142 The effects of low-protein, amino acid fortified diets, formulated on a net energy basis, on growth performance and carcass characteristics of finishing pigs.

J. W. Smith, II*, P. R. O'Quinn, R. D. Goodband, M. D. Tokach, and J. L. Nelssen, *Kansas State University, Manhattan.*

A total of 288 gilts (initially 48 kg) was used to compare performance of pigs fed low-protein, amino acid fortified diets (LPAAFD) with pigs fed corn-soybean meal (SBM) diets formulated to identical NE levels. Grower (48 to 75 kg) and finisher (75 to 111 kg) diets were formulated to contain .75 and .55% apparent digestible lysine, respectively. Treatments were arranged in a 2 X 2 factorial with main effects of NE and protein source. The low NE grower and finisher diets contained 2.51 and 2.58 Mcal NE/kg, respectively; the high NE grower and finisher diets contained 2.58 and 2.65 Mcal NE/kg, respectively. Amino acids were provided by SBM in the intact protein diets and a combination of SBM and synthetic amino acids (Lys, Thr, Trp, Met) in the LPAAFD. Protein concentrations were reduced by approximately 4% units in the LPAAFD and thr, trp, ile, and met & cys were 62, 17, 60, and 65% of apparent digestible lysine, respectively. Soy oil was added to the corn-SBM diets to provide identical NE concentrations as the LPAAFD. From 48 to 75 kg, pigs fed high NE grew faster than pigs fed low NE ($P < .10$). Pigs fed LPAAFD were less efficient than pigs fed intact protein ($P < .05$). From 75 to 111 and 48 to 111 kg, pigs fed diets containing intact protein had greater ADG and G:F than pigs fed LPAAFD ($P < .001$).Pigs fed the diets containing high NE had greater tenth rib fat depth and lower lean percentage ($P < .06$). Based on these results, low protein amino acid fortified diets decreased ADG and G:F regardless of NE.

	Low NE		High NE		
48 to 111 kg	Intact	LPAAFD	Intact	LPAAFD	CV
ADG, kg	.86	.78	.88	.79	3.7
G:F	.37	.34	.38	.34	3.4
Lean, %	52.97	52.22	52.06	51.51	1.8

Key Words: Pig, Net Energy, Low Protein

143 The effect of protein intake on growth performance, plasma urea concentration, liver weight, and arginase activity of finishing barrows and gilts.

H.-Y. Chen*, P. S. Miller, and A. J. Lewis, *University of Nebraska, Lincoln.*

Eighteen barrows (B) and 18 gilts (G) with an initial BW of 63 kg were used to evaluate the effect of protein intake on growth performance, liver weight, liver arginase activity, and plasma urea concentration (PUC). Pigs were allotted to a randomized complete block experiment with a 2 x 2 factorial arrangement of treatments (two sexes x two dietary protein levels; 16 and 25% CP). Pigs were penned individually and were weighed and bled weekly. The experiment was terminated when the average BW of pigs reached 105 kg. Pigs were allowed access to feed until approximately 6 h before slaughter. After slaughter, liver samples were frozen immediately in liquid nitrogen and kept at −80° C until analyzed for arginase activity. Average daily gain was reduced by 18% in G when dietary protein was increased from 16 to 25%, but only reduced 3% in B (sex x protein, $P < .1$). Average daily feed intake was greater ($P < .1$) in B than in G, but was not affected ($P > .1$) by dietary protein concentration. Feed efficiency (ADG/ADFI) was greater in B than in G ($P < .05$) and was reduced when dietary protein concentration was increased ($P < .1$). Barrows had lighter liver weights ($P < .005$), greater arginase activities ($P < .05$), and greater PUC ($P < .005$) than did G. Increasing dietary protein concentration from 16 to 25% resulted in increased liver weight, arginase activity, and PUC ($P < .005$). The data from this experiment suggest that G are affected more negatively by high protein diets than are B. The more negative effects in G may be related to liver metabolic capacity and activity of urea cycle enzymes.

Key Words: Pigs, Growth Performance, Arginase Activity

144 The response of entire male, female, and castrated male grown under commercial conditions to dietary threonine between 60 and 100 kg live weight.

D. J. Cadogan[1,*], T. K. Chung[2], R. G. Campbell[1], and C. Smith[1], [1]*Bunge Meat Industries, Corowa, Australia,* [2]*ADM, Singapore.*

Six hundred pigs (Bunge commercial genotype) comprising equal numbers of entire males, females, and castrated males were housed in groups of 10 and allocated among 5 treatments in a randomized design. Two diets and threonine ranges were used during the study. The first phase diets were offered to pigs between 60 and 80 kg, and were formulated to contain 13.5 MJ DE/kg (3,225 kcal DE/kg), 0.82% lysine (0.54 g/MJ DE available lysine). L-threonine was used to provide five total threonine levels (0.41, 0.49, 0.57, 0.64 and 0.73%). The second phase diets, offered to pigs between 80 and 100 kg, were formulated to contain 13.3 MJ DE/kg (3,180 kcal DE/kg) and 0.70% lysine (0.48 g/MJ DE available lysine). The total threonine levels were 0.35, 0.42, 0.49, 0.54, and 0.60%. All other essential amino acids were in excess of the pigs tissue requirements (120% of Auspig prediction). All diets were offered ad libitum for 42 days study and pigs were slaughtered on day 43. Castrates grew faster and ate more than entire males and females ($P< 0.05$). Males had a superior feed:gain compared to females and castrates ($P< 0.10$) but there were no interactions between the effects of sex and threonine for any measure of growth. Dietary threonine had only a small effect on growth performance in the first 21 days (60 to 80 kg), but had a marked effect on growth performance in the second period. For the latter period, growth rate and feed:gain improved with increasing threonine up to 0.56%. Whilst feed intake increased when threonine was raised from the lowest level to 0.42%. Carcass weight was increased with increasing threonine up to 0.49% threonine. P2 fat thickness was affected by sex but not by dietary threonine. Overall, the results suggest that sex has a small effect on the pigs requirement for threonine and the live weight ranges 60 to 80 kg, 80 to 100 kg, and 60 to 100 kg the threonine levels required to support maximum growth performance and carcass yields are 0.57, 0.49 and 0.54% respectively. The threonine:lysine ratio was 0.70 for all periods.

Key Words: Pigs, Threonine, Amino Acids

145 Select menhaden fish meal and spray dried blood cells in phase 1 and 2 diets for weanling pigs.

Q. Zhang*, T. L. Veum, and D. Bollinger, *University of Missouri-Columbia.*

An experiment with two trials was conducted to evaluate the partial replacement of spray dried animal plasma (AP) with special select menhaden fish meal (FM) and spray dried animal blood cells (BC) in weanling pig diets. A total of 232 crossbred pigs were weaned at 3 weeks of age (initial 5.9 kg BW) and allotted to treatments by litter, sex and weight. The 28-day experiment was divided into two phases: Phase 1 (P1), d 0-14, and P2, d 14-28. The four dietary treatments in P1 were: (T1) a control diet containing 6% AP, (T2) 4% AP plus 2.76% FM, (T3) 4% AP plus 1.53% BC and (T4) 2% AP plus 2.76% FM and 1.53% BC. The replacements were on an equal lysine basis. All diets contained 1.50% lysine, .45% methionine and 3.45 Mcal/kg. In P2, all pigs were fed a common diet containing 2.76% FM and 1.53% BC without any AP. There were no treatment interactions between P1 and P2 for growth performance criteria. For P1, there were no treatment differences ($P>.1$) for BW, ADG, ADFI and G/F ratio except that G/F ratio was higher ($P<.05$) for T3 compared to all other treatments. For P2, ADFI was improved in T2, T3 and T4 compared to T1 ($P<.05$). Overall (d 0 to 28), there were no treatment differences ($P>.2$) for ADG. However, pigs in T3 and T4 had higher ADFI ($P<.05$) and pigs in T4 had a lower G/F ratio ($P<.05$) compared to pigs in T1. In conclusion, FM and BC are effective and economical protein sources in weanling pig diets.

Key Words: Pigs, Performance, Protein Sources