

Workshop „Pharmaceuticals in Soil, Sludge and Slurry” of the German Federal Environment Agency (18th June to 19th June 2013)

TITLE: Antiparasitics and their impact on soil and dung fauna

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ABSTRACT:

Environmental contamination of rural and suburban areas by both medicinal residues and hygiene products constitutes a problem that has yet to be adequately regulated. Among the sources of medication discharge, farming activities hold a special place, due in particular to the unique and diffuse nature of discharges, which occur without any specific preliminary treatment. Two therapeutic classes dominate the field of veterinary medicine: antiparasitics and anti-infectious drugs. Four families (Tetracyclines, Sulfonamides, Penicillins and Macrolides) of these Veterinary Medicinal Products (VMPs) account for over 80% of all veterinary sales. The majority of antiparasitics administered to animals are eliminated through animal faeces. The toxicity of molecules from the avermectin, pyrethroid and organophosphoric families has been demonstrated against coprophagous dipterans and Coleoptera. Coleopterans contribute to fecal matter degradation, thus to the turnover of organic matter, which in turn modifies productivity of the entire grassland ecosystem.

Some examples of unintended effects on the soil and dung fauna of VMPs administered to livestock and recovered in the feces will be discussed through the results of laboratory and field experiments: benzimidazole, organophosphates (dichlorvos), pyrethrinoids (cypermethrin), macrolides (ivermectin, eprinomectin, moxidectin). The environmental effect is different depending on the mode of administration, the duration of elimination of VMPs and the susceptibility of species. The results suggest that VMPs have either adverse effects or no effect on the degradation of feces in pastures.

The possible effect of antibiotics on dung beetles will be also discussed, as dung beetles (adults, but especially their larvae) contain in their gut many symbiotic microorganisms. Our hypothesis is that this microflora may be impacted, causing a certain mortality or at least a delay in insect development. Works in the future have to be conducted to verify this hypothesis.