



Patuxent Science Meeting 2004 Poster Abstract

Effects of chlorfenapyr on adult birds

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Chlorfenapyr is the first commercial pesticide to be derived from a class of compounds produced by bacteria and known as halogenated pyrroles. Chlorfenapyr has low volatility and water solubility, is lipophilic, binds strongly to soil particles; and degrades slowly in soil, sediment, and water. It is rapidly metabolized and excreted, hence unlikely to bioaccumulate in organisms or biomagnify between trophic levels. The primary metabolite functions as an uncoupler of oxidative phosphorylation at mitochondria. Chlorfenapyr has high acute, sub-acute, and chronic (reproductive) toxicity in birds; and poses an acute poisoning hazard to aquatic organisms. The effect of chlorfenapyr on tissues of birds is unknown and biochemical markers diagnostic for exposure have not been determined. The EPA currently restricts usage to residential and commercial termite control and pests of ornamentals grown in greenhouses. Adult mallards were fed diets containing technical or formulated chlorfenapyr in concentrations that ranged from non-lethal to causing a moderate incidence of death. Feeding trials were performed during the summers of 2002 and 2003. The 2002 study consisted of 55 ducks fed diets containing either 0 ppm (15 ducks), 2 ppm (10), 5 ppm (10), or 10 ppm (10) technical chlorfenapyr; or 5 ppm formulated chlorfenapyr (10) for 10 weeks. Food consumption was estimated and ducks were weighed weekly. Necropsies of ducks (died or euthanized) were performed within 24 hrs of death. Samples of 21 tissues were saved for histological examination and portions of liver and diet were saved for chemical analysis. Blood and liver tissue from a subset of the ducks were used for the development of methods for protein pattern analysis. A subset of the ducks was tested for the presence of West Nile virus antibodies. The 2003 study consisted of 80 ducks divided into two groups. One group of 60 ducks received diets containing either 0 ppm (20 ducks), 5 ppm (20), or 10 ppm (20) technical chlorfenapyr for 5 weeks, followed by 5 weeks on 0 ppm for all ducks. Two ducks from each group were euthanized on days 3, 7, 22, 37, and 49 of the study. Blood, liver, and kidney samples were saved from ducks euthanized during the study, plus two ducks from each group during the terminal necropsy, for biochemical assays. Food consumption, body weight, tissues for histological examination, and tissues and diet for chemical analysis were saved as in the 2002 study. A second group of 25 ducks received diets containing either 0 ppm (10 ducks) or 5 ppm (10) technical chlorfenapyr for 3 weeks. Blood was collected prior to receiving treated diets, after 1 day on diet, and after 10 days on diet for a protein pattern analysis. Eight of the ducks were euthanized on day 17 and used for an assessment of protein patterns during a 48-hour period after death. Fresh blood or serous body fluid and portions of brain tissue, spleen, and kidney were collected from all ducks for West Nile virus testing. Data are undergoing statistical evaluation. Tissue, biochemical, and chemical analyses are incomplete.