

EFFECT OF DIETARY SUPPLEMENTATION OF INORGANIC, ORGANIC AND NANO ZINC ON SERUM CHOLESTEROL, SGOT AND SGPT LEVELS OF DUAL PURPOSE CHICKEN

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ABSTRACT

A total of 336 dual purpose chicks were distributed randomly into seven treatments. ZnSO₄ (Inorganic) was added to T₁ and T₂ at the level of 30mg/kg and 60 mg/kg; Zn-Met (Organic) was added at the level of 30mg/kg and 60 mg/kg in T₃ and T₄ and Nano ZnO at the level of 15, 30 and 60 mg/kg in T₅, T₆ and T₇, respectively. The trial was carried out for 8 weeks in deep litter system. Supplementation of Nano zinc @ 60 mg/kg lowered the serum cholesterol and SGPT level compared to other zinc sources. The effect of zinc sources on the SGOT level remained same in all treatments.

Keywords: Dual purpose chicken, zinc, inorganic, organic, nano, serum

INTRODUCTION

Zinc (Zn) is a trace element that is necessary for maintenance, normal growth, bone development, enzyme function and appetite regulation for all avian species. Zinc is a part of liver enzymes as cofactor including serum glutamic-pyruvic transaminase (SGPT) and serum glutamic-oxaloacetic transaminase (SGOT); as well

it is typically found in large quantities in liver enzymes (Bennett *et al.*, 2001).

At present, a new branch of science “nanotechnology” has made an entry and is getting rapid progress in different scientific areas. But scientific study related to zinc oxide nanoparticles as a source to meet zinc requirement of broilers is very scarce (Ahmadi *et al.*, 2014). Therefore, a study was conducted to investigate the effect of different levels and sources of inorganic, organic and Zinc oxide nanoparticles (ZONPs) on the serum parameters of dual purpose chicken.

MATERIALS AND METHODS

A total of 336 day old straight run Giriraja chicks (a dual purpose chicken) were wing banded, weighed and randomly assigned to seven groups with four replicates in each group having 12 chicks in each replicate (48 chicks per treatment). The chicks were reared in deep litter system with all standard management practices including vaccination till eight weeks of age. Basal diet for broiler pre-starter, starter and finisher was prepared as per BIS (1992) specification. Seven dietary treatments *viz.*, ZnSO₄ (inorganic) was added to T₁ and T₂

at the level of 30mg/kg and 60 mg/kg; Zn-Met (organic) at the level of 30mg/kg and 60 mg/kg in T₃ and T₄ and Nano ZnO at the level of 15, 30 and 60 mg/kg in T₅, T₆ and T₇, respectively were tested.

Blood samples were collected from four birds of each dietary group on 56th day and were transferred into sterile tubes for collection of sera. The sera samples were stored in deep freezer at -20°C in properly capped and labeled tubes for serum biochemical studies. Biochemical parameters *viz.*, serum cholesterol, SGOT, SGPT levels were measured using a biochemical analyzer (Erba chem.-5-plus). Experiment was conducted as per the guidelines of Institutional Animal Ethics Committee. Data pertaining to various parameters obtained during the trial were analyzed statistically by ANOVA using SPSS (version 20.0) statistical software.

RESULTS AND DISCUSSION

The serum biochemical profile of the dual purpose chicken fed with control diet and supplemented with inorganic, organic and nano Zinc at different levels is given in the table 1. A significantly ($p \leq 0.05$) lowest value of cholesterol (230.88 mg/dl) was recorded for T₇ (Nano zinc, 60 mg/kg) followed by T₆ (Nano zinc, 30 mg/kg), T₄ (organic zinc at 60 mg/kg), T₅ (Nano zinc at 15 mg/kg), T₃ (organic zinc at 30 mg/kg), T₂ (inorganic zinc at 60 mg/kg) and highest serum cholesterol level (256.45 mg/dl) was recorded in T₁ (inorganic zinc at 30 mg/kg). This is in line with the finding of Mishra *et al.* (2014), who reported a significant decrease of cholesterol content in the organic zinc group when compared to inorganic groups at the level of 40 ppm. Parak and Strakova (2011) reported decrease in cholesterol level in broiler breeder males fed with diet containing

inorganic and organic zinc. Similar result was obtained in broiler by Herzig *et al.* (2009) when fed with high amounts of zinc in diet.

In contrast, Kaya *et al.* (2001) reported that adding 50 and 200 mg/kg Zn to the diet increased plasma total cholesterol level in laying hens. The decrease in cholesterol content in T₇ might be because of increased quantity and high bioavailability of nano zinc when compared to other groups

The SGOT (U/L) level in all the treatment groups were comparable to each other. This result was in agreement with the findings of Sahoo *et al.* (2014), who observed no significant ($p \leq 0.05$) difference among the treatment groups supplemented with ZnSO₄, Zn-Met and nano zinc at different levels. The results are contradicted to the findings of Idowu *et al.* (2011), who reported significant difference in SGOT level with higher levels of Zinc proteinate.

The SGPT (U/L) level for T₇ (Nano zinc; 60 mg/kg) group was significantly ($p \leq 0.05$) lower compared to other groups except for T₆ (Nano zinc; 30 mg/kg) where a non-significant ($p \leq 0.05$) difference was recorded. The SGPT (U/L) levels for Zn-Met (T₃ and T₄) at the level of 30 and 60 mg/kg were comparable to nano zinc at the level of 15 and 30 mg/kg (T₅ and T₆). Within each source of Zinc, there was no significant difference at different levels which was similar to the findings of Sahoo *et al.* (2014). Mishra *et al.* (2014) reported a significantly ($p \leq 0.05$) lower SGPT value in nano zinc supplemented group @ 0.06 ppm. The findings of the present study corroborated with the findings of Osman and Ragab (2007) reporting significant effects ($p \leq 0.05$) of Zn- Met supplemented @ 30 ppm, 40 ppm and 50 ppm on serum SGPT level.

Table 1. Serum biochemical profile of the dual purpose chicken

Parameters	Treatments						
	T1	T2	T3	T4	T5	T6	T7
Cholesterol (mg/dl)	256.45±1.11 ^f	247.79±1.20 ^e	244.78±1.04 ^d	240.80±0.64 ^c	242.89±1.00 ^{cd}	237.46±1.00 ^b	230.88±1.06 ^a
SGOT (U/L)	116.7±3.46 ^a	118.62±3.09 ^a	114.38±2.03 ^a	115.18±2.34 ^a	111.30±2.77 ^a	110.22±2.61 ^a	109.27±4.66 ^a
SGPT (U/L)	23.87±0.64 ^{cd}	24.59±0.76 ^d	22.63±0.70 ^{bcd}	22.02±0.92 ^{bc}	21.82±0.72 ^{bc}	20.83±0.74 ^{ab}	19.41±0.79 ^a

Means having different superscripts differed significantly within a row (p<0.05)

SUMMARY

Supplementation of nano zinc @ 60 mg/kg in the diet of chicken has a significant effect on both serum Cholesterol and SGPT levels, showing a reduction in level of both of the parameters, but the effect on SGOT levels was non-significant. The findings of the present study demonstrates the effective role of zinc on reducing the serum cholesterol level craving a path for further research in these aspects.

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