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Environment impact of Moxidectin in sheep faeces upon Dung Diptera in South of Brazil

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Introduction

Dung Diptera can be beneficial to the environment because the adults feed on, deposit eggs in, and the larval nutrition depends on the feaces of animals which significantly improves nutrient cycling. However, anthelmintics which are used to control internal parasites have long persistence with a long half-life in faeces. This is harmful to the coprofauna and may adversely affect the diversity of this environmental system. In this study we evaluated the toxicity of moxidectin anthelmintic on the dung Diptera population in pastures of South of Brazil.

Methods

This study was conducted at Sheep and Goats Research Laboratory of Federal University of Paraná, Brazil. Twenty rams were separated in 2 groups: (1) untreated control; and (2) contaminated with worms and treated with one single subcutaneous dose of 0.2 mg/kg.bw of moxidectin (Cydectin®).

Faeces were collected on excretion peak of moxidectin at 36 hr to 60 hr (Sanhueza 2006) after application using collection bags. Eight replicates of 0.2 g faecal pats of control or contamination groups were placed in field where no animal faeces had been found for 6 months or no coverage against rain by 88 days. Dung Diptera was collected using the insect net and pitfall twice a day for 10 days, then every other day until day 20, then every 4 days until day 40, then every 8 days until day 88 post treatment.

Results

Table 1 outlines catches: Sphaeroceridae, Muscidae, Sarcophagidae, Sepsidae and Chloropidae were the families identified by both methods. Anthomyzidae, Tachinidae, Platystomatidae, Ephydridae, Lauxanidae, Lepidoptera,

Table 1. Effects of moxidectin of sheep feaces about the number (median) of dung Diptera with or no coverage against rain, collected using the insect net and pitfall, Curitiba- Brazil.

Insect net Methodology		Without coverage against rain		With coverage against rain		*P* -valor
Insecta	Diptera	Control	Moxidectin Feaces	Control	Moxidectin Feaces	
	Sphaeroceridae	153	278	79	151	0.134
	Sarcophagidae	4	6	2	4	0.479
	Muscidae	3	9	2	5	0.057
	Chloropidae	1	1	1	2	0.627
	Ulidiidae	1	2	0	1	0.573
	Sepsidae	0	3	1	2	0.015*
	Bibionidae	0	0	1	1	0.091
	Dolichopodidae	2	1	1	0	0.137
	Phoridae	0	0	1	0	0.190
	Syrphidae	1	1	0	2	0.199
Pitfall Methodology		Without coverage against rain		With coverage against rain		*P* -valor
Insecta	Diptera	Control	Moxidectin Feaces	Control	Moxidectin Feaces	
	Sphaeroceridae	3	7	5	5	0.6427
	Muscidae	1	1	1	1	0.8576
	Sarcophagidae	1	1	0	1	0.7603
	Dolichopodidae	0	0	0	1	0.0719
	Bibionidae	1	0	0	0	0.1436
	Chloropidae	0	2	2	1	0.7862
	Sciaridae	0	1	1	1	0.4290
	Cecidomyiidae	0	0	0	1	0.7189
	Ulidiidae	0	0	0	1	0.1129

*P-valor significativo (P< 0.05) pelo teste de Kruskall-Walis.

Chironomidae were found in insect net and, Sepsidae, Chironomidae, Lauxaniidae, Shyrphidae, Phoridae, Tipulidae, Mycetophilidae, Ephydridae were found in pitfall traps. These families were collected in small numbers of individuals. Moxidectin did not reduce number of individual dung Diptera (P>0.05). Despite moxidectin being chemically related to ivermectin, it is putatively less toxic for coprophagous insects in cattle dung (Lumaret *et al.* 2012; Õmura 2002). This study revealed the same response to sheep dung. However, Floate *et al*. (2002) showed reductions in fly numbers were observed in dung voided 2 weeks after treatment with topical application of Moxidectin.

Conclusion

Despite the reduced environmental impact of moxidectin, alternatives to antihelmintics should be developed, decreasing the use of parasite chemical control because knowledge about the effects of moxidectin on the environment is still very limited. Further studies are needed to assess changes in dung biodiversity and species composition over longer over longer periods of time and with higher moxidectin concentrations.

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