

# Determination of SID Tryptophan to Lysine Ratio in Nursery Pigs

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### Summary

Four hundred and fifty newly weaned nursery pigs were observed over a 35-day period at the Iowa State University Swine Nutrition Farm. Pigs were weighed and allotted to 1 of 5 treatments upon arriving, averaging  $6.49 \pm 0.40$  kg for an initial bodyweight. All pigs were had *ad libitum* access to feed and water. The 5 treatments consisted of differing ratios of SID tryptophan to lysine, as follows: 0.150 Trp:Lys, 0.175 Trp:Lys, 0.200 Trp:Lys, 0.225 Trp:Lys, and 0.250 Trp:Lys. The overall data indicate that there is no further advantage in terms of growth performance and feed efficiency by having a diet containing a Trp:Lys ratio greater than 0.175 for nursery pigs. The Trp:Lys ratio largely explained variation in feed efficiency, but not ADG or ADFI. These data are supportive of the Trp:Lys ratio (Trp:Lys = 0.170) specified by the NRC (2012).

### Introduction

Tryptophan is an essential amino acid and a limiting amino acid in corn-soybean meal based diets fed to nursery pigs. Current recommendations for the SID tryptophan to lysine ratio (Trp:Lys) for the nursery pig is 0.17 (NRC, 2012). However, recent studies in both high health and health challenged pigs have demonstrated performance advantages of an increased Trp:Lys to as high as 0.20 to 0.26. Therefore, the objective was to evaluate the impact of different Trp:Lys on the growth performance of nursery pigs.

### Materials and Methods

A total of 450 crossbreed weanling pigs (Gentiporc 6.0 × Gentiporc F25) were utilized for this experiment after being transported to the Iowa State University Swine Nutrition Farm. Upon arrival, each pig was ear-tagged for identification and weighed individually. The average initial BW of weaned pigs was  $6.49 \pm 0.40$  kg. Initial weight was used as a criterion for blocking, creating blocks of 5 pens each resulting in 9 blocks in total, for a total of 450 pigs. Each pig was then allotted to a pen that had been previously

assigned to 1 of 5 dietary treatments (0.150 Trp:Lys, 0.175 Trp:Lys, 0.200 Trp:Lys, 0.225 Trp:Lys, and 0.250 Trp:Lys). All pens were fed a common diet from during Phase 1 d 0 to 7. Each of the 5 dietary treatments were fed from d 7 to 35 with 2 phases (Phase 2 d 7 to 21 and Phase 3 d 21 to 35). Pigs were individually weighed on d 0, 7, 14, 21, 28 and 35. Feeders and any feed contained in the feeder were also weighed on d 0, 7, 14, 21, 28, and 35. Data were analyzed using PROC MIXED (SAS 9.4; SAS Inst. Inc., Cary, NC) with block as a random effect. Pen was the experimental unit. Incremental body weight and the corresponding rate of gain and feed efficiency were analyzed as a repeated measure. For each variable, normal distribution of residuals was tested using PROC UNIVARIATE. Determination of the optimal ratio between SID tryptophan and lysine of the 5 dietary treatment least squared means were analyzed using PROC REG for linear, quadratic, and broken line models. PROC NLIN was utilized for exponential regression analysis.

### Results and Discussion

Overall performance for this experiment was comparable to performance seen in commercial production, with an overall average daily gain of ~350 g/d and an overall gain to feed ratio of ~0.675 (feed to gain ratio of ~1.46). Over the 35-day experiment, increasing Trp:Lys resulted in increased ADG ( $P = 0.002$ ), increased ADFI ( $P = 0.023$ ), and improved gain to feed and feed to gain ratios ( $P = 0.008$ ). Additionally, increasing Trp:Lys resulted in increased BW exiting the nursery (d 35;  $P = 0.007$ ). The relationship between Trp:Lys and ADG and ADFI was not found to be significant ( $P \geq 0.420$ ). The relationship between Trp:Lys and overall gain to feed tended to be significant when fitted to an exponential curve ( $P = 0.061$ ), but not a linear, quadratic, or broken line curve ( $P \geq 0.244$ ). These data indicate that there is no further advantage in terms of growth performance and feed efficiency by having a diet containing a Trp:Lys greater than 0.175 for nursery pigs. These data are supportive of the Trp:Lys ratio (Trp:Lys = 0.17) specified by the NRC (2012).

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**Table 1. Least square means for the effects of increasing SID tryptophan to lysine ratio (Trp:Lys) on growth performance and feed efficiency in nursery pigs for the overall experimental period<sup>1</sup>**

Item	Treatment <sup>1</sup>					Pooled SEM	P-value
	0.150 Trp:Lys	0.175 Trp:Lys	0.200 Trp:Lys	0.225 Trp:Lys	0.250 Trp:Lys		
Number of pens	9	9	9	9	9		
Number of pigs allotted on d 0	90	90	90	90	90		
Initial BW (d 0), kg	6.5	6.5	6.5	6.5	6.5	0.4	0.659
Final BW (d 35), kg	18.5	19.7	19.4	18.7	19.3	0.8	0.007
ADG, kg	0.338	0.372	0.356	0.332	0.364	0.013	0.002
ADFI, kg	0.510	0.539	0.531	0.491	0.529	0.021	0.023
Gain:feed	0.661	0.691	0.680	0.676	0.688	0.006	0.008
Feed:gain	1.514	1.449	1.473	1.481	1.454	0.014	0.008

<sup>1</sup>Day 0 to 35