



NUTRITION NOTES

Innovation + Research from Kent Nutrition Group

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EFFECT OF INCREASED AMINO ACID LEVELS DURING THE GROWER STAGES IN GROW-FINISH PIGS

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INTRODUCTION

In 2017, Kent Research determined that diets with both higher levels of synthetic amino acids [lysine (Lys), threonine (Thr), methionine (Met), tryptophan (Trp)] and soybean meal performed better than our previous grow-finish program. However, in the trial work of 2017 we only evaluated one level of amino acids that were higher than the control diets at that time. Based on further information in the industry, it was apparent that we should continue to evaluate higher levels of amino acids in the grower stages, but not in the finishing stages. When Met is added to the diet, it also is converted in the pig into another sulfur amino acid called Cystine (Cys). So in our diet tables you will see the term Met + Cys which refers to these two sulfur amino acids that are needed in pig diets. The terminology that we are using to express amino acid requirements is based on the digestible levels of these amino acids (called standardized ileal digestible or SID) which reflects the amount of each amino acid absorbed and utilized for efficient synthesis of muscle. Amino acid requirements are based on the ratio of essential (those amino acids that must be supplied in the diet such as Thr, Met, and Tryp) amino acids to lysine since lysine is the first-limiting amino acid in swine diets. We decided to raise the SID Lys by 0.10 (1X) and 0.20 units (2X) during Days 0-21 and 0.05 (1X) and 0.10 (2X) during Days 21-42 (and using the amino acid ratios from Kent trials) to see if this would provide a growth and economic response in current genetics (DNA Boar x Choice Sow). We limited synthetic Lys to 9 and 8 lb/ton during Days 0-21 and 21-42, respectively thus allowing for more soybean meal to be utilized in these stages. Previous research we have conducted would indicate that it is important to keep enough soybean meal in the diet to help meet the amino acid requirements of other amino acids which includes non-essential amino acids (those amino acids a pig can biologically make provided enough nitrogen is in the diet since it is a key component of amino acids).

PROCEDURES

From the introduction above, we evaluated three treatments in this trial: 1) Standard amino acid program; 2) Standard with SID Lys increased by 1X during Days 0-42; and 3) Standard with SID Lys increased by 2X during Days 0-42. We utilized 864 pigs involving 16 replications per treatment. The pigs were fed a five-phase program utilizing NexGen VTM 6/5 PT and 200 lb/ton of Distillers Dried Grains with Solubles as shown in Tables 1 and 3. The results during the grower stages are shown in Table 2. Increasing the synthetic amino acids (AA), and increasing the soybean meal resulted in marked improvements in gain and feed efficiency when compared to the standard diets with very slight improvements in gain and feed efficiency occurring with the 2X AA compared to the 1X AA levels. In fact, pigs on the 1X and 2X AA levels gained respectively about 2.56 to 2.81 lbs more than the standard program over the 42 day test period. In Table 4 are the overall data (Days 0-110) in which pigs on the two previous amino acid treatments were fed similar diets from Days 42-110. We did observe that pigs on the 2X AA treatment during the grower stages had a 0.8% improvement in gain which resulted in a heavier market hog of about 1.87 lb compared to those on the standard program. In addition, the overall feed efficiency was slightly better for pigs on the 2X AA program when compared to the standard and the 1X AA programs, thus resulting in cost of gains being slightly higher for the 1X and 2X AA programs compared to the standard diets. At a market price of \$55/cwt live, the 2X AA program increased net return by \$0.18/hog marketed, while the 1X AA program had a slight loss of \$0.12/hog marketed.

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NUTRITION NOTES (continued)

Table 1. Grower Diets During Days 0-42

Days	0-21			21-42		
	Standard	+ 1X AA	+ 2X AA	Standard	+ 1X AA	+ 2X AA
Corn (7.0% CP)	1357.97	1308.52	1229.29	1428.97	1391.31	1351.90
SBM (46.85% CP)	392	440	520	322	360	400
DDGS (27% CP)	200	200	200	200	200	200
Calcium Carbonate	22.6	22.7	22.5	22.3	22.4	22.4
Monocalcium Phosphate 21%	2.0	1.0	-	1.6	0.8	-
Salt	7	7	7	7	7	7
6/5 VTM PT	6	6	6	6	6	6
L-Lysine HCl	8.00	9.00	9.00	7.93	8.00	8.00
L-Threonine	2.34	2.95	3.11	2.19	2.30	2.38
DL-Methionine	1.31	1.95	2.28	1.18	1.38	1.55
L-Tryptophan	0.48	0.58	0.52	0.53	0.51	0.47
Skycis	0.3	0.3	0.3	0.3	0.3	0.3
Total, Lb	2000	2000	2000	2000	2000	2000
\$/Ton ¹	172.07	178.89	185.94	165.75	169.18	172.65
ME, Kcal/lb	1521	1519	1519	1522	1522	1522
NE, Kcal/lb	1026	1021	1014	1032	1029	1026
Crude Protein, %	17.2	18.3	19.9	15.8	16.6	17.4
Lys, %	1.14	1.24	1.35	1.04	1.09	1.15
SID Lys, %	1.02	1.12	1.22	0.93	0.98	1.03
SID Trp/SID Lys Ratio	18	18	18	18	18	18
SID Thr/SID Lys Ratio	63	63	63	63	63	63
SID Met+Cys/SID Lys Ratio	54	54	54	55	55	55
SID Val/SID Lys Ratio	68	65	65	68	67	67
SID Ile/SID Lys Ratio	60	58	58	59	59	59

¹ Corn, \$3.35/bu or \$119.64/ton; SBM, \$290/ton; DDGS, \$119.64/ton

Table 2. Effect of Increased Amino Acids (AA) on Performance, Economics & Carcass Traits in Grow-Finish Pigs¹

Treatments	1	2	3
Increased AA Levels		1X	2X
Number of Pigs	288	288	288
Number of Pens	16	16	16
Initial Wt, lb	44.18	44.10	44.44
Days 0-42			
ADG, lb	1.660b	1.721a	1.727a
ADF, lb	3.874	3.892	3.882
F/G	2.333a	2.266b	2.248b
Cost/lb Gain, ¢	19.66	19.65	20.05

¹ Means with different superscripts in a row are significantly ($P \leq .05$) different





NUTRITION NOTES (continued)

Table 3. Finisher Diets During Days 42-110

Days	42-62	62-83	83-110
Corn (7.0% CP)	1492.39	1542.87	1595.33
SBM (46.85% CP)	261	212	161
DDGS (27% CP)	200	200	200
Calcium Carbonate	20.6	20.8	19.7
Monocalcium Phosphate 21%	1.0	0.1	-
Salt	7	7	7
6/5 VTM PT	5	5	5
L-Lysine HCl	8.16	7.95	7.79
L-Threonine	2.35	2.13	2.22
DL-Methionine	1.59	1.23	1.32
L-Tryptophan	0.61	0.62	0.64
Skycis	0.3	0.3	-
Total, lb	2000	2000	2000
\$/Ton ¹	161.13	155.67	149.25
ME, Kcal/lb	1523	1524	1526
NE, Kcal/lb	1039	1044	1049
Crude Protein, %	14.6	13.6	12.6
Lys, %	0.96	0.89	0.81
SID Lys, %	.86	0.79	0.72
SID Trp/SID Lys Ratio	18	18	18
SID Thr/SID Lys Ratio	64	64	66
SID Met+Cys/SID Lys Ratio	58	58	61
SID Val/SID Lys Ratio	66	67	68
SID Ile/SID Lys Ratio	57	57	57

¹ Corn, \$3.35/bu or \$119.64/ton; SBM, \$290/ton; DDGS, \$119.64/ton

Table 4. Effect of Increased Amino Acids (AA) on Overall Performance, Economics & Carcass Traits in Grow-Finish Pigs¹

Treatments	1	2	3
Increased AA Levels		1X	2X
(Days 0-42 only)			
Number of Pigs	288	288	288
Number of Pens	16	16	16
Initial Wt, lb	44.18	44.10	44.44
Days 0-110			
ADG, lb	2.015	2.022	2.032
ADF, lb	5.784	5.799	5.785
F/G	2.870	2.868	2.847
Cost/Lb Gain, ¢	22.70	22.88	22.90
Net Return, \$/Pig			
@ \$55/cwt live price	71.57	71.45	71.75
@ \$60/cwt live price	82.65	82.57	82.92
@ \$65/cwt live price	93.74	93.69	94.10
@ \$70/cwt live price	104.82	104.81	105.27
Carcass			
Percent Lean	56.73b	56.71b	56.91a
Dressing Percent	75.68	74.97	75.91
Grade Premium, \$/Cwt	6.42	6.47	6.70

¹ Means with different superscripts in a row are significantly ($P \leq .10$) different



NUTRITION NOTES (continued)

DISCUSSION

Growing pigs clearly had performance responses to the 1X and 2X AA levels compared to the standard program. This performance response in the growing phase with the 2X AA levels resulted in an overall (Days 0-110) slight improvement in net return (by roughly \$0.18 to \$0.36/hog marketed with live prices of \$55 to \$65/cwt compared to those pigs on the standard program). In addition, the percent lean was significantly better for pigs on the 2X AA program which resulted in an advantage of \$0.28/cwt for grade premiums (about \$0.56 cent/hog since the market hogs had carcass weights of around 200 lb).

SUMMARY

Using the diets with the 2X AA levels in the growing stages resulted in slightly heavier market hogs which improved the bottom line to producers by about \$0.75/hog marketed when one accounts for the gain and grade premium responses. Thus, these diets will become the new standard in feeding these lean and fast growing genetic lines of pigs.