164 Evaluation of the energy value of soybean meal relative to corn based on growth performance of 11- to 22-kg pigs. Henrique S. Cemin[1], Mike D. Tokach[2], Steve S. Dritz[2], Jason C. Woodworth[3], Joel M. DeRouchey[2], Robert D. Goodband[2], [1]*Hubbard Feeds,* [2]*Kansas State University,* [3]*Department of Animal Sciences & Industry, College of Agriculture, Manhattan, KS 66506*

A 21-d experiment was conducted to estimate the energy value of soybean meal (SBM) and determine the effects of increasing SBM on pig performance. A total of 2,233 pigs (PIC 337 × 1050), initially 11.0 kg, were placed in pens containing 20 to 27 pigs. Treatments were assigned in a randomized complete block design with BW as blocking factor. Dietary treatments consisted of 21, 27, 33, or 39% SBM obtained by changing the amount of feed-grade amino acids and corn. There were 23 replicates per treatment. Pigs were weighed and feed disappearance measured to calculate ADG, ADFI, G:F, and caloric efficiency (CE). Cull pigs and mortality were evaluated daily. Data were analyzed with the GLIMMIX procedure of SAS. There was a tendency (P = 0.090) for a quadratic response for ADG, with a decrease in ADG observed with 39% SBM. There was a tendency (linear, P = 0.092) for a decrease in ADFI as SBM increased. Pigs fed diets with increasing SBM had a tendency (quadratic, P = 0.069) for an increase in G:F up to 33% SBM and an improvement (linear, P = 0.001; quadratic, P = 0.063) in CE with increasing SBM. There was no evidence for differences (P ≥ 0.457) in cull pigs and mortality. Using CE to estimate the energy of SBM relative to corn, a value of 105.4% of corn energy or 2,816 kcal/kg NE was determined using all data points. When removing the CE value of the 39% SBM treatment due to the quadratic tendency, SBM was estimated to have 121.1% of corn energy or 3,236 kcal/kg NE. The results suggest that feeding increasing levels of SBM improves G:F and CE. The energy value of SBM was estimated between 105 and 121% of corn, which is much greater than the NRC (2012) would suggest.

Table 1. Effects of increasing soybean meal on growth performance and caloric efficiency[1]

	Soybean meal, %				SEM	Probability, *P* <	
Item[2]	21	27	33	39		Linear	Quadratic
BW, kg							
d 0	11.0	11.0	11.0	11.0	0.15	0.894	0.993
d 21	22.3	22.3	22.4	22.0	0.28	0.263	0.180
d 0 to 21							
ADG, g	537	537	543	524	7.3	0.207	0.090
ADFI, g	824	822	815	804	11.7	0.092	0.579
G:F, g/kg	652	653	667	653	5.1	0.390	0.069
CE, kcal NE/kg gain	3,801	3,738	3,600	3,623	28.8	0.001	0.063
Culls and mortality, %	0.72	0.36	0.36	0.36	0.356	0.457	0.596

[1] A total of 2,233 pigs (initially 11.0 kg) were used in a 21-d study with 20 to 27 pigs per pen and 23 replicates per treatment.
[2] BW = body weight. ADG = average daily gain, ADFI = average daily feed intake. G:F = gain-to-feed ratio. CE = caloric efficiency.

Keywords: caloric efficiency; energy; soybean meal

160 Effects of dietary amino acid concentration on digestibility of amino acids in soybean meal and soy protein concentrate fed to growing pigs. Su A Lee[1], Hans H. Stein[1], [1]*University of Illinois at Urbana-Champaign*

Two experiments were conducted to test the hypothesis that standardized ileal digestibility (SID) of AA by growing pigs is not influenced by dietary AA. In Exp. 1, thirty cannulated pigs (BW:31.4 ± 3.9 kg) were allotted to 5 diets. Four diets were formulated to contain 4.7 to 30.4% CP, by including 10, 30, 50, or 70% soybean meal. An N-free diet was used to determine the basal endogenous losses of CP and AA. The model included diet as a fixed variable and polynomial contrasts were used to test linear and quadratic effects of dietary AA. The SID of CP, Lys, Phe, and Thr decreased linearly (P < 0.05) as dietary AA increased (Table 1). However, this effect was primarily a result of the SID of AA in the diet containing 30.4% CP and the SID of CP and most AA was not affected by dietary AA if diets contained 4.7 to 22.1% CP. In Exp. 2, twenty-four cannulated pigs (BW:22.8 ± 1.7 kg) were used. Pigs were allotted to a quadruplicated 6 × 2 Youden square design with 6 diets and 2 periods. Five diets were formulated to contain 6.8 to 31.8% CP, by including 10, 20, 30, 40, or 50% soy protein concentrate. An N-free diet was also used. Data were analyzed as for Exp. 1. The SID of His and Lys decreased quadratically (P < 0.05) with increased dietary AA (Table 2). However, if dietary CP was 26.6% or less, no effect of dietary AA on SID of CP and most indispensable AA was observed. In conclusion, the SID of most AA is not influenced by dietary AA if dietary CP does not exceed around 26%. Hence, the SID of AA in feed ingredients may be determined in diets containing AA below, at, or slightly above requirements without impacting results.

Table 1. SID of CP and AA in diets containing different inclusion rates of soybean meal fed to growing pigs (Exp. 1)

	Soybean meal, %					Contrast *P*-value	
Item, %	10	30	50	70	SEM	Linear	Quadratic
CP	85.9	87.7	84.1	80.9	1.9	0.037	0.195
Indispensable AA							
Arg	91.9	94.4	93.2	91.9	1.0	0.785	0.076
His	88.1	90.7	87.1	83.8	1.3	0.008	0.033
Ile	86.9	87.6	85.9	85.1	1.3	0.233	0.575
Leu	86.8	87.0	84.9	83.9	1.2	0.070	0.626
Lys	87.2	87.4	84.1	81.1	1.8	0.012	0.382
Met	85.5	87.8	88.8	88.2	1.5	0.192	0.368
Phe	87.6	87.9	85.6	84.5	1.2	0.041	0.555
Thr	84.1	83.9	80.8	78.7	1.7	0.020	0.589
Trp	88.2	90.1	86.9	86.6	1.6	0.265	0.491
Val	84.4	85.1	82.9	82.2	1.5	0.200	0.659

[1]No linearity was found for SID of CP and AA in 3 diets containing 4.7, 12.7, and 22.1% CP, respectively, by including 10, 30, and 50% soybean meal.

Keywords: dietary protein levels, pig, standardized ileal digestibility of amino acids