



Short Communication

Efficacy of eprinomectin pour-on against *Dictyocaulus arnfieldi* infection in donkeys (*Equus asinus*)Vincenzo Veneziano^{a,*}, Antonio Di Loria^b, Roberto Masucci^c, Rossella Di Palo^d, Emanuele Brianti^e, Cengiz Gokbulut^f^a Department of Pathology and Animal Health, Faculty of Veterinary Medicine, University of Naples Federico II, Naples, Italy^b Department of Veterinary Clinical Science, University of Naples Federico II, Naples, Italy^c Equine Veterinary Clinic Nuovi Orizzonti, Castelvoturno, Italy^d DISCIZIA, Faculty of Veterinary Medicine, University of Naples Federico II, Naples, Italy^e Department of Veterinary Public Health, Faculty of Veterinary Medicine, University of Messina, Italy^f Department of Pharmacology and Toxicology, Faculty of Veterinary Medicine, University of Adnan Menderes, Aydin, Turkey

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ABSTRACT

A trial to assess the efficacy of eprinomectin (EPM) against the lungworm *Dictyocaulus arnfieldi* was carried out on 15, naturally-infected donkeys. Ten animals were treated with a 'pour-on' EPM preparation (at a dose of 0.5 mg/kg bodyweight), and five animals acted as controls. Faecal larval counts were carried out two days before treatment, on day of treatment and 7, 14, 21 and 28 days post-treatment with the anthelmintic. EPM was 100% effective in eliminating faecal larvae from day 7, until the end of study at day 28. No adverse drug-reactions or side-effects were observed in any of the treated donkeys.

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Dictyocaulus arnfieldi is a lungworm of equine species including donkeys, horses, mules, and zebras (Round, 1976). Although common in donkeys, it is rarely associated with clinical disease, in contrast to the case in horses where the parasite can cause coughing and nasal discharge. It is thought that donkeys are the natural host for *D. arnfieldi* and that the parasite can be transmitted from donkeys to horses pastured together.

There is a paucity of data available on the efficacy of anthelmintics in donkeys. The anthelmintic eprinomectin (EPM), an avermectin, is available in 'pour-on' form for use in cattle at a dose rate of 0.5 mg/kg bodyweight (Shoop et al., 1996). This drug has been widely used for parasite control in dairy cattle since, given its zero milk-withdrawal time, it can be used safely in lactating animals. The lack of drugs registered for use in donkeys, has resulted in anthelmintics licensed for use in horses or ruminants being used in this species at similar dose rates. Despite the increasing use of donkeys in leisure activities, onotherapy (animal-assisted therapy) and milk production (Monti et al., 2008), there are no data regarding the efficacy of anthelmintics such as EPM against parasites affecting this species. The aim of this field trial was to evaluate the efficacy of a pour-on EPM formulation, used at the dose rate recommended for cattle (0.5 mg/kg), against naturally-occurring *D. arnfieldi* infection in donkeys.

The investigation was approved by Animal Ethics Committee of the University of Naples, Federico II. Fifteen crossbred (including Ragusano, Amiata, and Sicilian-grey) female donkeys with a mean bodyweight of 208 kg were selected. The animals had not been treated with anthelmintics during the previous 9 months. The donkeys were tagged for identification purposes and group-housed indoors until trial commencement. Water was provided ad libitum throughout the course of the study.

Ten animals were randomly assigned to a 'treated' group and a pour-on EPM (Eprinex, Merial) licensed for use in cattle was administered at the cattle dose rate of 0.5 mg/kg bodyweight along the dorsal midline. The five remaining donkeys were untreated and acted as controls. Individual faecal samples were collected from all animals 2 days before treatment (D -2), on the day of treatment (D 0), and at 7 (D 7), 14 (D 14), 21 (D 21) and 28 (D 28) days after treatment. Larval count/g of faeces (LPG) was determined using the Baermann technique (MAFF, 1986).

Larvae were identified based on morphological criteria (Cameron, 1926) and the arithmetic mean of the LPG was calculated at each sampling point. The percentage treatment efficacy (%) of the EPM was calculated at each time-point using the formula:

$$\text{Efficacy} = 100 \times (1 - [\text{Ta}/\text{Ca} \times \text{Cb}/\text{Tb}])$$

where Tb is the number of larvae counted from the treated group before treatment, Ta the number of larvae counted after treatment, Cb the number counted from the control group before treatment

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Table 1

Arithmetic mean faecal larval count/g (LPG) of *Dictyocaulus arnfieldi* larvae in donkeys at sampling points between two days before (D -2) and 28 days after treatment with pour-on eprinomectin and in untreated controls. The percentage reduction (PR) in larval numbers is indicated for each time-point.

	LPG					
	D -2	D 0	D 7	D 14	D 21	D 28
Control animals	44.8	34.0	58.4	72.6	45.6	33.8
Treated animals	41.6	45.0	0	0	0	0
PR (%)	–	–	100	100	100	100

and Ca the number counted from the control group after treatment (Henderson and Tilton, 1955). Animals were monitored for evidence of adverse drug-reactions and sides-effects at each sampling time-point.

All larvae collected were identified as *D. arnfieldi*. The arithmetic mean LPG and the percentage reduction (PR) effect of the treatment are detailed in Table 1. The arithmetic mean of the LPG count was lower in the treated compared to the control group at all sampling points post-treatment and, as the efficacy of treatment was 100%, no statistical analysis was performed. No adverse reactions or side-effects were observed in any of the treated animals.

This is the first evaluation of the efficacy of EPM against naturally-occurring *D. arnfieldi* infection in donkeys, and information as to the effectiveness of other anthelmintics against this lung parasite of the donkey is limited. High doses of benzimidazoles are required to treat lungworm infections in donkeys but are not 100% efficacious. Thiabendazole at a high dose rate of 440 mg/kg has been used in donkeys (Clayton and Trawford, 1981), but a proportion of animals exhibited depression and anorexia after treatment. Orally administered mebendazole given for 5 days at elevated dose rates (15.2–20 mg/kg) was 75–100% effective and repeated treatments with fenbendazole (initial treatment of 7.5–30 mg/kg followed by two further treatments of 15 mg/kg) failed to eliminate lungworm infection in this species (Urch and Allen, 1980). In the previous assessment of macrocyclic lactones against *D. arnfieldi* in donkeys, Tex et al. (1993) found that orally administered ivermectin at 0.2 mg/kg was 100% effective 14 days post-treatment. In a field study of 15 young donkeys, Coles et al. (1998) found that oral moxidectin at the recommended dose of 0.4 mg/kg was 100% effective up to 21 days after treatment.

The results of the present study indicate that EPM when administered as a pour-on preparation, and at a dose rate recommended for cattle, is effective against *D. arnfieldi* infection in donkeys. Given that EPM is suitable for use in lactating animals, this anthelmintic may prove useful in the parasite control programmes of donkey farms involved in the production of milk for human consumption. However, further pharmacokinetic assessment, including milk residue studies, will need to be conducted to confirm the safety of this drug in donkeys, particularly in those producing milk for human consumption.

Conflict of interest statement

None of the authors of this paper has a financial or personal relationship with other people or organisations that could inappropriately influence or bias the content of the paper.

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