



University of Zabol
Faculty of Agriculture
Department of Animal Science

The Thesis Submitted For the Degree OF Phd Of Science
In The Field of Poultry Science

Title:

**Bioavailability of different sources of zinc (mineral salts,
chelated and nano) in growing quails**

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January 2020

Abstract

This study aimed to investigate the bioavailability of chelate, nano and zinc oxide in comparison to zinc sulfate and Evaluation of the effect of chelate, nano and zinc sulfate on performance, blood parameters, zinc concentration in liver, serum, meat and bone, meat quality, tibia bone Ash, characteristics carcass of Japanese quail during breeding. Experiment was performed from 21 to 35 days of old by a total of 520 seven-day-old quail chicks that randomly allocated to 13 treatments with 4 replicates (10 birds per replicate) as a completely randomized design. Treatments in this study include: control (without zinc supplementation), 3 zinc levels supplemented with nano, chelate, oxide and zinc sulfate 15, 25 and 35 mg per kg of diet. The results of the experiment showed that birds fed 25 mg zinc mg/ kg diet had lower feed intake and weight gain than the control group. Birds fed the diet with 35 mg of sulfate, 15, 25 and 35 mg of chelate, 15 and 25 mg of nano- zinc per kg diet were fed, with better feed conversion ratio than the control group ($P<0/05$). The study showed that birds fed diets supplemented with 25 mg / kg chelate and nano-zinc had higher carcass weight compared to other supplemented groups ($P<0/05$). Results showed that supplementation of basal diet of quails with 15, 25 and 35 mg Zn from the source of organic compounds, the SRBC response was significantly improved. It was also shown that insulin levels in birds fed 35 mg / kg nano zinc were higher than control and 15 mg zinc sulfate ($P<0/05$). The amount of superoxide dismutase was affected by different levels and sources of zinc and was higher in the groups receiving 35 mg nano zinc and 25 mg zinc chelate than the control group and 15 mg zinc sulfate ($P<0/05$). Catalase enzyme was higher in the groups receiving 25 mg / kg nano zinc than the control group. The results showed that the concentration of malondialdehyde was lower in birds fed 15 and 25 mg / kg nano zinc than in groups 15 and 25 mg / kg zinc sulfate. Meat water storage capacity was higher in the nano- and zinc-supplemented groups as well as 35 mg / kg zinc sulfate than the control group ($P<0/05$). Zinc supplementation with 35 mg / kg diet from Zinc nano oxid increased in serum zinc, liver and breast muscle compared to the control group ($P<0/01$).

For bioavailability estimates, zinc sulfate was considered as the standard material (100% bioavailability), And the results showed that the bioavailability estimates of nano, chelate, zinc oxide for insulin 182, 164 and 98% and for superoxide dismutase enzyme were 159, 122 and 98%, respectively. Nano, chelate, zinc oxide bioavailability for zinc in liver 205, 194 and 94%, for zinc in muscle 174, 146 and 97%, for zinc in tibia bone 166, 130 and 89% and for zinc in serum were 122, 113 and 77%, respectively. Therefore, according to the results use of zinc leads to an increase`in the amount zinc in serum, liver and breast muscle, improve meat quality, increased insulin levels, increased levels of catalase and SOD, and increased bone quality.

Keywords: Japanese Quail, Bioavailability, Nano Zinc, Chelate