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Nutritional plans of digestible lysine for growing-finishing gilts

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ABSTRACT - This experiment was conducted to evaluate nutritional plans of digestible lysine (DLys) for growing-finishing gilts. Eighty gilts with 63 days of age and an initial weight of 24.2±1.52 kg were distributed in a completely randomized block design, with five nutritional plans of DLys (9-8-7, 10-9-8, 11-10-9, 12-11-10, and 13-12-11 g/kg, from 63 to 103, 104 to 133, and 134 to 153 days of age, respectively) and eight replicates. Pigs were housed in pairs and fed their respective diets *ad libitum* throughout the experimental period (90 days). To monitor the animal development along the experiment at 103 and 133 days, gilts were weighed and subjected to analysis of ultrasound for evaluation of loin depth (*longissimus dorsi*) and backfat thickness. At the end of the experiment (153 days of age) the animals were weighed, and after slaughter carcasses were evaluated individually using a typifying pistol to evaluate the percentage and the content of carcass meat, loin depth and backfat thickness. From 63 to 133 days, there was no effect of the nutritional plans on daily feed intake, performance, or backfat thickness; however the loin depth was greater in the gilts that received plans with high levels of DLys (12-11; 13-12 g/kg) compared with the plan with the lowest level (8-7 g/kg). For the entire period (63 to 153 days), no influence of the nutritional plans was observed on the daily feed intake, performance variables, or carcass characteristics. A nutritional plan containing 9-8-7 g/kg of digestible lysine fed from 63 to 103, 104 to 133 and 134 to 153 days, respectively, meets the requirements for performance and carcass characteristics of growing-finishing gilts.

Key Words: amino acid, carcass, performance, phases, swine

Introduction

Protein deposition corresponds to the positive balance between protein synthesis and breakdown (Metayer et al., 2008). In an effort to maximize the protein deposition and optimize nutrient utilization in pig nutrition, it is necessary to determine the amino acid requirement for protein deposition in each growth stage. Lysine has been an amino acid of great interest due to its constancy in body protein and its metabolic preferential allocation for the deposition of muscle tissue (Kessler, 1998). Lysine requirements for growing pigs have been studied extensively (Rostagno et al., 2005, 2011) but most of these studies were done in independent phases.

However, the importance of working with interdependent nutritional plans in the growing-finishing phase has been noted because it seems to be more efficient in the determination of nutritional requirements of pigs (Kill et al., 2003; Souza, 2009). The benefit of nutritional plans over the independent phases is related to the carryover effects that the dietary level of a nutrient in the initial phases of growth may have on its requirement in the later phases (Main et al., 2008).

The gender can also influence the lysine requirement of pigs. The requirement of gilts to maximize the efficiency of weight gain is lower than that of boars and higher than that of barrows, which would be associated with an intermediate position of gilts between the other two genders in regard to the protein deposition rate (Quiniou et al., 2010). Thus, the gender may respond differently to nutritional plans consisting of sequences of lysine during the growing-finishing phase (O'Connel et al., 2005). Because 70% of the swine herd are in the growing-finishing phase an economic reduction in the feed cost during that phase has a major impact on the total production cost (Scramim and Batalha, 2004). Therefore, the knowledge and the update of the lysine requirements for pigs is essential for the optimization of the production system.

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In this sense, this experiment was conducted to evaluate nutritional plans for growing-finishing gilts from 63 to 153 days.

Material and Methods

The experiment was conducted at Empresa de Pesquisa Agropecuária de Minas Gerais (EPAMIG), in Oratórios/MG, Brazil.

Eighty gilts (AGPIC 425 × Camborough 25) with 63 days of age and an initial weight of 24.2±1.52 kg were used in a completely randomized block design with five digestible lysine (DLys) levels (treatments) with three-phase feedings per treatment (9-8-7, 10-9-8, 11-10-9, 12-11-10, and 13-12-11 g/kg, from 63 to 103, 104 to 133, and 134 to 153 days of age). Each treatment was replicated with eight pens with two pigs each. The criteria used for block formation were location (two sides) of the animals in the stable.

Experimental diets for the phases from 63 to 103 (Table 1), 104 to 133 (Table 2), and 134 to 153 days (Table 3) were corn-soybean meal-based supplemented with minerals and vitamins to meet the nutritional requirements for the animal category, except for lysine, according to Rostagno et al. (2005). Lysine and other amino acids were included in the diets in replacement of starch according to the ideal protein concept for growing-finishing gilts recommended by Rostagno et al. (2005). Pigs were housed in pens (1.87 m²/pig) equipped with semi-automatic feeders and drinkers, located in a concrete floor facility, and covered with asbestos tiles. The thermal environment in the room was monitored three times a day (07.00 h, 12.00 h and 17.00 h) using a black globe and hourly at a weather station (data logger®, model 3030.15, 433 MHz, TFA, Germany). These data were then converted into the black globe humidity index (BGHI), according to Buffington et al. (1981).

Pigs were fed *ad libitum* and water was provided throughout the experimental period. Experimental diets, daily feed waste and leftovers were weighted daily, and pigs were weighed at 63, 103, 133 and 153 days to assess average daily feed intake (ADFI) and digestible lysine intake

Table 1 - Ingredients and calculated nutritional composition of the experimental diets (as fed) for gilts from 63 to 103 days of age

Ingredients	Digestible lysine, g/kg				
	9	10	11	12	13
Corn	639.89	639.89	639.89	639.89	639.89
Soybean meal	307.45	307.45	307.45	307.45	307.45
Soybean oil	14.25	14.25	14.25	14.25	14.25
Dicalcium phosphate	12.07	12.07	12.07	12.07	12.07
Starch	10.63	8.89	6.31	3.50	0.00
Limestone	6.31	6.31	6.31	6.31	6.31
Salt	4.05	4.05	4.05	4.05	4.05
Premix[1]	4.00	4.00	4.00	4.00	4.00
L-lysine HCl 78%	0.00	1.29	2.58	3.87	5.16
DL-methionine 99%	0.00	0.39	0.99	1.60	2.21
L-threonine 98%	0.00	0.06	0.75	1.44	2.12
L-tryptophan 98%	0.00	0.00	0.00	0.08	0.27
L-valine 96.5%	0.00	0.00	0.00	0.14	0.87
Colistin sulfate 8%	1.25	1.25	1.25	1.25	1.25
Butylated hydroxytoluene	0.10	0.10	0.10	0.10	0.10
Calculated nutritional composition[2]					
Metabolizable energy (kcal/kg)	3,230	3,230	3,230	3,230	3,230
Crude protein (g/kg)	192.4	192.4	192.4	192.4	192.4
Digestible lysine (g/kg)	9.00	10.00	11.00	12.00	13.00
Digestible methionine + cystine (g/kg)	5.62	6.00	6.60	7.20	7.80
Digestible threonine (g/kg)	6.44	6.50	7.15	7.80	8.45
Digestible tryptophan (g/kg)	2.08	2.08	2.08	2.16	2.34
Digestible valine (g/kg)	8.15	8.15	8.15	8.28	8.97
Digestible isoleucine (g/kg)	7.39	7.39	7.39	7.39	7.39
Calcium (g/kg)	6.31	6.31	6.31	6.31	6.31
Available phosphorus (g/kg)	3.30	3.30	3.30	3.30	3.30
Sodium (g/kg)	1.80	1.80	1.80	1.80	1.80

[1] Content per kg of product: vitamin A - 2,000,000 IU; vitamin D3 - 300,000 IU; vitamin E - 5,000 IU; vitamin K3 - 625 mg; vitamin B12 - 5,000 mcg; vitamin B2 - 1,000 mg; biotin - 12.5 mg; pantothenic acid - 2,500 mg; niacin - 6,250 mg; butylated hydroxytoluene - 500 mg; vitamin B1 - 250 mg; vitamin B6 - 500 mg; folic acid - 150 mg; choline - 60 g; vitamin C - 12.5 g; cobalt - 125 mg; selenium - 125 mg; iron - 17.5 g; copper - 5,000 mg; manganese - 10 g; zinc - 20 g; iodine - 200 mg.

[2] According to Rostagno et al. (2005).

(ADLysI), average daily gain (ADG), final body weight, and feed conversion (FC).

At 63, 103 and 133 days, after weighing, the animals were subjected to analysis of ultrasound for evaluation of loin depth (*longissimus dorsi*) and backfat thickness by ultrasound (Aloka SSD 500). Images were collected between the tenth and eleventh ribs, as recommended by the National Swine Improvement Federation Guidelines. Later, from the images collected, loin depth and backfat thickness were calculated using the computer program Biosoft Toolbox for Swine (Biotronics Inc.).

At the end of the experiment, after a feed-deprivation period of 12 hours, pigs were weighed and transferred to a commercial slaughterhouse, where they were stunned and exsanguinated, according to the Brazilian rules for humane slaughter. Carcasses were individually evaluated using a typifying pistol (Stork-SFK, using informatics system "Fat-o-MeaterFom") introduced at the last rib position through the backfat and *longissimus dorsi*. Backfat thickness, loin depth, meat percentage and kilograms of meat in the carcass were obtained.

The following variables were evaluated in the periods from 63 to 103 and 63 to 133 days to monitor the development of gilts: ADFI, ADLysI, ADG, FC, final body weight, and (by ultrasound analysis) loin depth and backfat thickness. In the overall period (63 to 153 days), the following variables were evaluated: ADFI, ADLysI, ADG, FC, final body weight, and (with a typifying pistol) backfat thickness, loin depth, meat percentage and kilograms of meat in the carcass.

The data were analyzed using the GLM and NLIN procedures of SAS (Statistical Analysis System, version 9.2). The response variables were analyzed by a model containing the fixed effects of initial weight (covariate), DLys and side in the stable (two locations). From 63 to 103 days data were submitted to analysis of variance and the GLM procedure was used to test the effects of linear and quadratic levels of DLys on response variables by the method of orthogonal polynomials. From 63 to 133 and from 63 to 153 days, in case of significant effect of DLys, the means were compared by Tukey's test. A 0.05 critical level of probability for type I error was used for all statistical procedures.

Table 2 - Ingredients and calculated nutritional composition of the experimental diets (as fed) for gilts from 104 to 133 days of age

Ingredients	Digestible lysine, g/kg				
	8	9	10	11	12
Corn	689.94	689.94	689.94	689.94	689.94
Soybean meal	264.16	264.16	264.16	264.16	264.16
Soybean oil	10.34	10.34	10.34	10.34	10.34
Dicalcium phosphate	9.68	9.68	9.68	9.68	9.68
Starch	11.00	9.27	6.62	3.71	0.17
Limestone	5.98	5.98	5.98	5.98	5.98
Salt	3.80	3.80	3.80	3.80	3.80
Premix[1]	4.00	4.00	4.00	4.00	4.00
L-lysine HCl 78%	0.00	1.29	2.58	3.87	5.16
DL-methionine 99%	0.00	0.30	0.93	1.56	2.17
L-threonine 98%	0.00	0.14	0.84	1.55	2.26
L-tryptophan 98%	0.00	0.00	0.03	0.22	0.42
L-valine 96.5%	0.00	0.00	0.00	0.09	0.82
Colistin sulfate 8%	1.00	1.00	1.00	1.00	1.00
Butylated hydroxytoluene	0.10	0.10	0.10	0.10	0.10
Calculated nutritional composition[2]					
Metabolizable energy (kcal/kg)	3,230	3,230	3,230	3,230	3,230
Crude protein (g/kg)	176.9	176.9	176.9	176.9	176.9
Digestible lysine (g/kg)	8.00	9.00	10.00	11.00	12.00
Digestible methionine + cystine (g/kg)	5.28	5.58	6.20	6.82	7.44
Digestible threonine (g/kg)	5.90	6.03	6.70	7.37	8.04
Digestible tryptophan (g/kg)	1.87	1.87	1.90	2.09	2.28
Digestible valine (g/kg)	7.50	7.50	7.50	7.59	8.28
Digestible isoleucine (g/kg)	6.70	6.70	6.70	6.70	6.70
Calcium (g/kg)	5.51	5.51	5.51	5.51	5.51
Available phosphorus (g/kg)	2.82	2.82	2.82	2.82	2.82
Sodium (g/kg)	1.70	1.70	1.70	1.70	1.70

[1] Content per kg of product: vitamin A - 2,000,000 IU; vitamin D3 - 300,000 IU; vitamin E - 5,000 IU; vitamin K3 - 625 mg; vitamin B12 - 5,000 mcg; vitamin B2 - 1,000 mg; biotin - 12.5 mg; pantothenic acid - 2,500 mg; niacin - 6,250 mg; butylated hydroxytoluene - 500 mg; vitamin B1 - 250 mg; vitamin B6 - 500 mg; folic acid - 150 mg; choline - 60 g; vitamin C - 12.5 g; cobalt - 125 mg; selenium - 125 mg; iron - 17.5 g; copper - 5,000 mg; manganese - 10 g; zinc - 20 g; iodine - 200 mg.
[2] According to Rostagno et al. (2005).

Table 3 - Ingredients and calculated nutritional composition of the experimental diets (as fed) for gilts from 134 to 153 days of age

Ingredients	Digestible lysine, g/kg				
	7	8	9	10	11
Corn	736.47	736.47	736.47	736.47	736.47
Soybean meal	221.33	221.33	221.33	221.33	221.33
Soybean oil	08.83	08.83	08.83	08.83	08.83
Dicalcium phosphate	9.90	9.90	9.90	9.90	9.90
Starch	10.00	8.66	5.99	3.10	0.16
Limestone	6.07	6.07	6.07	6.07	6.07
Salt	3.80	3.80	3.80	3.80	3.80
Premix[1]	3.00	3.00	3.00	3.00	3.00
L-lysine HCl 78%	0.00	1.29	2.58	3.87	5.16
DL-methionine 99%	0.00	0.03	0.66	1.29	1.92
L-threonine 98%	0.00	0.02	0.72	1.43	2.13
L-tryptophan 98%	0.00	0.00	0.05	0.24	0.44
L-valine 96,5%	0.00	0.00	0.00	0.07	0.14
Colistin sulfate 8%	0.50	0.50	0.50	0.50	0.50
Butylated hydroxytoluene	0.10	0.10	0.10	0.10	0.10
Calculated nutritional composition[2]					
Metabolizable energy (kcal/kg)	3,230	3,230	3,230	3,230	3,230
Crude protein (g/kg)	161.1	161.1	161.1	161.1	161.1
Digestible lysine (g/kg)	7.00	8.00	9.00	10.00	11.00
Digestible methionine + cystine (g/kg)	4.93	4.96	5.58	6.20	6.82
Digestible threonine (g/kg)	5.35	5.36	6.03	6.70	7.37
Digestible tryptophan (g/kg)	1.66	1.66	1.71	1.90	2.09
Digestible valine (g/kg)	6.83	6.83	6.83	6.90	7.59
Digestible isoleucine (g/kg)	6.00	6.00	6.00	6.00	6.05
Calcium (g/kg)	5.51	5.51	5.51	5.51	5.51
Available phosphorus (g/kg)	2.82	2.82	2.82	2.82	2.82
Sodium (g/kg)	1.70	1.70	1.70	1.70	1.70

[1] Content per kg of product: vitamin A - 2,000,000 IU; vitamin D3 - 300,000 IU; vitamin E - 5,000 IU; vitamin K3 - 625 mg; vitamin B12 - 5,000 mcg; vitamin B2 - 1,000 mg; biotin - 12.5 mg; pantothenic acid - 2,500 mg; niacin - 6,250 mg; butylated hydroxytoluene - 500 mg; vitamin B1 - 250 mg; vitamin B6 - 500 mg; folic acid - 150 mg; choline - 60 g; vitamin C - 12.5 g; cobalt - 125 mg; selenium - 125 mg; iron - 17.5 g; copper - 5,000 mg; manganese - 10 g; zinc - 20 g; iodine - 200 mg.
[2] According to Rostagno et al. (2005).

Results and Discussion

During the experimental period, the average temperature in the room was 25.3±3.9 ºC, the relative humidity was 89±13.2% and the black globe temperature was 26.5±3.6 ºC with calculated BGHI value of 75.5±4.2. Based on the values of mean air temperature and BGHI, it can be inferred that pigs were exposed to periods of heat stress considering the thermoneutral range for this animal category proposed by Coffey et al. (2000) and Orlando et al. (2006).

There was no difference (P>0.05) in loin depth (31.2±0.76 mm) and backfat thickness (8.7±0.75 mm) of animals among treatments at the beginning of the experimental period.

The nutritional plans did not influence (P>0.05) the ADFI of the animals in the periods from 63 to 103, 63 to 133, and 63 to 153 days (Table 4). This is coherent with other studies (Kill et al., 2003; Kiefer et al., 2010; Alebrante et al., 2012a) that evaluated nutritional plans based on lysine levels for pigs in the growing-finishing phases and found no effect of nutritional plans on the voluntary feed intake.

Variations in feed intake due to the level of lysine in the diet are associated, among other factors, with the level of energy and the imbalance of amino acids in the formulation of diets (Edmonds and Baker, 1987; De La Llata et al., 2007). In the present study, diets were formulated to contain the same level of energy, and despite the variation in the DLys levels, amino acids were added to keep the ratio of lysine:amino acids as proposed in the concept of ideal protein (Rostagno et al., 2005).

There was effect (P<0.05) of nutrition plans on ADLysI in the periods from 63 to 103, 63 to 133, and 63 to 153 days. From 63 to 103 days, ADLysI increased (P<0.05) linearly with increasing dietary DLys, according to the equation: $\hat{Y} = -0.747 + 2.028X$ ($r^2 = 0.98$). Because there was no significant variation in feed intake it was concluded that the increasing on ADLysI occurred due to its concentration in the diets.

From 63 to 103 days the DLys levels increased (P<0.05) the ADG of the gilts linearly, according to the equation: $\hat{Y} = 791.546 + 16.703DLys$ ($r^2 = 0.88$). However, there was no effect (P>0.05) of nutritional plans on ADG in the periods from 63 to 133 and 63 to 153 days. Because in the first period (63 to 103 days) gilts responded to dietary DLys and there was no influence of nutritional plans on the overall ADG, we can assume that gilts fed diets with lower levels of DLys show higher ADG during the phase from 104 to 133 days.

Similar results were found by Souza (2009), who evaluated nutritional plans of DLys (8.5-7.5-6.5 to 11.5-10.5-9.5 g/kg) for gilts from 60 to 165 days and reported no treatment effects on ADG at the end of the experimental period. However, in the period from 60 to 130 days the plan with the highest levels of DLys (11.5-10.5 g/kg) provided better weight gain for animals as compared with the plan with the lowest levels of DLys (8.5-7.5 g/kg). Alebrante et al. (2012a,b) also did not find effect of nutritional plans of DLys (9-8-7 up to 13-12-11 g/kg) on the ADG of pigs at the end of the experimental period (54-155 days). Nevertheless, a linear effect of increasing levels of DLys was observed on ADG in the first phase (54 to 100 days).

These results indicate that pigs receiving nutritional plans with lower levels of DLys are able to compensate for the lower weight gain in the initial phases when evaluated over longer periods.

In the first period FC was improved ($P<0.05$) quadratically ($\hat{Y} = 4.450 - 0.418\text{DLys} + 0.018\text{DLys}^2$; $r^2 = 0.89$) up to the level of 11.9 g/kg of DLys. However, there was no effect ($P>0.05$) of the nutritional plans of DLys from 63 to 133 and 63 to 153 days. Improvement in the FC in the initial phases and no change at the end of the experimental period were also reported by Souza (2009) and Alebrante et al. (2012a,b). However, Kiefer et al. (2010) reported that pigs fed a nutritional plan of DLys (11-10-9 g/kg) showed better FC compared with the other nutritional plans studied (9-8-7, 10-9-8 and 12-11-10 g/kg).

The divergence of results between studies regarding FC is probably related, among other factors, to the differences in the genetic potential of animals used and the thermal environment. In the present study the animals were subjected to periods of high room temperatures (25.3±3.9 °C). According to Kerr et al. (2003), the activation of the thermoregulatory system of pigs can influence the requirements of amino acids. Regarding the genetic potential, Friesen et al. (1994) demonstrated that the animal performance response to dietary lysine can vary with genotype.

The feed conversion observed at 133 and 153 days was similar regardless of the treatments. This may be associated with the improved FC in the phase from 104 to 133 days in the gilts that received nutritional plans with the lowest levels of DLys, indicating change in the composition of the weight gain, with greater protein and decreased fat deposition in the carcass.

Table 4 - Performance of gilts from 63 to 103, 63 to 133, and 63 to 153 days of age fed nutritional plans consisting of digestible lysine levels

Item	Digestible lysine, g/kg					CV (%)
	63 to 103 days					
	9	10	11	12	13	
Initial weight, kg	24.2	24.2	24.2	24.2	24.3	2.58
Final weight[1], kg	62.1	62.5	62.8	64.5	64.3	3.23
Feed intake, g/d	2004	1911	1929	1964	1994	6.30
Digestible lysine intake[1], g/d	18.0	19.1	21.2	23.6	25.9	6.11
Weight gain[1], g/d	946	956	965	1007	1002	5.34
Feed conversion[2]	2.12	2.00	2.01	1.96	1.99	4.00
	63 to 133 days					
	9-8	10-9	11-10	12-11	13-12	
Final weight, kg	93.2	92.8	92.4	93.2	92.8	3.75
Feed intake, g/d	2213	2171	2158	2199	2188	5.66
Digestible lysine intake[3], g/d	19.0e	20.9d	22.9c	25.6b	27.6a	5.61
Weight gain, g/d	985	978	972	985	980	5.02
Feed conversion	2.25	2.22	2.22	2.23	2.24	4.17
	63 to 153 days					
	9-8-7	10-9-8	11-10-9	12-11-10	13-12-11	
Final weight, kg	112.7	113.1	112.0	113.4	110.8	3.71
Feed intake, g/d	2289	2266	2242	2299	2294	5.25
Digestible lysine intake[3], g/d	18.6e	20.9d	22.8c	25.8b	28.2a	6.01
Weight gain, g/d	984	988	974	991	963	5.33
Feed conversion	2.33	2.29	2.31	2.32	2.34	4.20

[1] Linear effect ($P<0.05$).
[2] Quadratic effect ($P<0.01$).
[3] Means within the same row followed by different letters are different according to Tukey's test ($P<0.05$).

Although the nutritional plans of DLys did not influence the ADG or FC, these variables were significantly improved in the first period (63 to 103 days). This behavior did not characterize the compensatory growth, since there was no quantitative or qualitative restriction of nutrients between the studied phases. According to O'Connell et al. (2005), compensatory growth occurs after periods of restriction in the diet with subsequent increase in the supply of the nutrient previously restricted. In the present study, the DLys levels were reduced gradually with phases and the diets were provided *ad libitum* without remarkable changes in feed intake between treatments.

From 63 to 103 days the loin depth increased ($P<0.05$) linearly by increasing dietary DLys (Table 5), according to the equation: $\hat{Y} = 36.81 + 1.10$ DLys ($r^2 = 0.93$). In the periods from 63 to 133 and 63 to 153 days, the carcass characteristics were not affected ($P>0.05$) by the nutritional plans. Souza (2009) and Alebrante et al. (2012a) reported no effect of the nutritional plans on carcass characteristics. On the other hand, Kiefer et al. (2010) reported that pigs fed the nutritional plan 11-10-9 g/kg of DLys showed reduced backfat thickness and increased carcass meat compared with other nutritional plans.

In the present experiment, the absence of effect on carcass characteristics by the nutritional plans of DLys is consistent with the results of performance, for which there was no variation in ADG or FC. Based on the results of performance and carcass characteristics, it was evident that the initial levels of dietary DLys can influence protein metabolism, as the pigs fed nutritional plans with lower levels of DLys seem to be more efficient for protein deposition in the finishing phases.

Supporting this hypothesis, Main et al. (2008) reported that pigs fed diets containing DLys below the requirements in the growing phase are more efficient to use lysine for weight gain in the finishing phase as compared with animals fed adequate levels of DLys in the growing phase. Agreeing with this statement, Magowan et al. (2011) demonstrated that only pigs that had a greater nutritional intake in the nursery phase were efficient in the use of high-nutrient-density diets in subsequent phases.

Based on this experiment we can infer that at the stage where there is a higher protein deposition rate, from 30 to 70 kg (NRC, 1998), animals respond to higher levels of dietary DLys. However, working with longer periods it was found that gilts that were fed the nutritional plan consisting of the lowest sequences of DLys (9-8-7 g/kg) were able to recover from the worst performance in the initial phase (63 to 103 days), showing similar ADG, FC and carcass characteristics to those on the other treatments.

The results obtained in the present study may imply that nutritional plan containing 9-8-7 g/kg of DLys fed from 63 to 103, 104 to 133, and 134 to 153 days met the DLys requirements for maximum performance response of gilts in the growing-finishing phase. These results are close to those of 8.7-7.7-6.4 g/kg recommended by NRC (2012) for growing-finishing gilts, though they are below the 9.9-9.3-8.9 g/kg recommended by Rostagno et al. (2011).

Table 5 - Carcass characteristics of gilts from 63 to 103, 63 to 133, and 63 to 153 days of age fed nutritional plans consisting of digestible lysine levels

Item	Digestible lysine, g/kg					CV (%)
			63 to 103 days[1]			
	9	10	11	12	13	
Loin depth[3], mm	46.6	48.1	49.2	49.3	51.5	5.46
Backfat thickness, mm	13.5	13.0	13.5	13.2	13.8	10.9
			63 to 133 days[1]			
	9-8	10-9	11-10	12-11	13-12	
Loin depth, mm	60.4	62.5	60.8	64.0	64.1	6.89
Backfat thickness, mm	16.7	16.7	17.8	18.0	17.8	19.5
			63 to 153 days[2]			
	9-8-7	10-9-8	11-10-9	12-11-10	13-12-11	
Meat quantity, kg	45.7	47.0	45.7	45.8	44.5	8.44
Meat percentage, %	57.6	57.7	57.2	58.0	56.7	3.17
Loin depth, mm	61.7	63.4	61.1	63.1	63.2	12.0
Backfat thickness, mm	12.8	13.1	13.3	13.3	14.6	18.9

[1] Ultrasound.
[2] Typifying pistol.
[3] Linear effect ($P<0.05$).

Conclusions

Based on the results obtained in the present study, it can be concluded that even though growing gilts respond to a dietary digestible lysine level of up to 13 g/kg, the nutritional plans containing 9, 8 and 7 g/kg of digestible lysine from 63 to 103, 104 to 133, and 134 to 153 days, respectively, meet the requirements for best performance and carcass characteristics of growing-finishing gilts.

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