

Effects of Treatment of Cattle with some Anthelmintics on the Subsequent Degradation of their Dung

Recent reports seem to indicate that the use of certain anthelmintics in cattle may cause adverse effects on non-target faunal inhabitants of cow pats, thus interfering with the normal degradation and recycling of dung deposited on pasture (Anderson *et al.* 1984, Lumaret 1986, Wall & Strong 1987). The present communication presents some data from a microcosm experiment on the possible effects of some commonly used anthelmintics on the rate of cow dung decomposition.

Five Friesian heifers (approx. 300 kg bw.) were treated with normally recommended therapeutic doses of the anthelmintics ivermectin, metrifonatum, levamisole chloride, pyrantel citrate and fenbendazole, respectively (Table 1). After 24 h faeces were collected from the treated animals. Faeces were also collected from non-treated heifers, to provide control dung material.

Experimental dung pats (weight 0.1 kg, diameter 8 cm) were placed in groups of three in clay pots (diameter 18 cm) containing 2.5 litres of composted garden soil. To each pot was added a mixture of earthworms, i.e. *Aporrectodea longa* (approx. 8.5 g fresh weight) and *Aporrectodea tuberculata* (approx. 6.5 g fresh weight). The pots were covered with a plastic bag to lower the rate of evaporation. Two holes (1 cm²) were cut in each bag to allow access of insects. In the early summer the pots were placed outdoors under an open shelter where they were watered frequently. Air temperature varied be-

tween 14°C and 20°C. The dung pats were observed daily for degradation, and at the end of the experimental period (98 days) earthworms were recovered from the pot soil for fresh weight measurements.

A large number of dung flies (*Scatophaga stercoraria*) invaded the dung pats via the holes in the plastic covers, and eggs were deposited within the first hours of the experiment. During the following 8 days the activity of the dung fly larvae changed the appearance of the dung into a sawdust-like material covering most of the soil surface, except for the dung collected from the ivermectin treated heifer. In these pats, which remained solid and virtually unchanged, a number of dead fly larvae were observed on the surface (Table 1). Earthworm activity, as judged from the occurrence of their excrements on the soil surface, was noticed in all pots.

Within a period of 42 to 55 days all pats except those from the ivermectin treated heifer, had disappeared completely (Table 1). Complete disappearance of the ivermectin pats was not observed until day 98.

The present results confirm the larvicidal effect of ivermectin on higher dipteran larvae breeding in cow dung, as previously observed (Meyer *et al.* 1981, Miller *et al.* 1981, Schmidt 1983).

In none of the earthworm species could any significant difference between treatments, including controls, be demonstrated for the biomasses at 98 days (analysis of variance: P

Table 1. Disappearance of cow pats obtained from animals treated with some anthelmintics 24 h earlier, and observations of fly larvae and fresh weight of earthworms in and around the pats. Means of 3 replicates.

Treatment	Complete disappearance of pat observed after (days)	Observation of dead fly larvae	Fresh weight (g) of earthworms on days 0 and 98:			
			<i>Aporrectodea longa</i>		<i>Aporrectodea tuberculata</i>	
			0	98	0	98
Untreated controls	42	NO	8.5	7.1	6.4	6.3
Ivermectin 0.2 mg/kg s.c. (Ivomec [®] , MSD)	98	YES	8.6	7.3	6.5	4.7
Metrifonatum 50 mg/kg p.o. (Neguvon [®] , Bayer)	42	NO	8.5	7.2	6.6	5.2
Levamisoli chloridum 8 mg/kg p.o. (Decaris [®] , Janssen)	42	NO	8.5	7.6	6.6	3.0
Pyranteli citras 25 mg/kg p.o. (Banminth [®] , Pfizer)	42	NO	8.5	6.7	6.6	4.5
Fenbendazolium 75 mg/kg p.o. (Panacur [®] , Hoechst)	55	NO	8.6	5.3	6.5	3.7

s.c. = subcutaneous injection; p.o. = oral drenching.

> 0.75 and $0.25 < P < 0.5$ for *A. longa* and *A. tuberculata*, respectively), and so the worms were apparently not affected by the tested anthelmintics.

One of the effects of dung insect activity on the decay of cow dung seems to be that the pats become more attractive to earthworms; these may, under Danish conditions, be responsible for about 50 % of the disappearance of cow pats (Holter 1979, 1983).

The pronounced delay in the disappearance rate of dung from cattle treated with ivermectin 24 h earlier, may therefore be ascribed to negative effects on dung-living dipterous larvae. Similar effects have been found in the field under natural pastureland condi-

tions (Wall & Strong 1987, Madsen et al. in preparation). From an environmental and agricultural point of view, studies of the duration of the insecticidal activity in faeces from cattle treated with anthelmintics therefore seem highly desirable.

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