Thesis Abstract

Levels and forms of vitamin D in broilers diets

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This study aimed to evaluate the concentration effects of two vitamin D isoforms, cholecalciferol (D_3) and 25-hydroxycholecalciferol (25-OHD_3) in broilers diets on performance, bone and physiological features of these birds. Of a total of 1920 one-day-old male chicks Cobb-500 were used from commercial hatchery, reared under bed creation systems. The animals were distributed in six treatments and eight replicates with 40 birds per treatment in a completely randomized design. The following vitamin D supplementation levels were applied: 70 and 87.5 µg/kg feed in initial phase; 56 and 70 µg/kg feed during the growth phase, and 35 and 47.35 µg/kg of feed in final phase of creation, obtained from two forms (D_3 and 25-OHD_3). The treatments consisted of supplementation of two levels from each isolated source and their associations (60% D_3 + 40% 25-OHD_3) according to the study phases. In the metabolism assay, 480 birds (14 and 35 days of age) were separated to be used for evaluation of calcium (Ca) and phosphorus (P) retention and excretion during the periods of 19 to 21 days and 40 to 42 days of age. The diets were based on corn and soybean meal, with supplementation of phytase (500 FTU/kg). The performance, bone characteristics, plasma levels, bone radiographic density, carcass yield, and P and Ca retention were evaluated. In the initial creation phase, we observed an increased P excretion by broilers fed diets supplemented with vitamin D_3 ($P < 0.05$). In addition, the association between the two vitamin D isoforms resulted in higher retention of Ca and P than the birds fed diets supplemented only with vitamin D_3 ($P < 0.05$), and higher P retention when compared to birds fed diets supplemented with 25-OHD_3 ($P < 0.05$). Dietary supplemental 25-OHD_3 at 87.5 µg/kg resulted in higher plasma

levels of Ca in relation to the same supplemented source with 70 µg/kg at 21 days of age ($P < 0.05$). In the final phase, the birds fed diets supplemented with vitamin D_3 presented the lowest values of consumption and retention of Ca and P ($P < 0.05$). The association between the forms (D_3 and 25-OHD_3) reduced the excretion values of Ca and P ($p < 0.05$). The birds receiving a source of 25-OHD_3 and the association had better feed conversion ratio and higher bone ash content ($P < 0.05$). At all stages studied D_3 + 25-OHD_3 combined supplementation increased tibial density of broilers in relation to supplementation of only vitamin D_3 ($P < 0.05$). Results of this study indicate that the addition of 25-OHD_3 in the feed supplemented with vitamin D_3 improve the feed conversion, increase the Ca plasma levels, and also increases bone density, providing higher retention coefficients of Ca and P and lower P excretion, regardless of the development phase of these birds.

Key words: Cholecalciferol; Broiler; Hydroxycholecalciferol

