# EFFECT OF PESTICIDE RESIDUES ON BLOOD CHEMISTRY OF BROILER CHICKS FED VARIOUS LEVELS OF CRUDE PROTEIN

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A study involving 240 broiler chicks was conducted to observe the influence of different levels (0, 50, 100, 150 ppm) of pesticide (Lannate) on the blood chemistry of the broiler chicks fed rations containing different levels of protein. At 4, 6 and 8 weeks age, there was significant decrease in total serum proteins, serum albumen, serum cholesterol and serum triglycerides but significant increase in serum glucose due to feeding of pesticide. The values of these parameters were significantly reduced at lower levels of protein at the end of 4 weeks. These values at 6 and 8 weeks of age were not influenced by the protein level, except that at the end of 6 weeks, serum glucose was significantly reduced at lower level of protein.

## INTRODUCTION

The pesticide, Lannate (S-methyl N-thioacetimidate) of Dupont Company, is used in spraying maize, cotton, and sorghum alone or in mixtures with other pesticides. Residues of ethylene dibromide (EDB) pesticide on cereal grains have been found to affect spermatogenesis in the bull and egg production and egg weight in laying hens (Fuller and Morris, 1962). Further toxic effects of insecticides including changes in total protein and transaminase activity have been observed in chicks treated with fenchlorphos (Rodica and Stefania, 1973). Simeonov (1986) observed the effect of insecticide for fowls and noted rise in blood sugar. Mohiuddin and Ahmed (1986) fed five White Leghorn cockerels with Ekalux at 5 mg $bird^{-1}$ $day^{-1}$ for 20 days and observed a marked reduction in serum total proteins. The present study was, therefore, undertaken to investigate blood chemistry values of broiler chicks as influenced by different levels of protein and the pesticide (Lannate).

## MATERIALS AND METHODS

The methods and statistical techniques adopted were the same as described by Arshid *et al.* (1991) except that the blood was collected in test tubes at the end of 4, 6 and 8 weeks without an anticoagulant. Serum from each sample was extracted by centrifugation. The estimates for serum glucose, total protein, albumen, cholesterol and triglycerides were made using spectrophotometric methods (Anonymous, 1970).

## RESULTS AND DISCUSSION

**Serum glucose:** The serum glucose increased with the advancement of age of chicks in all the groups. These values were also increased in birds fed Lannate, particularly at higher levels (Table 1). The comparison of means at 4, 6 and 8 weeks age in-

dicated a significantly higher serum glucose of the birds given pesticide levels of 50, 100 and 150 ppm in the ration as compared to the control group offered ration without pesticide. The differences among various pesticide levels at 4 weeks were, however, non-significant in this respect. The results further indicated that the groups fed on rations with 100 and 150 ppm pesticide had significantly higher values at 6 weeks age than that of the group fed ration with 50 ppm pesticide, the difference between the former two groups being non-significant. At 8 weeks age, however, there were significant differences among all pesticide levels.

The results of the present study are in line with those of Simeonov (1986) whose values showed that with the addition of pesticide, serum glucose values increased due to liver toxicity and lower conversion of glucose to glycogen.

**Serum total proteins (STP):** The serum total proteins increased with the advancement of age of chicks in all the groups. However, these values were relatively lower in birds fed on Lannate particularly at higher level (Table 1). Analysis of variance of the data revealed highly significant difference in serum total protein at 4, 6 and 8 weeks age due to levels of pesticide. The impact of protein levels was highly significant at 4 weeks but nonsignificant 6 and 8 weeks. The protein and pesticide interaction was, however, found non-significant during the period of study.

Comparison of means at 4, 6 and 8 weeks of age showed that in general serum total protein reduced significantly with increase in the pesticide level in the feed as compared to those on feed without pesticide. The pesticide level of 150 ppm in feed also caused a significant decrease in serum total protein of birds at 4 weeks age as compared to those on 50 ppm level, the difference between 50 and 100 as well as 100 and 150 ppm levels being mon-significant. The STP of birds fed the higher protein level significantly increased at 4 weeks relative to those on lower protein level. The differences in the mean values of STP at 6 weeks of age among all the pesticide fed groups were also significant. At the age of 8 weeks, STP values of the chicks decreased significantly at 150 ppm pesticide level in comparison to 50 and 100 ppm levels, the difference between the latter levels being non-significant.

The addition of pesticide showed adverse effect on STP which was significantly decreased probably due to damage done to liver by pesticide toxicity. The results of present study are in accordance with those of Mohiuddin and Ahmed (1986).

**Serum albumen:** Serum albumen increased with the advancement of age of chicks in all the groups. However, this increase was relatively less in birds fed Lannate, particularly at higher levels (Table 1). Analysis of variance of the data at all ages showed similar results as given in case of serum total protein. The comparison of means at 4 and 6 weeks followed exactly the same pattern as indicated in case of STP at the age of 4 and 6 weeks. The comparison of means at 8 weeks of age indicated that serum albumen was significantly reduced with increase in pesticide levels as compared to those not fed pesticide. These values were significantly lower at 100 and 150 ppm pesticide levels in comparison to that at 50 ppm level; the difference between the former two levels was, however, non-significant. Serum albumen decreased with the addition of pesticide in rations due to damage done to liver by the pesticide, resulting in decreased production of albumen in the liver.

**Serum cholesterol:** The serum cholesterol increased with advancement of age of chicks in all the groups, however, these values were relatively lower in birds fed on Lannate, particularly at higher levels (Table 1).

**Table 1. Mean blood chemistry values of experimental birds at various ages fed on various levels of pesticide and protein**

| Parameters | Pesticide levels (ppm) | 4 weeks age | | | 6 weeks age | | | 8 weeks age | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | A* | B** | Mean | A | B | Mean | A | B | Mean |
| Serum glucose (mg dl$^{-1}$) | 0 | 165.31 | 161.78 | 163.54 b | 171.43 | 169.85 | 170.64 c | 182.99 | 182.13 | 182.56 d |
| | 50 | 170.81 | 166.11 | 168.46 a | 185.57 | 182.57 | 184.07 b | 199.48 | 199.40 | 199.44 c |
| | 100 | 172.03 | 168.84 | 170.43 a | 189.29 | 185.51 | 187.40 a | 204.71 | 204.33 | 204.52 b |
| | 150 | 174.27 | 170.29 | 172.28 a | 192.86 | 187.31 | 190.08 a | 208.37 | 207.67 | 208.02 a |
| | Mean | 170.60 e | 166.75 f | 168.68 | 184.79 e | 181.31 f | 183.05 | 198.89 | 198.38 | 198.63 |
| Serum total protein (g dl$^{-1}$) | 0 | 3.55 | 3.21 | 3.38 a | 3.79 | 3.78 | 3.78 a | 3.91 | 3.91 | 3.91 a |
| | 50 | 3.38 | 3.06 | 3.22 b | 3.37 | 3.35 | 3.36 b | 3.52 | 3.51 | 3.51 b |
| | 100 | 3.31 | 3.01 | 3.16 bc | 3.29 | 3.28 | 3.28 c | 3.49 | 3.49 | 3.49 b |
| | 150 | 3.23 | 2.99 | 3.11 c | 3.23 | 3.22 | 3.22 d | 3.40 | 3.40 | 3.40 c |
| | Mean | 3.37 e | 3.07 f | 3.22 | 3.42 | 3.41 | 3.41 | 3.58 | 3.58 | 3.58 |
| Serum albumin (g dl$^{-1}$) | 0 | 1.29 | 1.23 | 1.26 a | 1.33 | 1.32 | 1.33 a | 1.64 | 1.64 | 1.64 a |
| | 50 | 1.24 | 1.19 | 1.21 b | 1.24 | 1.23 | 1.24 b | 1.52 | 1.52 | 1.52 b |
| | 100 | 1.23 | 1.18 | 1.21 bc | 1.21 | 1.22 | 1.21 c | 1.45 | 1.47 | 1.46 c |
| | 150 | 1.21 | 1.18 | 1.20 c | 1.19 | 1.19 | 1.19 d | 1.45 | 1.45 | 1.45 c |
| | Mean | 1.24 e | 1.19 f | 1.22 | 1.24 | 1.24 | 1.24 | 1.51 | 1.52 | 1.52 |
| Serum cholesterol (mg dl$^{-1}$) | 0 | 106.21 | 104.74 | 105.47 a | 114.00 | 113.50 | 113.75 a | 117.71 | 117.41 | 117.56 a |
| | 50 | 100.00 | 99.22 | 99.61 b | 102.33 | 101.70 | 102.02 b | 105.88 | 105.61 | 105.75 b |
| | 100 | 98.00 | 95.93 | 96.96 c | 100.05 | 99.47 | 99.76 c | 104.12 | 104.17 | 104.14 c |
| | 150 | 95.17 | 93.32 | 94.24 d | 99.00 | 98.60 | 98.80 c | 101.60 | 101.32 | 101.46 d |
| | Mean | 99.84 e | 98.30 f | 99.07 | 103.85 | 103.32 | 103.58 | 107.33 | 107.13 | 107.23 |
| Serum triglycerides (g l$^{-1}$) | 0 | 0.84 | 0.83 | 0.83 a | 0.93 | 0.93 | 0.93 a | 0.96 | 0.96 | 0.96 a |
| | 50 | 0.70 | 0.68 | 0.69 b | 0.71 | 0.70 | 0.70 b | 0.73 | 0.72 | 0.72 b |
| | 100 | 0.66 | 0.66 | 0.66 c | 0.70 | 0.70 | 0.70 b | 0.70 | 0.69 | 0.70 c |
| | 150 | 0.64 | 0.63 | 0.63 d | 0.69 | 0.69 | 0.69 c | 0.68 | 0.67 | 0.68 d |
| | Mean | 0.71 e | 0.70 f | 0.70 | 0.76 | 0.75 | 0.76 | 0.77 | 0.76 | 0.76 |

Protein levels: A* = 23% CP during starter phase; 19% CP during finisher phase; B** = 20% CP throughout.

Means followed by different letter(s) for a particular parameter and specific age show significant differences at $P \leq 0.05$.

Comparison of means at 4, 6 and 8 weeks of age showed that the serum cholesterol decreased significantly with increase in the pesticide levels in comparison to the control and with one another except that these values at 6 weeks of age were not significantly different at 100 and 150 ppm pesticide levels from each other. Serum cholesterol decreased possibly because of liver damage which resulted in reduced production of cholesterol.

**Serum triglycerides:** Serum triglyceride values increased with the advancement of age of chicks in all the groups. However, these values were relatively lower in the birds fed on Lannate particularly at higher levels (Table 1). Analysis of variance of the data at all ages showed similar results as given in case of STP. Comparison of means at 4, 6 and 8 weeks of age showed that serum triglycerides decreased significantly with increase in the pesticide levels in comparison to the control and with one another except that these values at 6 weeks of age were not significantly different at 50 and 100 ppm pesticide levels from each other. Serum triglycerides decreased possibly due to liver damage.

## REFERENCES

Anonymous. 1970. Clinical Laboratory. Medico-Chemical Investigation Methods. E. Merck Darmstadt, Federal Republic of Germany.

Arshid, W., T.H. Shah, M.B. Sial, M. Siddique and G. Hur. 1991. Effect of pesticide residue on the haematological picture of broilers fed different levels of crude protein. Pak. J. Agri. Sci. 27 (4): 343-349.

Fuller, H.L. and G.K. Morris. 1962. A study of the effects of ethylene dibromide fumigant components on egg production. Poult. Sci. 41: 645-654.

Mohiuddin, S.M. and M.N. Ahmed. 1986. Effect of feeding Ekalux (quinolphos) pesticide in poultry. Indian Vet. J. 63 (10): 796-798. (Poult. Abst. 13 (7): 1472, 1987).

Rodica, G. and M. Stefania. 1973. Effect of some insecticides on the bursa of Fabricious in chicks. Archiv for Experimentelle Veterinarmedizin, 27 (4): 723-728. (Vet. Bull. 44 (5): 2438, 1974).

Simeonov, S.P. 1986. Acute toxicity of insecticide fenitrothion for fowls. Veterinarnoneditsinski Nauki, 23 (2): 39-42. (Poult. Abst. 12 (8): 2014, 1986).