

# EFFECT OF LEAD TOXICITY ON GROWTH AND PERFORMANCE OF BROILERS\*

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## ABSTRACT

*Experimental studies on effect of lead toxicity on growth and performance of broilers was conducted by administrating lead acetate in drinking water from 2<sup>nd</sup> to 6<sup>th</sup> week of age at 250 and 400 ppm. Group I (control) were given commercial diet with normal drinking water while group II and III birds were given commercial diet with lead acetate at dose level of 250 ppm and 400 ppm in drinking water respectively. The effect of lead toxicity on general performance of broilers was evaluated on the basis of feed consumption, average weekly body weights, body weight gain and feed conversion ratio. The minimum feed intake was observed in group III i.e. birds receiving 400 ppm lead acetate in drinking water and maximum was in group I i.e. control group birds. Group II and III birds showed lower average weekly body weight through out the experimental period of six weeks when compared with control group. Average weekly body weight gain per chick in different groups showed significant differences. Though increasing weight gain was observed in both treatment group upto 4<sup>th</sup> week, a decreasing trend was observed 5<sup>th</sup> week onwards indicating the impact of lead toxicity after 3 week duration. Feed conversion ratio showed non-significant differences between different groups. Treatment group birds revealed increase feed intake for per kg gain, thus indicating toxic effect of lead resulting into lower average weights in these groups at the end of 6<sup>th</sup> week. The present investigation indicated the adverse effects of lead acetate on performance of broilers at 250 and 400 ppm*

## INTRODUCTION

Lead a potent heavy environmental pollutant is naturally occurring elements that has been mobilized and redistributed to a large extent in the environment by man. Berg *et al.* (1980) stated that contamination of the environment with lead has reached to such a level that it can affect the growth, productivity and health of poultry. But the

adverse effect of lead on health and productivity in poultry has not been studied to the desired extent in comparison with other farm animals. With a view to study the toxic effect of lead on growth performance of broilers, present investigation was under taken.

## MATERIALS AND METHODS

The present investigations were carried out in the Department of Veterinary Pathology, PGIVAS, Akola. Seventy five, day old broiler

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chicks (Hubb, C & M Farming Ltd, Raipur) were randomly divided into three groups, each group thus comprising of 25 birds. Group I (control) were given commercial diet with normal drinking water while group II and III birds were given commercial diet with lead acetate at the dose level of 250 ppm and 400 ppm in drinking water respectively for a period of 2<sup>nd</sup> to 6<sup>th</sup> week. The effect of lead toxicity on general performance in broilers was evaluated on the basis of feed consumption, average weekly body weights, body weight gains and feed conversion ratio. Average weekly feed consumption and body weight gain upto six weeks period was recorded for each group. For average weekly body weights, initial body weight of individual chick on first day of experiment was recorded. Subsequently body weights were recorded at weekly interval upto six weeks for each group. Feed conversion ratio was calculated as per the formula mentioned below:

$$\text{Feed conversion ratio (FCR)} = \frac{\text{Feed consumed (gm)}}{\text{Weight gain (gm)}}$$

Statistical analysis of data was done as per the standard method described by Snedecor and Cochran (1994).

## RESULTS AND DISCUSSION

The results are summarized in Table-1, 2 and 3. Average feed intake during six week period in different groups was found to be 3073 gms (group I), 2645 gms (group II) and 2430 gms (group III). The minimum feed intake was observed in the group III i.e. birds receiving 400 ppm lead acetate in the drinking water and maximum was in the group I i.e. control group birds. These observations suggested that dose dependent decrease in feed consumption during lead toxicity, which corroborates with the findings of Park and Kim (1984), Brar (1994) Shakoor *et al.* (2000) and Erdogan *et al.* (2005). Shakoor *et al.* (2000) stated that feed intake in the

lead treated birds could be due to altered set point for feed consumption or decreased appetite. Similarly, here feed consumption showed decreasing trend from 2<sup>nd</sup> week onwards when lead was given in the drinking water.

Average weekly body weight of day old chicks ranged from 41.23 to 42.39 gm. Non significant differences were observed in initial body weights between treatment and control group birds indicating proper randomization of treatment group. The mean weekly body weights from 1<sup>st</sup> to 6<sup>th</sup> week among groups I, II and III were in the range of 151.95 to 1551.9 gm, 150.78 to 1447.57 gm and 151.09 to 1335.64 gm respectively. Group II and III birds showed lower average weekly body weight throughout the experimental period of six weeks when compared with the control group. Present finding corroborates with those reported by Morgan *et al.* (1975), Stone and Soares Jr. (1976) and Erdogan *et al.* (2005). Lowered body weights in treatment group birds could be due to decrease in the feed consumption or due to metabolic disorders associated with lead, such as inhibition of enzyme involved in the haem synthesis and the oxidase system resulting in loss of cellular functions and tissue damage (Erdogan *et al.*, 2005). Average weekly body weight gain per chick in different groups showed significant differences ( $P < 0.01$ ). Though increasing weight gain was observed in both treatment group upto 4<sup>th</sup> week, a decreasing trend was observed from 5<sup>th</sup> week onwards indicating the impact of lead toxicity after 3 week duration. Rising trend was apparent in the 6<sup>th</sup> week suggesting that beginning of tolerance to cumulative effect of lead. Similar finding of decreased body weight gain was reported by Mylorie *et al.* (1977), Nezel and Vogt (1978) and Erdogan *et al.* (2005).

Feed conversion ratio showed non-significant differences between different groups. Feed required for per kg body weight gain for group I, II and III were  $1.57 \pm 0.21$ ,  $1.80 \pm 0.26$

and  $1.94 \pm 0.31$  respectively. Treatment group birds revealed increase feed intake for per kg gain, thus indicating toxic effect of lead resulting into lower average weights in these groups at the end of 6<sup>th</sup> week. Similar findings with respect to increase FCR in treatment group birds were reported by Bakalli *et al.* (1995). Though present observations did not reveal significant differences between the groups, feed conversion efficiency found to be decreased in the treatment group birds when compared with the control group birds.

The present investigation indicated adverse effects of lead acetate on performance of broilers at 250 and 400 ppm levels.

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**Table 1:**  
**Average weekly feed consumption (gms)**  
**in different groups.**

Groups	Weeks						Total
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>	
I	110.00	273.00	465.00	523.00	652.00	1050.00	3073.00
II	110.00	263.00	445.00	466.00	535.00	826.00	2645.00
III	111.00	249.00	425.00	439.00	479.00	727.00	2430.00

**Table 2:**  
**Average weekly body weight and body weight gain (gms) per chick in different groups (Mean  $\pm$  SE)**

		$\pm 6.58$	$\pm 7.40$	$\pm 5.69$	$\pm 6.56$
	3 <sup>rd</sup>	641.45 $\pm 12.31$	603.83 $\pm 12.48$	558.21 $\pm 9.45$	601.16 <sup>d</sup> $\pm 11.41$
	4 <sup>th</sup>	939.50 $\pm 27.37$	603.83 $\pm 12.48$	833.12 $\pm 15.29$	894.21 <sup>c</sup> $\pm 21.66$
	5 <sup>th</sup>	1245.00 $\pm 23.74$	1183.00 $\pm 27.20$	1082.27 $\pm 28.97$	1170.09 <sup>f</sup> $\pm 26.64$
	6 <sup>th</sup>	1551.90 $\pm 38.18$	1447.57 $\pm 35.31$	1335.64 $\pm 34.32$	1445.04 <sup>g</sup> $\pm 35.94$
Average weekly body weight gain (gms)	1 <sup>st</sup>	108.20 $\pm 2.96$	109.13 $\pm 3.45$	108.95 $\pm 2.92$	108.76 <sup>a</sup> $\pm 3.11$
	2 <sup>nd</sup>	226.05 $\pm 6.03$	149.09 $\pm 4.96$	135.27 $\pm 3.44$	170.14 <sup>b</sup> $\pm 4.81$
	3 <sup>rd</sup>	306.45 $\pm 8.61$	290.96 $\pm 11.63$	240.56 $\pm 7.38$	279.32 <sup>e</sup> $\pm 9.21$
	4 <sup>th</sup>	322.55 $\pm 16.50$	304.78 $\pm 17.64$	250.05 $\pm 8.84$	292.46 <sup>e</sup> $\pm 14.33$
	5 <sup>th</sup>	341.50 $\pm 13.57$	273.00 $\pm 14.34$	234.50 $\pm 17.93$	283.00 <sup>e</sup> $\pm 15.28$
	6 <sup>th</sup>	364.50 $\pm 22.56$	279.48 $\pm 13.19$	241.22 $\pm 8.92$	295.07 <sup>e</sup> $\pm 14.89$

Mean values with common alphabet as superscript do not differ significantly (P<0.01).

**Table 3:**  
**Average feed conversion efficiency in different groups (Mean  $\pm$  SE)**

Parameter	Treatment			Pooled Mean	'F' test	C.D.
	I	II	III			
Average Feed Conversion Efficiency	1.57 $\pm 0.21$	1.80 $\pm 0.26$	1.94 $\pm 0.31$	1.77 $\pm 0.26$	NS	-