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RESEARCH ARTICLE

Effect of Copper Supplementation on the Performance of Coloured Meat Type Birds

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ABSTRACT

To study the effect of copper supplementation on the growth performance and carcass traits of coloured meat type birds, 40, 10 week old birds were randomly divided into two groups of 20 (Five replicate of four birds each) each on the basis of body weight as per complete randomized design (CRD). One of the groups was fed the basal diet and served as control (T1), while the similar diet was supplemented with 125 ppm of copper through copper sulphate penta-hydrate in group T2. The results revealed that the copper supplementation had positive effect on body weight gain, but the carcass traits remained comparable between both the groups when supplemented through its inorganic source that is Copper sulphate.

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INTRODUCTION

Poultry industry is the fastest growing sector of Indian agriculture, (Mehta, 2002) and a larger portion is contributed from broiler industry, which is gaining importance day by day. Broiler industry is important as a source of quality protein and requires less capital and facilities with a very short rotation cycle, to get early earnings as compared to other livestock sectors, but high and variable cost of feed has always been a major hurdle. The need of growth promoters was taking care of by "antibiotic growth promoter" from about 65 years back (Moore *et al.*, 1946) and became a routine practice (Eyssen and deSomer, 1963; Miles *et al.*, 1984; Harms *et al.*, 1986; Rosen, 1996; Engberg *et al.*, 2000; Singh *et al.*, 2008; Deo et al., 2011). Currently, there is controversy surrounding the use of antibiotic growth promoters for animals designed for meat production, as overuse of any antibiotic over a period of time may lead to the local bacterial populations becoming resistant to the antibiotic (Mamber and Katz, 1985; Aarestrup, 1999; Aarestrup *et al.*, 2001) and thus, the indiscriminate use of antibiotics is now being discouraged and even banned by legislation in several countries (Nollet, 2005; Cervantes, 2006; Michard, 2008).

In search of the safe alternative of the antibiotic growth promoter, high level of copper is being claimed as comparatively safer alternative (Carlson *et al.*, 1979) due to its antimicrobial action (Fuller *et al.*, 1960; Bunch *et al.*, 1961). Since the major site of copper accumulation is not the muscle, poultry meat remains safe for human consumption. Copper was used at a level of about 125-250ppm (Fisher *et al.*, 1973; Hoda and Maha, 1995; Pesti and Bakalli., 1996; Ewing *et al.*, 1998; Banks *et al.*, 2004; Zhang *et al.*, 2009; Das *et al.*, 2010; Samanta *et al.*, 2011) through various sources. Easy availability, cheaper in cost and high bio-availability made regular use of copper sulfate for this purpose.

On the basis of above facts the study was designed to find out the effect of copper supplementation @ 125ppm on the performance of coloured meat type birds.

MATERIALS AND METHODS

The experiment was carried out utilizing 40, 10 weeks old coloured meat type chicks. The chicks were weighed at the time of start of the experiment and were distributed into two homogeneous groups of 20-bird each (5 replicates of four birds each) on the basis of their body weights using completely randomized design (CRD). The birds were arranged in pens with concrete floor over a 4 cm rice hulls bedding. The feeds of different experimental groups were offered *ad-libitum* and all–mash system of feeding was practiced during the experiment. Fresh and

clean drinking water was made available to birds all the time; thus, in the entire study period uniform condition of housing, feeding and watering was maintained for both group of birds.

The basal diets utilized during the experimental period were fed to control group while the same diets were supplemented with 125ppm of copper through copper sulphate pentahydrate in group T2.

The birds were weighted individually every week for a period of three weeks and by which weight gains in both the groups were calculated on weekly basis.

To study the carcass traits, one bird from each replicate was slaughtered at the termination of the experiment. Birds were kept off fed for 12 hours before slaughter. During this period, they were provided clean fresh drinking water *ad-lib*. After weighing slaughter was done to bleed birds properly and all the body measurements of different parts were taken as per the normal practice and weights recorded. The data obtained during experiment were analyzed statistically by using the method described by Steel and Torrie (1992). Differences among the treatments were tested for significance by Duncan's New Multiple Range Test (1955).

RESULTS AND DISCUSSION

The diet prepared for the growing birds was having Maize 47 %, Rice polish 31 %, Soybean meal 10 %, Fish meal 5 %, GNC 1 %, Limestone powder 3 %, Shell grit 2 %, DCP 0.5 % and salt 0.5 %.

The records of weekly body weight (Table 1) indicates that, the body weight of the treatment group was numerically higher as compared to the control for the starting two weeks but statistically (P>0.05) remained comparable, but at third week of the study significant (P<0.05) improvement in the body weight was observed, which indicates that long term effect of feeding 125 ppm of copper is beneficial in respect of body weight gain in meat type coloured birds.

In contrast to the present findings, Skrivan *et al.* (2002) observed 6-7 % decreased weight gain by copper supplementation, but the reason behind that might be a very short period of supplementation because they added 126 ppm of copper for just two weeks of study and thereafter they reduced it to a level of only 35 ppm through its inorganic source that is, copper sulfate. Similarly in our study also we did not observe effect on growth performance till second week of study. In a study Waldroup *et al.* (2003) also did not have an effect of copper supplementation on body weight gain at a level of 55 and 250 ppm.

Similar to the present findings, improved body weight gain was also been reported by Arias and Koutsos (2006); Sunder *et al.* (2009); Lu *et al.* (2010); Prajapati *et al.* (2010); Singh *et al.* (2010); Das *et al.* (2010) and Idowu *et al.* (2011) at levels varying from about 75 to 250 ppm of copper through their inorganic sources.

Regarding the effect of copper supplementation at different periods of time a similar finding was also been reported by Samanta *et al.* (2011) when supplemented copper sulfate at 150 and 250 ppm, but did not reported any effect on body weight gain at first 14 days of their study, while the overall growth improvement was observed at the end of the experiment.

The parameters of carcass traits are reported in Table 2 and all of them showed a non significant (P>0.05) variation among the two groups. Thereafter a numerical improvement was observed on dressing weight of treatment group as compared to the control, while the weight of liver get reduced numerically (P>0.05) by copper supplementation.

Table 1: Effect of copper supplementation on growth performance of birds

	T1 (Control)	T2 (125ppm)
Starting	680	676
7 Days	793	832
14 Days	967	1048
21 Days*	1164[a]	1269[b]

*Means in row a not shearing a common superscript differ significantly (P<0.05)

Table 2: Effect of copper supplementation on carcass weights (% of body weight)

	T1 (Control)	T2 (125ppm)
Feathers	5.33	5.20
Shank	9.45	9.74
Dressed Wt	61.46	63.43
Liver	2.23	2.03
Heart	0.52	0.50
Gizzard	2.25	2.09
Spleen	0.16	0.18

When we compare the effect of copper supplementation with previous reports, Arias and Koustos (2006) when supplemented 188 ppm of copper in broiler birds they reported an improvement in the carcass weight when used either recycled or fresh litter.

Similar to our reports of 125 ppm, Waldroup *et al.* (2003) also did not observed any effect on the dressing percentage and edible carcass yield by supplementation of 55 and 250 ppm of copper through copper sulfate. Sunder *et al.* (2009) also did not observed any effect on ready to cook yield of the carcass when supplemented with 128 ppm of copper through copper sulfate. Similarly, Zhang *et al.* (2009) when supplemented copper through either copper sulfate or tri basic copper chloride at 50, 150, 250 and 350 ppm of copper level and did not observe any effect on carcass yield. Similarly, Mondal *et al.* (2007) were also unable to found any improvement in carcass weight due to supplementation of copper at 200 and 400 ppm level by copper sulfate. No significant (P>0.05) effect on the dressing % was also been observed by supplementation of 250 ppm of copper through copper sulfate by Idowu *et al.* (2011).

When we compare the weight of different visceral organs Arias and Koutsos (2006) did not observe any effect on weight of spleen and liver when supplemented copper at 188 ppm through tri basic copper chloride or copper sulfate. Sunder *et al.* (2009) also did not observe any effect on liver weight when supplemented with 128 ppm of copper through copper sulfate and similarly in our findings also no effect was observed by supplementation of copper.

Conclusion

The result of the present finding indicates that supplementation of 125 ppm copper is beneficial to improve the growth performance of the coloured meat type birds, without any deleterious effect on the carcass weights.

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