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CARCASS TRAITS OF MUSCOVY DUCKS FED ON NUTRITIONAL PLANS WITH DIFFERENT LEVELS OF AVAILABLE PHOSPHORUS

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Abstract: O presente estudo teve como objetivo avaliar as características de carcaça de patos em confinamento alimentadas com planos nutricionais com diferentes níveis de fósforo disponível. Foram utilizados 240 patos crioulos. O delineamento experimental foi inteiramente casualizado com tratamentos constituídos por seis planos nutricionais de diferentes níveis de fósforo disponível, com quatro repetições de 10 patos cada. Os dados coletados foram submetidos ao teste de Tukey à 5%. Os maiores níveis de fósforo disponíveis apresentaram influência ($p < 0,05$) no crescimento de patos, com os dados mostrando que as diferenças entre os sexos apresentaram melhor eficiência dos machos em relação às fêmeas. Portanto, concluiu-se que o plano nutricional 2 apresentou exigências nutricionais adequadas de fósforo disponível para os patos, obtendo melhores resultados de características de carcaça.

Keywords: mineral, nutritional requirement, poultry, waterfowl

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Introduction

The muscovy ducks are waterfowl with great rusticity, resistance to diseases in a good management and exceptionally resistance in adverse conditions (backyard productions) (Elkin et al., 1987).

For poultry industry, muscovy ducks have the peculiar feature to provide a range of final products how meat, eggs, feathers for ornamental design, fat livers (“foie gras”) and other products for a market increasingly on the rise, but little explored in Latin America (Rufino et al., 2017).

The available phosphorus and the calcium are independent mineral, that is, the lack or excess of one can damage the absorption or use of the other, preventing the expression of the birds' maximum performance. For muscovy ducks, however, studies that report the requirement of available phosphorus in the literature are still scarce, being used tables requirements of broilers for its (Pinheiro et al., 2011).

Considering the above, the present study aimed to evaluate the performance, carcass traits and bone parameters of muscovy ducks in housing fed diets with different levels of available phosphorus.

Material and Methods

This study was conducted in the facilities of Poultry Sector, Department of Animal and Vegetable Production (DPAV), College of Agrarian Sciences (FCA), Federal University of Amazonas (UFAM), south sector of the university campus, Manaus, State of Amazonas, Brazil. The experimental procedures were approved by the local Committee for Ethical Animal Use (CEUA - protocol n. 017/2016) of Federal University of Amazonas, Manaus, AM, Brazil.

Two hundred and forty muscovy ducks (*Cairina moschata domesticus*) of creole lineage were used distributed in boxes with water and food *ad libitum*. The experimental method was completely randomized with the treatments constituted by six nutritional phasic plans (I - initial, G - growth and T - termination) with different

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levels of %available phosphorus (Nut. Plan 1 - I: 0.65, G: 0.60 and T: 0.55; Nut. Plan 2 - I: 0.60, G: 0.55 and T: 0.50; Nut. Plan 3 - I: 0.55, G: 0.50 and T: 0.45; Nut. Plan 4 - I: 0.50, G: 0.45 and T: 0.40; Nut. Plan 5 - I: 0.45, G: 0.40 and T: 0.35; and Nut. Plan 6 - I: 0.40, G: 0.35 and T: 0.30) with four replicates of 10 muscovy ducks each.

At 90 days of age, after 12 hours of fasting, eight muscovy ducks of each treatment (four males and four females) were randomly selected, identified and weighed. Next, these were electrically stunned (40 V; 50 Hz), with the birds slaughtered by cut of jugular vein. The carcasses were immersed into hot water (60°C for 62s), plucked and eviscerated.

Statistical analysis was performed using the software Statistical Analysis System and estimates of the treatments were subjected to Tukey test at 5% of significance.

Results and Discussion

In carcass traits, differences ($p < 0.05$) were observed for slaughter weight, legs and gizzard among available phosphorus levels and sexes, and abdominal fat, liver, heart and pro-ventricle between sexes (Table 1). However, no interaction ($p > 0.05$) between available phosphorus levels and sexes could be observed.

Table 1. Slaughter weight (SW), carcass yield (CY), feathers (FT), legs (LG), abdominal fat (AF), liver (LV), heart (HT), gizzard (GZ) and pro-ventricle (PV) of muscovy ducks in housing fed nutritional plans with levels of available phosphorus.

Factors	Variables								
	SW (kg)	CY (%)	FT (%)	LG (%)	AF (%)	LV (g)	HT (g)	GZ (g)	PV (g)
Nut. Plans									
Nut. Plan 1	2.58 ^a	70.28	11.59	2.58 ^a	0.93	43.37	20.62	66.25 ^{ab}	9.87
Nut. Plan 2	2.42 ^{ab}	69.30	9.02	2.42 ^{ab}	1.11	40.00	17.37	72.12 ^a	10.50
Nut. Plan 3	2.52 ^a	70.75	10.53	2.52 ^a	0.97	39.25	19.25	58.87 ^{ab}	13.50
Nut. Plan 4	2.36 ^{ab}	65.52	26.88	2.00 ^b	0.88	39.50	17.00	58.12 ^{ab}	8.75
Nut. Plan 5	2.31 ^{ab}	71.84	9.33	2.36 ^{ab}	0.72	39.00	21.00	53.62 ^{bc}	11.25
Nut. Plan 6	2.00 ^b	75.25	20.10	2.31 ^{ab}	0.83	34.50	16.87	48.25 ^c	10.75

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Sexes									
Male	3.07 ^a	71.90	17.61	3.03 ^a	0.77 ^b	47.25 ^a	22.83 ^a	68.66 ^a	12.41 ^a
Female	1.67 ^b	69.07	11.54	1.68 ^b	1.05 ^a	31.29 ^b	14.54 ^b	50.41 ^b	9.12 ^b
Effect	P Value								
Nut. Plans	0.02 [*]	0.80 ^{ns}	0.58 ^{ns}	0.01 ^{**}	0.47 ^{ns}	0.79 ^{ns}	0.40 ^{ns}	0.01 ^{**}	0.12 ^{ns}
Sexes	0.01 ^{**}	0.46 ^{ns}	0.37 ^{ns}	0.01 ^{**}	0.02 [*]	0.01 ^{**}	0.01 ^{**}	0.01 ^{**}	0.01 ^{**}
Interaction	0.23 ^{ns}	0.25 ^{ns}	0.30 ^{ns}	0.33 ^{ns}	0.35 ^{ns}	0.45 ^{ns}	0.28 ^{ns}	0.32 ^{ns}	0.34 ^{ns}
CV (%)	12.53	18.76	16.27	12.53	4.32	19.71	17.53	17.93	13.80

CV – Coefficient of variation; * Means followed by lowercase letters in column differ in 5% by Tukey test (P<0.05); ** Means followed by lowercase letters in column differ in 1% by Tukey test (P<0.01); ns – non significant.

Higher available phosphorus levels showed a positive influence on muscovy ducks growth, with similar results observed by Feijó *et al.* (2016) studding calcium levels for muscovy ducks, obeying the 2:1 ratio between Ca and P.

Our data showed that differences among sexes were due the better feed efficiency of males than females in same growth period, showing a high significant difference in slaughter weight, %feathers, %legs and edible viscera yields.

According Gois *et al.* (2012) there is a natural sexual dimorphism among muscovy ducks, with a mean weight of 3.80 kg for males and 2.22 kg for females. But, females showed greater growth precocity, reaching adult weight and ideal carcass fat deposition most faster, even having a lower final weight.

Stringhini *et al.* (2003) affirm too that females have great carcass fat deposition due the existence of larger size adipocytes than the males, which, indirectly, cause a lower feed efficiency and a necessity of waterfowl in fat deposition for the isolation of feathers in contact with water.

Conclusion

In summary, the nutritional plan 2 (initial = 0.60%; growth = 0.55% and termination = 0.50%) showed adequate nutritional requirements of available phosphorus for muscovy ducks in housing, obtaining better results of carcass traits.

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