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EFFECT OF ADDED THREONINE IN A LYSINE SUPPLEMENTED,  
LOW PROTEIN CORN-SUNFLOWER MEAL DIET

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Threonine has been shown to be one of the limiting amino acids in certain types of swine diets. Recent research indicates that the level of threonine required by the young growing pig may be greater than that suggested by the National Research Council (NRC). Research reported in the 1983 Swine Field Day Proceedings, indicated that lysine, threonine and tryptophan are the first three limiting amino acids in a corn-sunflower meal diet with lysine being most deficient. The trial reported, herein, was conducted to identify the optimum level of threonine required by the young growing pig fed a low protein, lysine supplemented corn-sunflower meal diet.

#### Experimental Procedure

Ninety-six weaned pigs averaging 17.1 lb were allotted to six experimental treatments according to sex, weight and ancestry with four pigs per pen and each treatment replicated four times. Pigs were housed in the environmentally controlled laboratory located in the Animal Science Complex. Feed and water were provided ad libitum during the 28 day trial. Pig weights and feed weigh backs were taken weekly throughout the four week experiment.

The composition of the diets are shown in table one. Experimental treatments were as follows:

1. 13% C.P. sunflower meal basal plus .96% L-lysine, .11% DL-tryptophan, .2% L-isoleucine and .1% DL-methionine
2. Diet one plus .05% L-threonine
3. Diet one plus .1% L-threonine
4. Diet one plus .15% L-threonine
5. Diet one plus .2% L-threonine
6. 18% C.P. sunflower meal basal plus .73% L-lysine

Table 1. Composition of Experimental Diets (%)

Ingredient	13% C.P.	18% C.P.
Yellow corn	81.16	67.02
Sunflower meal	14.14	29.32
Dicalcium phosphate	1.7	1.0
Ground limestone	1.0	1.3
Salt, white	.3	.3
Trace mineral premix	.05	.05
Vitamin premix	.03	.03
ASP-250 <sup>a</sup>	.25	.25
L-lysine HCl	.96	.73
DL-tryptophan	.11	--
L-isoleucine	.2	--
DL-methionine	.1	--

<sup>a</sup> Aureomycin, sulfamethazine and penicillin.

### Results

Performance data collected over the 28 day trial are summarized in Table 2. Average daily gains increased linearly ( $P < .01$ ) as L-threonine was supplemented to the 13% protein basal diet. Daily gains increased from 15 to 20% when .05 to .15% L-threonine was added to the low protein diet; however, only the supplementation of the basal diet with .2% L-threonine resulted in a significant increase in daily gain. Average daily gains of pigs fed the 13% protein basal diet with L-threonine additions of .05, .1, .15 or .2% were not significantly different from those pigs fed the 18% protein diet. Feed efficiency increased linearly ( $P < .005$ ) as threonine was supplemented to the low protein diet. Pigs fed the 13% protein diet (treatment 1) had the highest feed to gain ratio which was higher ( $P < .05$ ) than the feed to gain ratio of pigs fed this diet supplemented with L-threonine.

The results of this study indicate that additions of threonine to a low protein lysine supplemented corn-sunflower meal diet will improve average daily gains and feed/gain. In this experiment, .2% supplemented L-threonine was needed in a 13% protein lysine supplemented diet to realize performance similar to that of pigs fed an 18% sunflower meal diet containing an equal level of lysine.

Table 2. Effect of Dietary Threonine Levels  
On Performance of Young Weaned Pigs

Diet		<u>13% protein</u>				<u>18% protein</u>
Added Threonine	0	.05	.10	.15	.20	0
Treatment	1	2	3	4	5	6
Initial wt, lb <sup>a</sup>	17.0	17.1	16.9	17.1	17.1	17.1
Final wt, lb	38.8 <sup>b</sup>	43.4 <sup>b,c</sup>	42.1 <sup>b,c</sup>	42.7 <sup>b,c</sup>	46.6 <sup>c</sup>	46.8 <sup>c</sup>
Avg daily gain, lb <sup>e</sup>	.78 <sup>b</sup>	.94 <sup>b,c</sup>	.90 <sup>b,c</sup>	.90 <sup>b,c</sup>	1.05 <sup>c</sup>	1.06 <sup>c</sup>
Avg daily feed, lb	1.82	2.02	1.82	1.89	2.10	1.98
Feed/gain <sup>f</sup>	2.34 <sup>b</sup>	2.18 <sup>b,c</sup>	2.03 <sup>c,d</sup>	2.07 <sup>c</sup>	2.00 <sup>c,d</sup>	1.87 <sup>d</sup>

a

Four lots of four pigs each per treatment.

b,c,d

Means with unlike letters are different (P<.05).

e

Significant linear response (P<.01).

f

Significant linear response (P<.005).

### Summary

Ninety-six, four to five week old pigs, were utilized in a 28 day experiment conducted to identify the optimum level of threonine required by the young growing pig when fed an amino acid fortified 13% protein corn-sunflower meal diet.

Average daily gains were improved by the addition of L-threonine to a 13% protein basal; however, no significant differences were attained before the threonine supplementation reached .2%. This provided .73% total threonine in the diet. Feed/gain decreased (P<.05) when the low protein diet was supplemented with .1% L-threonine. Additional threonine supplementation was of no further benefit in improving feed efficiency.