

Effect of Graded Level of Nano Selenium Supplementation on the Performance of Broiler Chicken

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Abstract : Selenium is an essential trace element for the chicken with a variety of biological functions like growth, fertility, immune system, hormone metabolism, and antioxidant defense systems. Selenium deficiency in chicken causes exudative diathesis, pancreatic dystrophy and nutritional muscle dystrophy of the gizzard, heart and skeletal muscle. Additionally, insufficient immunity, lowering of production ability, decreased feathering of chickens and increased embryo mortality may occur due to selenium deficiency. Nano elemental selenium, which is bright red, highly stable, soluble and of nano meter size in the redox state of zero, has high bioavailability and low toxicity due to the greater surface area, high surface activity, high catalytic efficiency and strong adsorbing ability. To assess the effect of dietary nano-Se on performance and expression of gene in Vencobb broiler birds in comparison to its inorganic form (sodium selenite), four hundred fifty day-old Vencobb broiler chicks were randomly distributed into 9 dietary treatment groups with two replicates with 25 chicks per replicate. The dietary treatments were: T1 (Control group): Basal diet; T2: Basal diet with 0.3 ppm of inorganic Se; T3: Basal diet with 0.01875 ppm of nano-Se; T4: Basal diet with 0.0375 ppm of nano-Se; T5: Basal diet with 0.075 ppm of nano-Se, T6: Basal diet with 0.15 ppm of nano-Se, T7: Basal diet with 0.3 ppm of nano-Se, T8: Basal diet with 0.60 ppm of nano-Se, T9: Basal diet with 1.20 ppm of nano-Se. Nano selenium was synthesized by mixing sodium selenite with reduced glutathione and bovine serum albumin. The experiment was carried out in two phases: starter phase (0-3 wks), finisher phase (4-5 wk) in deep litter system. The body weight at the 5th week was best observed in T4. The best feed conversion ratio at the end of 5th week was observed in T4. Erythrocytic catalase, glutathione peroxidase and superoxide dismutase activity were significantly ($P < 0.05$) higher in all the nano selenium treated groups at 5th week. The antibody titers (\log_2) against Ranikhet diseases vaccine immunization of 5th-week broiler birds were significantly higher ($P < 0.05$) in the treatments T4 to T7. The selenium levels in liver, breast, kidney, brain, and gizzard were significantly ($P < 0.05$) increased with increasing dietary nano-Se indicating higher bioavailability of nano-Se compared to inorganic Se. The real time polymer chain reaction analysis showed an increase in the expression of antioxidative gene in T4 and T7 group. Therefore, it is concluded that supplementation of nano-selenium at 0.0375 ppm over and above the basal level can improve the body weight, antioxidant enzyme activity, Se bioavailability and expression of the antioxidative gene in broiler birds.

Keywords : chicken, growth, immunity, nano selenium

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