Proceedings of the 5th International Conference on Nanotechnology: Fundamentals and Applications
Prague, Czech Republic, August 11-13, 2014
Paper No.293

Comparison Dietary Nano and Micro Manganese on Broilers Performance

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Extended Abstract

Chitosan a cationic biopolymer obtained from N-deacetylation of chitin, has excellent features due to its non-toxicity, biodegradability, biocompatibility and bio adhesion ((Dorkoosh et al., 2003), Having encapsulated active compounds, chitosan protects nutrients from harsh conditions into gastrointestinal tract and enhances their absorption (Aranaz et al., 2009) . Researches about animal sciences in nanotechnology have been limited till now. So this research is designed to determine the effect of Manganese in broilers diet both in nano and micro shapes and the comparison between them. On the other hand manganese is essential for normal bone formation, enzymes function, and amino acid metabolism in poultry (Conly et al ., 2012). This nutrient is available in different compounds and so different bioavailability, also the utilization of manganese has become an increasing concern because of the extremely rapid growth rate of commercial broiler strains, which puts additional stress on bone structure. Thus, this study aimed to enhance the Manganese digestibility in poultry by modifying the Manganese size into nanometer.

Effects of dietary Manganese loaded chitosan nanoparticle supplementation vs micro particle manganese, on growth, performance, bone characteristics and its manganese content in broilers, were investigated. 304, (1-d-old) Ross 308 mail broiler chicks were randomly assigned into 19 dietary treatments, each group were given a diet having a different concentration of Mn (20mg/ kg, control group;70 mg /kg, 120 mg/kg and 170 mg/kg) , as graded level, from different sources (Manganese Sulfate, Carbonate and Oxide) and two scales(Nano and Micro) for 35d.

The treatment replicated 4 times, 4 birds in each. Results indicated that supplemental manganese in both nano and micro scale and from different sources, didn't have any significant effect on growth performance, feed consumption, FCR and body weight gain . Bone length and diameter were measured , using a caliper with an accuracy of 0.001 cm. The wet bone volume (bone volume) was taken by the weight change in the air and water method (Zhang and Coon, 1992). The tibias were breaking force was measured with a SANTAM STM – 5 Testing Machine. Manganese content of dried tibia measured by following the procedure of AOAC (1995), and dried tibia weight was determined by a digital scale . The weighing accuracy was within 0.0001 g.

By the supplementation with manganese, tibia length , tibia volume , tibia breaking strength, and tibia diameter increased significantly ($P < 0.01$). Also there was a significant difference ($P < 0.01$) on these parameters between the treatments, supplemented with different sources of manganese . The highest quantity of these parameters were related to nano manganese sulfate and the lowest of these values after the control group were related to the micro manganese oxide. Comparison of dry tibia weight indicated that the bone weight increased significantly ($P < 0.001$) by diet supplementation with nano Mn instead of micro Mn. Also dietary micro Mn increased tibia weight significantly ($P < 0.001$) in comparison with basal diet . Manganese from different sources didn't have a significant effect on bone Mn content and bone weight .

These may indicate that nano manganese could be a new substitute supplementation with a higher performance in broilers diet.

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