

EFFECT OF IMIDACLOPRID- A NEONICOTINOID INSECTICIDE ON THE IMMUNE SYSTEM OF WHITE LEGHORN COCKERELS

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ABSTRACT

The effect of repeated (28 day) oral administration of imidacloprid on the immune system of male WLH chicks was assessed. 125 birds were divided into five groups each containing 25 birds. The birds of group C1 were given no treatment and served as control. Group C2 was administered groundnut oil (1ml/kg) and served as control (vehicle). Group I1 was given 1/40 of LD₅₀ (1.25 mg/kg), and Group I2 was put on 1/30 of LD₅₀ (1.67 mg/kg), while group I3 received 1/20 of LD₅₀ (2.5 mg/kg) of Imidacloprid suspended in groundnut oil. There was a significant decrease in the Total Leukocyte Count after 28 days of exposure in the birds of group I3 (2.5 mg/kg). There was no significant effect on Serum antibody titres against ND as compared to controls. After 28 days there was a significant decrease in liver:body wt. ratio of birds in group I2 and I3 and decrease in thymus: body wt ratio of birds in all the treatment groups. While no significant effect was seen in bursa: body wt. ratio and spleen:body wt. ratio of birds. Cell-mediated immunity as tested by dye test did not reveal any significant differences. Histopathologically, bursa and spleen showed mild depletion of lymphocytes.

Keywords: Imidacloprid, immunity, cockerels.

INTRODUCTION

Imidacloprid is a relatively new, systemic insecticide related to the tobacco toxin nicotine. It was introduced in the market in 1991 as the first chloronicotinyl insecticide, and has since become the most successful, highly effective and largest selling insecticide worldwide for agricultural use and as a veterinary medical remedy to control ectoparasitic insects in the last decade (Mencke and Jeschke, 2002). It has higher selectivity factors for insect versus mammals than organophosphates, methylcarbamates and organochlorines. This is attributable to both target site specificity (Tomizawa and Casida, 2003) and detoxication. Due to the favorable mammalian safety characteristics imidacloprid has been developed as flea control agent on cats and dogs. In agriculture, it is most commonly used insecticide for rice, cereal, maize, potatoes, vegetables, sugar beets, fruits, cotton, hops and turf for control of sucking insects, coleoptera (beetles) and others (Cox, 2001). Imidacloprid has been found toxic to immune system of rats at higher doses causing decrease in haemagglutinating antibody titre, delayed type of hypersensitivity (DTH) response and leucocytic migration (Gatne *et al.*, 2005).

Present study was conducted to investigate the effect of repeated (28 day) oral administration of

imidacloprid on the immune system of male White Leghorn chicks (WLH).

MATERIALS AND METHODS

Experimental animals

The present study was conducted on day old healthy male White Leghorn chicks. The chicks were procured and housed in pens of Battery brooder house at Central Poultry Research Station, Anand Agricultural University, Anand. The chicks were provided with ad libitum standard feed and water.

Experimental design

Birds were acclimatized for a period of one week before the start of oral dosing with imidacloprid. All the birds were randomly divided into five groups (C1, C2, I1, I2, and I3) each containing 25 birds. Apparent LD₅₀ of imidacloprid (50 mg/kg) was taken into consideration for calculation of different dose groups (Siddiqui, 2004). Birds were treated with imidacloprid at dose rate of 1/20 of LD₅₀, 1/30 of LD₅₀ and 1/40 of LD₅₀ in three treatment groups for a period of 28 days starting from 7 days of age. Group C1 was given no treatment and served as control. The group C2 was administered groundnut oil and served as vehicle control. Group I1 was given 1/40th of LD₅₀ (1.25 mg/kg), group I2 was put on 1/30th of LD₅₀ (1.67 mg/kg) and group