Season [winter (W) or summer (S)], space allocation from purchase to slaughter [.79 m^2/pig (10 pigs/pen) or .56 m^2/pig (14 pigs/pen)] and diet [control (C)-NRC (1988), control plus 5% fat (F), control plus .15% L-lysine-HCl (L) or control plus fat and lysine (F+L)]. All diets were formulated with corn-soybean meal and offered ad libitum in meal form. Pigs were housed in mechanically ventilated, partially slatted confinement facilities with pen size adjusted following pig removal or death. Carcass % lean was calculated by John Morrell and Co., Sioux City, IA. The interaction (P < .1) between diet and space for daily feed intake was in magnitude of response and not direction of response. Since no other interactions were detected (P > .25), the main effects are reported in the following table:

	Diet				Space (m^2/pig)		Season	
ITEM	C	F	L	F+L	.78	.56	W	S
No. Pens	16	16	16	16	32	32	32	32
ADG, kg/d[a,b,c]	.68	.70	.69	.71	.71	.68	.71	.68
ADF, kg/d[d,e,f,g]	2.46	2.27	2.41	2.26	2.28	2.43	2.41	2.30
G/F[d,h]	.28	.31	.28	.31	.29	.30	.29	.29
Lean gain, kg/d[h,i]	.26	.26	.26	.26	.26	.25	.27	.24

[a]C vs all other diets (P < .075); [b]Space (P < .001); [c]Season (P < .005) [d]C vs all other diets (P < .0005); [e]L vs F+L (P < .005); [f]Space (P < .0001); [g]Season (P < .001); [h]L vs F+L (P < .0001); [i]Space (P < .05).

These results suggest crowded commingled feeder pigs don't respond to diets with added energy (fat) or lysine when compared to NRC (1988) formulated diets, even when crowding reduces feed intake and daily gain. The lack of season interactions may be due to the unusually cool temperatures recorded during the second summer trial.

Key Words: Pigs, Crowding, Lysine, Fat