

IMPACT OF AVERMECTIN TREATMENTS ON THE NATURAL FAUNA OF CATTLE DUNG

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SUMMARY: The effect of avermectin treatments on the natural fauna of cattle dung was evaluated using feces collected from 60 animals divided into 3 groups. Animals in groups 1 and 2 were treated with ivermectin or abamectin, respectively (both at 0.2 mg/Kg), and group 3, without treatment, was considered control. The feces were weighed and the fauna was identified. Regarding the weight of feces and the number of dung beetles, no statistical differences ($p > 0.05$) were observed amongst the three groups. The species identified in all groups were: *Aphodius lividus*, *Ataenius platensis*, *Ontherus sulcator* e *Onthophagus hirculus*. The horn fly *Haematobia irritans* was identified only in feces from the control group. It was concluded that, at least to the adult fauna, treatments with avermectins do not cause significant alterations on the colonization of fecal material of cattle.

KEY WORDS: Avermectin, bovine, dung fauna.

INTRODUCTION

The presence of avermectin residues in cattle feces and their effects on colonization and incorporation of fecal material to the soil by the dung fauna are well known (MEYER *et alii*, 1980; MILLER *et alii*, 1981; WARDHAUGH & RODRIGUEZ-MENÉNDEZ, 1988; SCHMIDT, 1983). Ivermectin is detectable in feces of treated animals and its concentration can be determined by the presence of its derived components in the feces by fluorescent chromatography.

WARDHAUGH & MAHON (1991) demonstrated avermectin residues in feces up to four weeks after subcutaneous treatment of cattle (0.2 mg/Kg). The concentrations of these residues were high enough to result in significant mortality of larvae of several genera of dung beetles.

Avermectin is also reported to produce mortality and decreased fecundation rates of adult coleoptera (RIDSILL-SMITH, 1988; WARDHAUGH & RODRIGUEZ-MENÉNDEZ, 1988), and delays in the construction of nests in feces and in oviposition (HOULDING *et alii*, 1991).

On the other hand, there are reports that fecal materials that had been treated with ivermectins have a shorter degradation

speed than untreated ones, producing, as a result, a negative impact on the natural micro and macrofauna present in feces (WARDHAUGH & MAHON, 1991).

The objective of this paper was to confirm the finds of the international literature regarding the effect of avermectin treatments on the natural fauna of cattle dung, considering animals treated with therapeutic dosis of ivermectin and abamectin in the Republic of Argentina.

MATERIALS AND METHODS

Sixty bovines, Aberdeen Angus breeding, of approximately two years old, were divided into three groups of 20 animals each. Animals in group 1 were treated with ivermectin (Merial), while animals in group 2 were treated with abamectin (Rosenbush), both at 0.2 mg/Kg live weight. Group 3 did not receive any treatment and was considered control. After 72 hours of treatments, fecal samples were collected directly from the rectum of each animal. Each sample was then weighed, adjusted to 2 Kg and placed in an experimental field, keeping a distance of 1m between each other. Before the beginning of the experiment,

2 to 8 cm of the vegetal coverage of the soil was removed to allow homogeneous environmental conditions to all samples. After 96 hours, each sample was weighed again and the number of parasites present was determined. The classification of the dung fauna was carried out according to Berlese, 1904.

A significance level of 95% was considered for statistical analyses. In order to homogenate variances and correct normality, the values of feces weights and number of dung beetles recovered were transformed into decimal logarithms (n+1). The means were compared by analyses of variance, using the Bonferroni z test for multiple comparisons.

RESULTS

The mean weights of fecal samples and the number of dung beetles, with their respective standard deviations (SD), obtained in the three groups are presented in Table 1.

The differences observed amongst the groups, either for feces weight or number of dung beetles were not statistically significant ($p > 0.05$).

The variance analyses of weights and number of dung beetles in feces are presented respectively in Tables 2 and 3.

The dung fauna identified in feces from all three groups is specified in Table 4. It is important to stress that under this experiment conditions, the only difference amongst the groups was the presence of the family Muscidae in feces from group 3 (control).

Table 1 - Mean values and standard deviations (SD) of weights and number of dung beetles recovered in feces from cattle treated with ivermectin (group 1) or abamectin (group 2).

Group	Final weight (kg) ± SD	Number of dung beetles
1	1,326.5 ± 74.5	71.3 ± 24.7
2	1,071.0 ± 106.0	78.8 ± 31.7
3 (control)	1,285.0 ± 98.3	73.3 ± 22.8

Table 2 - Variance analyses of final weight of feces collected from cattle treated with ivermectin or abamectin. Values transformed into log (n+1).

Source	DF	Square sums	Square means	F value	Pr > F
Model	2	0.01920867	0.00960433	5.36	0.0461
Error	6	0.01074133	0.00179022		
Total corrected	8	0.02995000			

Table 3 - Variance analyses of number of dung beetles in feces collected from cattle treated with ivermectin or abamectin. Values transformed into log (n+1).

Source	DF	Square sums	Square means	F value	Pr > F
Model	2	0.01075356	0.00537678	0.36	0.7138
Error	6	0.09039400	0.01506567		
Total corrected	8	0.10114756			

Table 4 - Dung fauna observed in feces from cattle treated with ivermectin (group 1) or abamectin (group 2).

Genera and species	Group 1	Group 2	Group 3 (control)
<i>Aphodius lividus</i>	X	X	X
<i>Ataenius platensis</i>	X	X	X
<i>Ontherus sulcator</i>	X	X	X
<i>Onthophagus hirculus</i>	X	X	X
<i>Haematobia irritans</i>			X

DISCUSSION

Although there are several publications on the potential undesirable effect of the macrocyclic lactons (ivermectin and abamectin) on the natural fauna that colonizes the bovine fecal material (HALLEY *et alii*, 1989; WARDAUGH & MAHON, 1991), such effect was not observed in the present study. In this sense, this paper confirms previous findings reported by WARDAUGH & MAHON, 1991 and HOLTER *et alii*, 1993, who demonstrated normal colonization of treated feces.

It is important to register that in feces from animals treated with ivermectin or abamectin no intermediate stages of *Haematobia irritans* were found, confirming the anti-parasitic effect of avermectins on this fly (HALLEY *et alii*, 1989; MILLER *et alii*, 1981; MEYER *et alii*, 1980). This last observation allows us for an indirect validation of the presence of active avermectin residues in feces of treated animals.

With this experiment it was concluded that, as far as the dung adult fauna is concerned, treatments with avermectins do not affect significantly the natural colonization of bovine feces, allowing normal levels of degradation in the environment.

SUMÁRIO

Avaliou-se o efeito do tratamento de bovinos com avermectinas sobre a fauna natural presente nas fezes. Foram utilizadas fezes de 60 animais divididos em 3 grupos: grupo 1- tratado com ivermectina, grupo 2- tratado com abamectina (ambas na dose de 0,2 mg/Kg peso vivo) e grupo 3- sem

tratamento (controle). Foram feitas pesagens das fezes e identificação da fauna presente. As diferenças observadas nos pesos e número de besouros esterqueiros presentes nas fezes dos diferentes grupos não foram estatisticamente significativas ($p > 0,05$). As espécies identificadas nos 3 grupos foram: *Aphodius lividus*, *Ataenius platensis*, *Ontherus sulcator* e *Onthophagus hirculus*. A mosca *Haematobia irritans* foi encontrada apenas no grupo controle. Concluiu-se que, pelo menos em relação à fauna adulta, tratamentos com avermectinas não ocasionam alterações significativas na colonização da matéria fecal de bovinos.

PALAVRAS-CHAVE: Avermectinas, bovinos, fauna esterqueira

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