

Complete Mass Balance of Dietary Polychlorinated Dibenzo-*p*-dioxins and Dibenzofurans in Dairy Cattle and Characterization of the Apparent Synthesis of Hepta- and Octachlorodioxins

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Mass balances of 2,3,7,8-substituted dibenzo-*p*-dioxins (PCDDs) and dibenzofurans (PCDFs) were measured in cows following administration of pentachlorophenol (PCP)-treated wood. Fecal excretion accounted for the major fraction of all congeners. Recovery in feces increased with increasing chlorination, while storage in body fat and excretion in milk decreased with increasing chlorination. The PCDFs with no chlorines in the 4- and 6-positions were apparently metabolized because residues were not detected in milk and body fat. Storage and excretion of 1,2,3,4,6,7,8-HpCDD and 1,2,3,4,6,7,8,9-OCDD exceeded intake by factors of 1.7 and 3.4, but recovery of other PCDD/Fs did not exceed intake significantly. Excess excretion of OCDD, but not HpCDD, was confirmed in a follow-up study. Synthesis of HpCDD and OCDD did not occur when PCP-treated wood was fermented with rumen microorganisms, and enhanced concentrations of HpCDD and OCDD were not found in gastrointestinal tract contents of dosed animals. Formation of OCDD during incubation of feces spiked with PCP-treated wood led to the conclusion that synthesis was postexcretion during sample preparation.

KEYWORDS: Dioxins; furans; pentachlorophenol; wood; PCDD/Fs; synthesis