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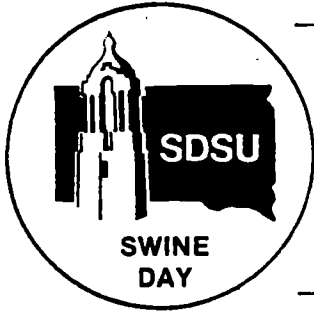
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**EFFECT OF TRYPTOPHAN SUPPLEMENTATION OF A
LOW PROTEIN, CORN-SUNFLOWER MEAL DIET
FOR YOUNG GROWING PIGS**

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Research conducted at South Dakota State University and reported in the 1983 and 1984 Swine Field Day Proceedings, indicated that the amino acid tryptophan is limiting in a lysine supplemented, 12% protein, corn-sunflower meal diet fed to young weaned pigs. This trial was conducted to further study the effects of tryptophan supplementation of an amino acid fortified, 12% protein, corn-sunflower meal diet and to estimate the dietary tryptophan requirement of the young weaned pig fed that diet.

(Key Words: Start Pigs, Tryptophan Requirement, Sunflower Meal.)

Experimental Procedure

Ninety-six crossbred weaned pigs averaging 21.3 lb were allotted to six experimental treatments according to sex, weight and litter. There were four pigs per pen with each treatment being replicated four times. Pigs were housed in an environmentally controlled room in the Animal Science Complex. Feed and water were provided ad libitum throughout the 28 day trial. Pig weights as well as feed intake data were taken weekly. Blood samples were obtained on day 28 for determination of serum urea nitrogen, calcium, phosphorus and zinc.

The composition of the experimental diets is shown in table 1. Experimental treatments were as follows:

1. 12% C.P. sunflower meal basal plus .81% L-lysine, .22% L-threonine, .15% L-isoleucine and .1% DL-methionine
2. Diet 1 plus .025% L-tryptophan
3. Diet 1 plus .05% L-tryptophan
4. Diet 1 plus .075% L-tryptophan
5. Diet 1 plus .1% L-tryptophan
6. 18% C.P. sunflower meal basal plus .6% L-lysine

Table 1. Composition of Experimental Diets (%)

Ingredient	12% C.P.	18% C.P.
Yellow corn	86.04	68.23
Sunflower meal	10.20	29.23
Dicalcium phosphate	1.25	.33
Ground limestone	.80	1.18
Salt, white	.30	.30
Trace mineral premix	.05	.05
Vitamin premix	.03	.03
Aurofac - 50 ^a	.05	.05
L-lysine	.81	.60
L-threonine	.22	--
L-isoleucine	.15	--
DL-methionine	.10	--

^a Aureomycin.

Results

Performance and blood analysis data are summarized in table 2. Average daily gain and feed intake increased quadratically ($P < .005$) as L-tryptophan was supplemented to the 12% protein basal diet. Daily gains increased up to 67% and feed consumption 50% when the basal diet was supplemented with from .05 to .1% L-tryptophan. Average daily gain and feed consumption of pigs fed the 12% protein basal diet supplemented with either .05, .075 or .1% L-tryptophan were similar to those pigs fed the 18% protein diet. Feed efficiency increased linearly ($P < .005$) as graded levels of L-tryptophan were added to the basal diet. Feed/gain was significantly reduced when the basal diet was supplemented with either .05 or .075% L-tryptophan and feed efficiencies for pigs fed these diets were not significantly different from those of pigs fed the 18% protein diet.

Serum urea nitrogen decreased in pigs fed diets supplemented with L-tryptophan and were lowest when diets were supplemented with either .05, .075 or .1% L-tryptophan, indicating an improvement in the amino acid profile of the diets. Serum calcium was relatively constant in pigs fed the 12% protein diets and was numerically highest in pigs fed the 18% protein diet. Serum phosphorus and zinc concentrations were higher in pigs fed the 12% protein diets than in pigs fed the 18% protein diet.

The results of this trial and the previous trial, reported in the 1984 Swine Day Proceedings indicate that additions of tryptophan to a low protein, lysine supplemented, corn-sunflower meal diet will improve weanling pig performance. From these trials we estimate that the dietary tryptophan requirement of

the young weaned pig (13-45 lb) fed a low protein, amino acid supplemented, corn-sunflower meal diet is approximately .16%.

Table 2. Effect of Dietary Tryptophan Levels on Performance of Young Weaned Pigs

Diet Supplemental L-tryptophan, % Dietary Tryptophan, %	12% C.P.				18% C.P.	
	0	.025	.05	.075	.1	0
	.104	.129	.154	.179	.204	.210
Initial wt, lb	21.3 ^a	21.3 ^b	21.3 ^c	21.3 ^c	21.4	21.2
Final wt, lb	37.5 ^a	42.6 ^b	48.0 ^c	48.4 ^c	47.6 ^c	49.3 ^c
Avg daily gain, lb ^e	.58 ^a	.76 ^b	.96 ^c	.97 ^c	.94 ^c	1.00 ^c
Avg daily feed, lb ^e	1.38 ^a	1.74 ^b	2.07 ^c	2.08 ^c	2.07 ^c	2.00 ^c
Feed/gain ^f	2.38 ^a	2.30 ^{a,b}	2.17 ^{b,c}	2.14 ^{b,c}	2.21 ^{a,b}	2.00 ^c
Serum urea nitrogen, mg/dl ^g	9.41 ^a	7.32 ^b	5.34 ^c	5.46 ^c	5.25 ^c	12.71 ^d
Serum calcium, mg/dl ^h	8.93 ^a	9.11 ^{a,b}	9.60 ^{c,d}	9.28 ^b	9.42 ^{b,c}	9.76 ^d
Serum phosphorus, mg/dl ^g	10.62 ^a	10.87 ^{a,b}	11.10 ^{a,b}	11.26 ^b	11.31 ^b	8.66 ^c
Serum zinc, ppm	.85 ^a	.86 ^a	.88 ^a	.87 ^a	.86 ^a	.57 ^b

a,b,c,d Means without common superscripts differ (P<.05).
^e Linear quadratic tryptophan response (P<.005).
^f Linear tryptophan response (P<.005).
^g Linear (P<.005) quadratic (P<.01) tryptophan response.
^h Linear tryptophan response (P<.025).

Summary

Ninety-six crossbred weaned pigs were utilized in a 28 day trial conducted to estimate the dietary tryptophan requirement of the growing pig fed a lysine supplemented, 12% protein, corn-sunflower meal diet.

Daily gain, feed efficiency and feed consumption of pigs were improved as L-tryptophan was supplemented to the 12% protein basal diet. Serum urea nitrogen decreased in pigs fed diets supplemented with L-tryptophan. Serum calcium was numerically highest in pigs fed the 18% protein diet while serum phosphorus and zinc concentrations were highest in pigs fed the 12% protein diets. The data suggest a dietary tryptophan requirement of .16% for young weaned pigs fed a 12% protein corn-sunflower meal diet.