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Improving immune system and antioxidant status in Japanese quails through biochar supplementation

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Abstract

The study evaluated the effects of pistachio by-products biochar (PBB) on performance, blood metabolites, immune response, antioxidant status, and ammonia gas emissions in Japanese quails. A total of 500 one-day-old Japanese quails were assigned to a completely randomized design with five dietary treatments and five replicates for 35 days. The experimental diets included: (1) a basal feed without additives (control), (2) a basal feed with 0.05% flumequine 10% (positive control), (3) a basal feed with 0.35% PBB, (4) a basal feed with 0.65% PBB, and (5) a basal feed with 1% PBB. The results showed that weight gain significantly increased in birds fed 0.65% biochar compared to the control and flumequine groups, without any effect on feed intake. A trend towards a lower feed conversion ratio was observed in birds fed 0.65% biochar compared with the control. Quails fed 1% biochar had significantly lower cholesterol and LDL levels, while the control group exhibited the highest levels. The highest lymphocyte percentage was observed in quails fed 1% biochar, and increasing biochar levels in the diet significantly reduced the heterophil/lymphocyte ratio. However, biochar supplementation had no significant effect on immunoglobulin (IgG, IgM, IgY, and IgT) levels. Antioxidant markers, including total antioxidant capacity, glutathione peroxidase, and superoxide dismutase, were highest in birds receiving 1% PBB, with no significant difference between the 0.65% and 1% levels. Additionally, biochar supplementation significantly reduced ammonia gas emissions. Overall, incorporating at least 0.65% PBB in meat quail diets improved growth performance, blood parameters, antioxidant enzyme activity, and immune function, offering an eco-friendly alternative to antibiotics.

Key words: Biochar, Pistachio by-products, Blood metabolites, Immune response, Ammonia emission

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