

PROTEASE SUPPLEMENTATION ON PERFORMANCE AND CARCASS PARAMETERS OF PIGS FED DIETS WITH 1000 FTU PHYTASE

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Resumo: A 45d-trial was conducted to evaluate a protease effect on performance and carcass parameters of finisher pigs. 120 PIC castrated male pigs with 125d were distributed to three treatments with 13 or 14 replicates of three pigs each. Treatments consisted of a Positive control (PC), Negative control (NC, PC less 50 kcal/kg ME and 0.05% SID Lys), and NC+Protease (PROT) added at 250g/MT. All treatments were formulated using corn, SBM and wheat bran according to the ideal protein concept in two feeding phases. Mash diets contained 1000 FTU of phytase formulated considering Ca, Av. P, AAs and ME nutritional value. Performance, fecal score, carcass parameters and pancreas were evaluated. Data were analyzed by SAS in a completely randomized block design. NC significantly reduced ADG vs PC from 125 to 170d ($P<0.05$). Still, pigs fed PROT recovered ADG to levels observed in PC group and reduced intake levels vs NC and PC. As a result, PROT optimized FCR compared to NC ($P<0.05$). Meat yield was higher for PC compared to NC ($P<0.05$), while PROT treatment did not differ from both. It is concluded that PROT could revert the negative impact in performance observed by reducing about 6.8% SID Lys and 50 kcal and partially recovered the negative effects observed on carcass.

Palavras Chave: meat yield; pancreas; carcass compactness; loin depth

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Abstract: A 45d-trial was conducted to evaluate a protease effect on performance and carcass parameters of finisher pigs. 120 PIC castrated male pigs with 125d were distributed to three treatments with 13 or 14 replicates of three pigs each. Treatments consisted of a Positive control (PC), Negative control (NC, PC less 50 kcal/kg ME and 0.05% SID Lys), and NC+Protease (PROT) added at 250g/MT. All treatments were formulated using corn, SBM and wheat bran according to the ideal protein concept in two feeding phases. Mash diets contained 1000 FTU of phytase formulated considering Ca, Av. P, AAs and ME nutritional value. Performance, fecal score, carcass parameters and pancreas were evaluated. Data were analyzed by SAS in a completely randomized block design. NC significantly reduced ADG vs PC from 125 to 170d ($P<0.05$). Still, pigs fed PROT recovered ADG to levels observed in PC group and reduced intake levels vs NC and PC. As a result, PROT optimized FCR compared to NC ($P<0.05$). Meat yield was higher for PC compared to NC ($P<0.05$), while PROT treatment did not differ from both. It is concluded that PROT could revert the negative impact in performance observed by reducing about 6.8% SID Lys and 50 kcal and partially recovered the negative effects observed on carcass.

Keywords: meat yield; pancreas; carcass compactness; loin depth

Introdução: An efficient production with minimized costs is a key objective of every industry including swine production. In this context, the use of proteases allows producers to optimize the protein of their diets. It is known that about 85-90% of dietary protein is utilized by pigs, what means 17-25kg of protein/MT excreted in a diet with 17% CP. Not only the undigested but the overall protein content is a substrate for exogenous proteases, helping to increase the digestibility speed of AAs in intestinal tract and reducing the protein available to fermentation and growth of pathogenic bacteria. Wang et al. (2011) reported that higher CP increased cecal *E. coli*, colon total anaerobe counts, ileal crypt depth, serum interleukin-1 and interleukin-6. Proteases can alleviate the negative effects of gut dysbacteriosis through improving digestion and gut health which result in better performance. Then this trial evaluated the effect of a protease on productive and carcass parameters of pigs.

Material e Métodos: A total of 120 PIC male pigs of approximately 125 d of age with similar BW were used in this study. Animals were allotted in completely randomized block design with three treatments and 13 or 14 replicates of 3 animals per pen. Treatments consisted of a Positive control (PC), Negative control (NC, PC less 50 kcal/kg ME and 0.05% SID Lys (about 6.8% reduction)), and NC+Protease (PROT, from *Bacillus licheniformis* PWD-1) added at 250g/MT. Mash diets were formulated according to the ideal protein concept and contained 1000 FTU of phytase formulated considering the nutritional value for Ca, Av. P, AAs recommended by the provider plus 10 kcal/kg ME. All main ingredients (corn, SBM, MBM and wheat bran) were analyzed prior to the formulation. The feeding program were divided in two periods: Finisher 1 (125-150d) and Finisher 2 phase (151-170d). Performance was measured at 150 and 170d. Fecal score was classified from 1 (normal hard feces) to 5 (watery, mucous-like feces) in 3 consecutive days before the end of each phase. The following carcass parameters were evaluated using 2 pigs per pen at 170d: carcass yield, loin depth, backfat thickness at last rib and at midline (P2), meat yield (Bridi and Silva, 2007), carcass length, carcass compactness (hot carcass weight/carcass length) and loin eye area. Pancreas weight was expressed as g and % of body weight. Data were analyzed by SAS and Tukey test was used to compare multiple treatments at $P<0.05$.

Resultado e Discussão: Reducing the nutritional density of pig diets by 50 kcal/kg ME and 6.8% SID Lys (and other AAs accordingly) significantly impaired the performance of finisher pigs (PC vs NC) reducing ADG from 125 to 170d of age ($P<0.05$). Still, pigs fed PROT recovered ADG to levels observed in PC group and reduced feed intake vs NC and PC. As a result, PROT optimized FCR compared to NC (2.788 vs 3.076, $P<0.05$) showing

a numerically better result than PC (Table 1). This strategy could bring savings in feed formulation without impairing performance. Wang et al. (2011) also reported improvement in weight gain and feed conversion ratio with protease supplementation while feed intake was reduced in nursery pigs. Meat yield was higher for PC compared to NC ($P < 0.05$), while PROT treatment did not differ from both. No other differences were found in carcass parameters, but trends were observed for Loin Depth (mm) ($P = 0.10$), Carcass Length (cm) ($P = 0.08$) and Carcass Compactness ($P = 0.10$) for which PC animals were different from NC ones but not from PROT. There were no differences in fecal score and pancreas measurements ($P > 0.05$). Recently, the same protease resulted in a reduction of pancreatic weight (g and %) in diets with 2% raw soybean at 21d of broilers (Palma et al., 2018). According to Jezierny et al. (2010), the presence of protease inhibitors causes pancreatic hypertrophy and hyperplasia due to stimulation of the pancreatic secretion, as well as depresses the proteolytic activity in the small intestine, resulting in a reduction in the free amino acids release.

Table 1. Performance and carcass parameters of pigs from 125 to 170 d of age

Treatments	ADG	ADFI	FCR	Meat Yield (%) ¹	Loin depth (mm)
	125-170d (kg/d)	125-170d (kg/d)	125-170d (kg/kg)		
Positive Control	0.957 a	2.807 a	2.942 ab	59.80 a	72.45 a
Negative Control	0.911 b	2.793 a	3.076 b	58.50 b	67.43 b
Protease	0.959 a	2.669 b	2.788 a	59.19 ab	70.53 ab
P value	0.0447	0.0105	0.0021	0.0132	0.1053
CV (%)	5.47	4.24	6.24	1.62	8.03

¹Meat yield (%) = 60 - (backfat thickness at P2 x 0.58) + (0.10 x loin depth).

Conclusão: The reduction of 50 kcal and 6.8% SID Lys (following the ideal protein concept) did negatively affect performance in finisher phase. However, the supplementation of 250g/MT protease completely compensated the nutritional depletion. The negative effects observed on carcass by these reduced nutritional levels (beyond the matrix recommended by the provider) were partially recovered by the protease.

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