

EFFECT OF HIGH LEVELS OF CHOLECALCIFEROL ON PERFORMANCE, SOME BLOOD CONSTITUENTS, BONE QUALITY AND MINERAL RETENTION IN BROILER CHICKS FED LOW LEVELS OF CALCIUM AND PHOSPHORUS

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ABSTRACT

A 6-wk feeding trial with 216 unsexed day-old Hubbard chicks was conducted to study the effects of supplementing extra levels (3000 vs. 7000 and 8000 I.U) of cholecalciferol on performance, bone quality and mineral retention in broiler chicks fed suboptimal levels of calcium and non-phytate phosphorus (0.5% Ca and 0.25% NPP). A control diet containing recommended levels of Ca, NPP and cholecalciferol (1%, 0.5% and 3000 I.U, respectively). Each diet was fed *ad libitum* to 6 replicates containing 9 chicks in each.

The results indicated that:

- 1- Productive performance (body weight, body weight gain, feed consumption and feed conversion ratio) didn't affected significantly ($P \leq 0.05$) by inclusion deficient Ca and NPP diets with high levels of cholecalciferol.
- 2- Plasma Ca and P weren't influenced significantly ($P \leq 0.05$) by the reduction of Ca and P with extra levels of cholecalciferol.
- 3- Dry tibia weight, tibia ash%, tibia Ca and P weren't significantly affected by reducing dietary levels of Ca and NPP with high levels of cholecalciferol.
- 4- Birds fed extra levels of cholecalciferol (7000 or 8000 I.U) retain more Ca and P as percentage of intake compared with control birds with significant differences ($P \leq 0.05$)

In conclusion, we recommended that higher levels of cholecalciferol supplementation to low Ca and NPP diet improved the performance, bone quality and minerals retention in order to reduce phosphorus pollution as well as feed cost.

Keywords: Bone quality, low calcium, low phosphorus, cholecalciferol, growth, broiler chicks.

INTRODUCTION

Phosphorus (P) from plant feed ingredients is not completely available for chicken due to its complex bond with inositol and divalent cations like Ca, Mg, Cu, Zn, Fe, Mn, etc. The complex is called as phytate. Therefore, inverse relation exists between dietary phytate and the solubility/ availability of these minerals to poultry (Nwokola and Bragg, 1977; Eardman, 1979; Kornegay *et al.*, 1996). Use of plant feed ingredients in chicken diet, result in excretion of P and other minerals bound with phytate in considerable quantities and cause environmental pollution. Dietary calcium (Ca) and P at their recommended concentrations is known to reduce the utilization of PP (Ballam *et al.*, 1985; Schoner *et al.*, 1993; Qian *et al.*, 1994). The evidence of increased PP availability from plant feed ingredients at their sub-optimal concentrations of P (Davies *et al.*, 1970 ; Onyango *et al.*, 2006), existence of gut mucosal phytase activity (Bitar and Reinhold, 1972 ; Onyango *et al.*, 2001) and its enhancement with D3 supplementation (Onyango *et al.*, 2006) reducing cost