

EFFICIENCY OF LYSINE UTILIZATION FOR ENTIRE MALE PIGS WITH HIGH GENETIC POTENTIAL

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Resumo: Este estudo comparou as respostas de desempenho e eficiência de utilização da Lisina de suínos em diferentes níveis de lisina digestível. 64 suínos machos inteiros foram aleatoriamente distribuídos em um dos quatro tratamentos dietéticos que consistiam em quatro níveis de Lisina (55, 68, 82 e 95% das exigências propostas pelo do NRC) com 16 repetições por tratamento em um ensaio de 28 dias. O consumo de ração foi mensurado diariamente por meio de um comedouro automático inteligente de precisão e o peso corporal foi obtido no início e no final do experimento. A composição corporal foi avaliada nos dias 0 e 28 por um scanner de densitometria de raios X de duplo feixe de energia e os dados foram convertidos para deposição diária de proteínas e deposição de lipídios. Nenhum efeito quadrático ($P > 0,05$) dos níveis de Lisina foi observado para as variáveis mensuradas. PV final, GPD, CRD, CA, proteína corporal final, lipídio corporal final, ganho de proteína e ganho lipídico foram significativos para os níveis de Lisina na dieta ($P = 0,05$). A ingestão e retenção de Lisina aumentaram com o aumento da Lisina dietética, enquanto a eficiência de utilização diminuiu ($P = 0,05$). O nível de Lisina das dietas influencia a eficiência de utilização desse aminoácido e o desempenho dos suínos.

PalavrasChaves: Aminoácidos; composição corporal; nutrição de suínos.

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Abstract: This study compared the performance responses and lysine efficiency utilization of pigs under the influence of SID lysine levels. A total of 64 entire male pigs were randomly assigned to one of four dietary treatments that consisted of four SID Lys levels (55, 68, 82 e 95% of NRC requirements) with 16 replicates of 1 pig each in a 28 days trial. Feed intake was measured daily by automatic intelligent precision feeder and body weight was recorded at the beginning and end of the trial. Body composition was assessed on days 0 and 28 by dual-energy X-ray densitometry scanner and the data converted to daily protein deposition and lipid deposition. No quadratic effects ($P > 0.05$) of the SID Lys levels were observed on any of the variables. Final BW, ADG, ADFI, F:G, final body protein, final body lipid, protein gain and lipid gain were significant for dietary lysine levels ($P = 0.05$). SID Lys intake and Lys retention increased with increasing dietary lysine while utilization efficiency decreased ($P = 0.05$). The SID lysine level in diets for entire male pigs influences their efficiency of SID Lys utilization and performance.

Keywords: Amino acids; body composition; swine nutrition.

Introdução: Improvements in livestock production are directly linked to the process of optimizing animal nutrition. Reflected by this, precision nutrition has become a key point, mainly related to the most used nutrients, such as amino acids and their more efficient forms of utilization. Lysine (Lys) is the first limiting amino acid for pigs and it is considered as the reference for the estimation of the other amino acid requirements. Modern pigs, with high genetic potential for lean deposition may be more efficient using dietary Lys. Moreover, as more deficient diets are in standardized ileal digestible (SID) Lys, pigs will use SID Lys more efficiently (1). Therefore, this study was performed to evaluate the effects of limited SID lysine levels on the efficiency of SID lysine utilization for entire male pigs.

Material e Métodos: Pigs were housed in a single pen with 95 m² in an environmentally controlled barn. 64 entire male pigs were used in a 28 days trial. Pigs were randomly assigned to one of 4 dietary treatments that consisted of 4 SID Lys levels (55, 68, 82 e 95% of NRC requirements) with 16 replicates of 1 pig each. A corn-soybean meal diet supplemented with crystalline amino acids, mineral and vitamins, was formulated to provide all nutrients required for entire growing pigs according to NRC (2012) (3), except for SID Lys. Feed was provided ad libitum through AIPF (Automatic and Intelligent Precision Feeder). Each animal had a transponder attached by an ear tag with a unique identification code that was identified by the AIPF that delivered the assigned experimental diet. At day 0 and 28, individual body weight (BW) was taken and body composition was measured by DXA. Body protein content and body lipid content were estimated using specific equations (4). Individual feed intake was recorded daily by the AIPF. Daily SID Lys intake was calculated multiplying the average daily feed intake (ADFI) by the SID Lys concentration of each dietary treatment. Lys deposition was estimated considering a Lys concentration in the body protein content of 7.1% (2), and the efficiency of SID Lysine utilization was calculated dividing the Lys deposition by the subtraction of SID Lys intake less the SID Lys for maintenance. Data were analyzed using the PROC GLIMMIX (5). Orthogonal polynomial contrasts were used to evaluate linear and quadratic effects of dietary SID Lys levels. Significance was set at $P = 0.05$.

Resultado e Discussão: No quadratic effects ($P > 0.05$) of the SID Lys levels were observed on any of the variables evaluated in this study. Increasing SID Lys levels increased linearly ($P < 0.05$) final BW, average daily gain (ADG) and ADFI, leading to a linear improvement of the feed-to-gain ratio (Table 1). Final body protein and final body lipid content, as well the daily

protein gain and daily lipid gain increased linearly ($P<0.05$) with the increase in SID Lys supply. These results reflected the increase observed for ADG and ADFI. Because the only difference among the experimental diets was their SID Lys concentration and adding the effect observed for ADFI, SID Lys intake increased linearly ($P<0.05$) as the SID Lys level in the diet was higher which resulted in a linear increase ($P<0.05$) in Lys retention. Finally, it was observed a linear decrease ($P<0.05$) in the efficiency of SID Lys utilization as SID Lys levels increased indicating that the pigs became more efficient using SID Lys when SID Lys intake is limited.

Table 1. Performance, body composition and Lys use of entire male pigs fed diets with increased SID Lys levels.

Item	SID Lys supply ¹ , %				SEM	P-value	
	55	68	82	95		Linear	Quadratic
Initial BW, kg	39.5	38.2	39.6	39.5	1.115	0.849	0.638
Final BW, kg	54.5	57.0	61.5	65.7	1.199	0.000	0.683
ADG, kg	0.54	0.67	0.78	0.94	0.058	<0.001	0.814
ADFI, kg	1.66	1.75	1.83	1.97	0.132	0.006	0.711
F:G	3.17	2.63	2.43	2.12	0.093	<0.001	0.236
Inicial protein, kg	5.0	4.9	5.0	5.0	0.68	0.825	0.749
Inicial lipid, kg	8.0	7.9	8.0	7.9	0.70	0.767	0.817
Final protein, kg	7.4	7.8	8.5	9.2	0.91	<0.001	0.585
Final lipid, kg	11.6	12.3	12.3	13.0	1.15	0.022	0.935
Protein gain, g/d	86	105	125	150	8.84	<0.001	0.521
Lipid gain, g/d	130	158	152	184	17.40	0.002	0.813
SID Lys intake, g/d	8.7	11.5	13.8	18.2	1.00	<0.001	0.190
Lys retention, g/d	6.1	7.4	8.8	10.7	0.63	<0.001	0.521
Lys efficiency	0.79	0.71	0.69	0.62	0.02	<0.001	0.792

¹Diets provided 55, 68, 82, and 95% of the NRC (2012) recommendations.

ADFI: average daily feed intake; ADG: average daily gain; BW: body weight; F:G: feed-to-gain ratio; SID Lys: standardized ileal digestible lysine.

Conclusão: The SID lysine level in diets for entire male pigs influences their efficiency of SID Lys utilization and performance.

Agradecimentos: The authors acknowledge the financial support received from São Paulo Research Foundation – FAPESP (grant No. 2018/15559-7). We express our gratitude to all financial support for this project provided by Agroceres PIC matrizes de suínos LTDA and Seara alimentos. We also thank Conselho Nacional de Desenvolvimento Científico e Tecnológico – CNPq for providing a scholarship.

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