

Scotland's Rural College

## 31 Effects of dietary standardized ileal digestible (SID) lysine (Lys) levels and dietary SID tryptophan to Lys ratios on growth performance and behavior of late-nursery to finish maternal barrows

Lu, Ning; Zaragoza, Luis E; Vier, Carine M; Diaz, Julia A Calderon; Orlando, Weasley A; Hewett, Ellie; Turner, Simon; Estrada, Jorge; Camp, Jordi; Cast, Wayne R; Dritz, Steve

*Published in:*  
Journal of Animal Science

*DOI:*  
[10.1093/jas/skae102.083](https://doi.org/10.1093/jas/skae102.083)

Print publication: 01/05/2024

*Document Version*  
Publisher's PDF, also known as Version of record

[Link to publication](#)

### *Citation for published version (APA):*

Lu, N., Zaragoza, L. E., Vier, C. M., Diaz, J. A. C., Orlando, W. A., Hewett, E., Turner, S., Estrada, J., Camp, J., Cast, W. R., & Dritz, S. (2024). 31 Effects of dietary standardized ileal digestible (SID) lysine (Lys) levels and dietary SID tryptophan to Lys ratios on growth performance and behavior of late-nursery to finish maternal barrows. In *Journal of Animal Science* (Supplement 2 ed., Vol. 102, pp. 72-73). Oxford University Press. <https://doi.org/10.1093/jas/skae102.083>

### **General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal ?

### **Take down policy**

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Download date: 12. Jun. 2024

**Table 1.** Effect of breeding value (high or low) and nutrition plan (Current or alternative lysine curve for PIC 800 as % of PIC 337 lysine curve) on the overall performance during the wean-to-finish period and carcass traits of 2,080 gilts and barrows.

Trait <sup>1</sup>	Breeding Value			Nutrition plan – Lysine curve <sup>1</sup>			Breeding value x nutrition plan <i>P</i> -value
	High	Low	SEM	Current	Alternative	SEM	
On-Test Weight, kg	6.17 <sup>b</sup>	5.99 <sup>a</sup>	0.046	6.08	6.08	0.047	0.801
Off-Test Weight, kg	133.22 <sup>b</sup>	131.37 <sup>a</sup>	1.038	131.91	132.64	1.040	0.697
Average Daily Gain, kg/day	0.835 <sup>b</sup>	0.821 <sup>a</sup>	0.005	0.826	0.830	0.005	0.628
Average Daily Feed Intake, kg/day	1.91 <sup>b</sup>	1.88 <sup>a</sup>	0.011	1.90	1.90	0.011	0.704
Feed Conversion Ratio	2.34	2.33	0.008	2.33	2.34	0.008	0.536
Hot Carcass Weight, kg	97.85 <sup>b</sup>	96.03 <sup>a</sup>	0.013	96.62 <sup>a</sup>	97.30 <sup>b</sup>	0.013	0.748
Carcass Backfat Thickness, mm	16.3 <sup>b</sup>	15.4 <sup>a</sup>	0.282	15.8	15.8	0.282	0.911
Carcass Loin Depth, mm	66.9 <sup>∇</sup>	66.4 <sup>*</sup>	0.398	66.9	66.5	0.398	0.829
Carcass Lean, %	57.0 <sup>a</sup>	57.5 <sup>b</sup>	0.211	57.2	57.2	0.211	0.911
Carcass Yield, %	74.1 <sup>b</sup>	73.7 <sup>a</sup>	0.226	73.8	73.9	0.226	0.533

<sup>1</sup> Pigs were fed either the current recommendation or an alternative SID Lys curve for PIC 800, in a 6 phase feeding program: phase 1 (6–11 kg; 100 vs 100%, respectively); phase 2 (11–23 kg; 97 vs 100%, respectively); phase 3 (23–45 kg; 97 vs 100%, respectively); phase 4 (45–73 kg; 97 vs 95%, respectively); phase 5 (73–102 kg; 97 vs 95%, respectively); and phase 6 (102–132 kg; 97 vs 90%, respectively).

<sup>a</sup> Different letters indicate a statistical difference at  $P < 0.05$ .

<sup>∇</sup> Different letters indicate a statistical tendency at  $P < 0.10$ .

Abstract citation ID: skae102.083

### 31 Effects of dietary standardized ileal digestible (SID) lysine (Lys) levels and dietary SID tryptophan to Lys ratios on growth performance and behavior of late-nursery to finish maternal barrows.

Ning Lu<sup>1</sup>, Luis E. Zaragoza<sup>1</sup>, Carine M. Vier<sup>1</sup>, Julia A. Calderon Diaz<sup>1</sup>, Weasley A. Orlando<sup>1</sup>, Ellie Hewett<sup>2</sup>, Simon Turner<sup>2</sup>, Jorge Estrada<sup>3</sup>, Jordi Camp<sup>1</sup>, Wayne R. Cast<sup>1</sup>, Steve Dritz<sup>1</sup>,

<sup>1</sup>Genus PIC, <sup>2</sup>SRUC, <sup>3</sup>Carthage Veterinary Service

Abstract: The objective was to determine the effects of dietary standardized ileal digestible (SID) lysine (Lys) levels and SID tryptophan (Trp) to Lys ratios on growth performance and behavior of late-nursery to finish maternal barrows. A total of 2,293 barrows (PIC Camborough, initially  $11.9 \pm 0.35$  kg) were used in this trial with 96 mixed-sex pens and 23 to 25 pigs/pen. There was a total of 6 dietary phases: P1:11.9-29.5 kg; P2:29.5-49.6 kg; P3:49.6-62.6 kg; P4:62.6-80.3 kg; P5:80.3-103.3 kg; and P6:103.3-137.8 kg. Pens were blocked by body weight and randomly allotted to 1 of 6 treatments: T1: 100% Lys (dietary SID Lys levels meet PIC SID Lys recommendation) and 21.0% of SID Trp:Lys ratio; T2: 100% Lys and 18.5% of SID Trp:Lys ratio; T3: 100% Lys and 16.0% of SID Trp:Lys ratio; T4: 80% Lys (dietary SID Lys levels meet 80% of PIC SID Lys recommendation) and 21.0% of SID Trp:Lys ratio; T5: 80% Lys and 18.5% of SID Trp:Lys ratio; and T6: 80% Lys and 16.0% of SID Trp:Lys ratio for P1-P2 and then 100% Lys and 18.5% of SID Trp:Lys ratio for P3-P6. Ear lesion (EL) was monitored during P2-P5. Data were analyzed using a linear mixed model in R Studio (Version 3.5.2, R Core Team; Vienna, Austria). Pigs fed T1 and T2 showed improved average daily gain than T6 ( $P < 0.05$ ), with other treatments intermediate (Table 1). Pigs fed T2 showed improved average daily feed intake as compared with T6 ( $P < 0.05$ ), with other treatments intermediate. There was no evidence for significant difference on feed-to-gain ratio or mortality. Removal was significantly greater for pigs fed T6 compared with all other treatments ( $P < 0.05$ ). Pigs fed T2 had significantly greater hot carcass weight than T4, with other treatments intermediate. There was no evidence for significant differences on carcass yield or lean percentage. Pig fed T6 had significantly greater incidence of EL in P2 than all other treatments ( $P < 0.05$ ). Pigs fed T4 and T6 had greater incidence of EL in P3 than T1 ( $P < 0.05$ ), with other treatments intermediate. Pigs fed T5 and T6 had significantly greater incidence of EL in P4 than T1, T2, and T3 ( $P < 0.05$ ), with T4 intermediate. During P5, pigs fed T4 and T5 had the greatest incidence of EL ( $P < 0.05$ ), while pigs

fed T6 had significant greater incidence of EL than T3 ( $P < 0.05$ ), with T1 and T2 intermediate. In conclusion, dietary SID Lys and SID Trp:Lys ratio less than PIC recommendation during late-nursery-to-grower phase resulted in compromised overall growth performance of maternal barrows, even with restored dietary SID Lys and SID Trp:Lys levels in finish phase. Dietary SID Lys level and/or SID Trp:Lys ratios lower than PIC recommendation may result in greater incidence of aggression behavior in maternal barrows.

Table 1. Effects dietary standardized ileal digestible (SID) lysine (Lys) levels and dietary SID tryptophan to SID Lys ratios on growth performance on growth performance and behavior of late-nursery to finish maternal barrows<sup>1</sup>

Item	Treatments <sup>2</sup>						SEM	Probability, P= <sup>3</sup>
	T1	T2	T3	T4	T5	T6		
<b>Growth Performance</b>								
Start body weight, kg	11.9	11.9	11.9	11.9	11.9	11.9	0.35	1.000
End body weight, kg	138.4	139.4	137.1	136.3	138.4	136.8	0.98	0.116
Average Daily Gain, g/d	920.3 <sup>a</sup>	912.3 <sup>b</sup>	904.7 <sup>ab</sup>	890.5 <sup>ab</sup>	892.7 <sup>ab</sup>	868.4 <sup>a</sup>	9.85	0.002
Average Daily Feed Intake, kg/day	2.68 <sup>ab</sup>	2.75 <sup>b</sup>	2.69 <sup>ab</sup>	2.65 <sup>ab</sup>	2.70 <sup>ab</sup>	2.57 <sup>a</sup>	0.038	0.010
Gain to Feed Ratio, g/g	344	332	336	336	330	338	23.8	0.392
Mortalities, % <sup>1</sup>	5.2	5.8	4.4	4.0	5.5	4.5	1.10	0.843
Removals, % <sup>1</sup>	2.1 <sup>a</sup>	3.9 <sup>a</sup>	2.6 <sup>a</sup>	3.7 <sup>a</sup>	3.9 <sup>a</sup>	9.4 <sup>b</sup>	1.00	<0.001
<b>Carcass characteristics</b>								
Hot Carcass Weight, kg <sup>1</sup>	106.2 <sup>ab</sup>	106.8 <sup>b</sup>	105.3 <sup>ab</sup>	104.4 <sup>a</sup>	106.1 <sup>ab</sup>	105.3 <sup>ab</sup>	1.066	0.032
Carcass Yield, % <sup>6</sup>	71.6	71.5	71.5	71.6	71.5	71.7	0.236	0.944
Carcass lean, %	52.6	52.6	52.7	52.6	52.5	52.8	0.104	0.341
<b>Incidence of ear lesions, %</b>								
Phase 2	1.6 <sup>a</sup>	1.6 <sup>a</sup>	0.5 <sup>a</sup>	2.9 <sup>a</sup>	4.3 <sup>a</sup>	11.1 <sup>b</sup>	0.88	<0.001
Phase 3	3.8 <sup>a</sup>	7.7 <sup>ab</sup>	8.1 <sup>ab</sup>	10.3 <sup>b</sup>	8.3 <sup>ab</sup>	12.5 <sup>b</sup>	1.42	<0.001
Phase 4	4.3 <sup>a</sup>	5.8 <sup>ab</sup>	5.5 <sup>ab</sup>	10.9 <sup>ab</sup>	15.8 <sup>b</sup>	13.3 <sup>b</sup>	1.45	<0.001
Phase 5	3.8 <sup>ab</sup>	3.6 <sup>ab</sup>	3.1 <sup>a</sup>	17.4 <sup>c</sup>	16.4 <sup>c</sup>	8.4 <sup>b</sup>	1.37	<0.001

<sup>1</sup> A total of 2,293 barrows (PIC Camborough, initially  $11.9 \pm 0.35$  kg) were used in this trial with 96 mixed-sex pens and 23-25 pigs/pen. There was a total of 6 dietary phases: P1:11.9-29.5 kg; P2:29.5-49.6 kg; P3:49.6-62.6 kg; P4:62.6-80.3 kg; P5:80.3-103.3 kg; and P6:103.3-137.8 kg.

<sup>2</sup> Pens were blocked by body weight and randomly allotted to 1 of 6 treatments: T1: 100% Lys (dietary SID Lys levels meet PIC SID Lys recommendation) and 21.0% of SID Trp:Lys ratio; T2: 100% Lys and 18.5% of SID Trp:Lys ratio; T3: 100% Lys and 16.0% of SID Trp:Lys ratio; T4: 80% Lys (dietary SID Lys levels meet 80% of PIC SID Lys recommendation) and 21.0% of SID Trp:Lys ratio; T5: 80% Lys and 18.5% of SID Trp:Lys ratio; and T6: 80% Lys and 16.0% of SID Trp:Lys ratio for P1-P2 and then 100% Lys and 18.5% of SID Trp:Lys ratio for P3-P6.

<sup>3</sup> Different letters indicate a statistical difference at  $P < 0.05$ .

**Keywords:** behavior, growth performance, late-nursery-to-finish pigs, lysine, standardized ileal digestible tryptophan to lysine ratio