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The Thesis Submitted for the Degree of Ph.D

(Poultry Nutrition)

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

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Abstract

The aim of current study was to evaluate the effects of different levels of mineral salts, chelates and nano iron resources supplementation to diet on performance, tissue iron reserves and meat quality of growing Japanese quails, an experiment was carried out using 400 Japanese quails in a completely randomized design with 10 experimental treatments and 4 replicates. The experimental treatments consisted of one basal diet without iron supplement (control), basal diet supplemented with sulfate iron in three levels of 60, 90 and 120 mg/kg, basal diet supplemented with chelate iron in three levels of 60, 90 and 120 mg/kg, and basal diet supplemented with nano iron in three levels of 60, 90 and 120 mg/kg. Birds fed 120 mg chelate of iron had more weight gain than 60 mg and 120 mg sulfate. Nutrition of 90 and 120 mg Nano improved feed conversion ratio compared to controls, sulfate and 60 mg chelate iron. Birds fed with diet containing 120 mg chelate and nano-iron had more iron accumulation in breast meat than sulfate and control groups ($P < 0.05$). The group of 120 mg chelate iron was higher water holding capacity than the control treatments, 60 and 90 sulfate, 60 chelate and 90 nano iron and the amount of malondialdehyde less than the control group and 60 mg iron sulfate. The group of 120 nano, higher iron liver and serum iron and decreased cooking loss compared to the control treatment and lowering drip loss were less than the control group, 60 nano and 60 chelate iron. Effect of experimental treatments on feed cost were not significant. were used to calculate bioavailability from Four sources of iron (sulfate, nano, chelate and oxide) with five levels (zero, 60, 90, 120, 150, 180). The bioavailability of iron sources for catalase enzyme when iron sulfate as the standard material (100%). chelate 136%, nano-130 and 47% oxide. The bioavailability was estimated for superoxide dismutase of to be chelate 140, nano-141 and iron oxide 88%. bioavailability chelate, nano and iron oxide had 150, 130 and 47% for xanthine oxidase. The bioavailability of chelate 107, nano 123 and oxide 66% for serum iron content. Chelate, nano, and oxide respectively are bioavailability 117, 118, and 79 for red blood cell counts,. For hemoglobin, is bioavailability chelate 134, nano is 112% and iron oxide 57%. The bioavailability of iron chelates 118, nano 104 and 82% iron oxide was calculated for hematocrit. The bioavailability of chelate 156, nano-163, and oxide 79% for ferritin. For the amount of iron in the liver, the iron chelate had abioavailability of 118%, nano-111% and iron oxide of 68%. In generally, iron nanoparticles and iron chelate form have the best performance blood and enzymatic compared to sulfate, oxide and control and can be used in poultry diet.

Keywords: Chelate, Iron resources, Meat quality, Nano, Performance, Quail