

**(No) effect of oral ivermectin treatment of ponies on dung degradation in semi-natural pastures. A field study.**

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Large herbivores are increasingly used in nature conservation areas. This creates opportunities for dung fauna and wildlife that feed on these invertebrates. However, in The Netherlands the routine use of toxic anthelmintics in ruminants in conservation areas, notably ivermectin, potentially affects dung fauna populations and thus dung degradation. From June 2008 to July 2009 a field experiment was conducted in an extensively managed pasture, part of the Dutch ecological main structure or EHS. Dartmoor ponies, used for grazing, were treated with an oral dose of ivermectin (40 g per animal). Dung of treated and untreated ponies was collected from the pasture and laid out in a protected part of the field to allow colonization by dung insects. Earthworms had access to half of the dung pats. The other half was shielded from contact with the soil. The disappearance of dung was monitored during more than 1 year. There was no significant effect of ivermectin on the degradation rate of pony dung despite the presence of ivermectin concentrations in the dung (up to  $\pm 1$  mg/kg dw on average) that exceeded known toxicity thresholds for dung fly and dung beetle larvae. Dung degradation in the presence of earthworms was c. 4 times faster than without worms. After more than a year, ivermectin was still traceable in the soil underneath contaminated dung pats (maximum average of c. 10  $\mu$ g/kg dw), even though the dung itself had already disappeared. The findings show that toxic levels of ivermectin in dung may not always lead to delayed degradation under field circumstances. Because of its persistence, however, ivermectin should not be used in nature conservation areas or only used with certain risk mitigating restrictions.