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Efficacy of moxidectin 0.5% pour-on against naturally acquired nematode infections in cattle in the Mexican tropics

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Abstract

The efficacy of 0.5% moxidectin pour-on in cows with naturally acquired nematode infections was evaluated. The study was carried out in a ranch in Veracruz, Mexico. Four groups of 15 cows were randomly allocated. Animals in the treated group received 0.5% moxidectin pour-on at a dose of 0.5 mg/kg body weight on a single occasion. The other two groups remained as untreated controls. Fecal samples from all cattle were taken on days 0 (pre-treatment), 7, 14, 28 and 60 (post-treatment, PT). Fecal egg-counts were determined using a modified McMaster technique and fecal cultures were performed to identify gastrointestinal nematodes infected larvae (L_3). Treatment with moxidectin was associated with a significant reduction in fecal trichostrongyle egg-counts compared with the controls; efficacy was 100% at 28 days PT. *Haemonchus* spp. and *Strongyloides* spp. were the two genera identified from coprocultures.

Keywords: Cattle; Gastrointestinal nematodes; Moxidectin; *Haemonchus*; Tropics

1. Introduction

Moxidectin is a macrocylic lactone belonging to the milbemycin family. It has a broad spectrum of endectocide activity and is widely used in many species of animals. Moxidectin has been available as a pour-on formulation and an aqueous-based injectable formulation for cattle for many years. The efficacy and persistent activity of the pour-on and injectable formulation of moxidectin against gastrointestinal nematode infections in cattle has been reported by numerous authors (Smith et al., 2000; Stromberg et al., 2000). Moxidectin pour-on had an efficacy of almost 100% against trichostrongyles for more than 5 weeks (Whang et al., 1994; Morin et al., 1996). During a field trial with naturally infected cattle in Argentina,

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moxidectin given subcutaneously at a dose rate of 0.2 mg/kg bodyweight in autumn, winter and spring, was highly effective in reducing fecal egg-counts and parasite larval contamination on pasture and in improving weight gains (27 kg) compared to control cattle (Bulman et al., 1993).

In the Mexican tropics, few studies have been carried out to evaluate the efficacy of moxidectin against gastrointestinal nematodes in cattle (Aguilar-Tipacamu and Rodriguez-Vivas, 2002). The purpose of the present study was to evaluate the efficacy of moxidectin 0.5% pour-on against naturally acquired nematode infections in cows and calves in the Mexican tropics.

2. Materials and methods

2.1. Study area

The present study was carried out in Martínez de la Torre, Veracruz, Mexico (Centro de Enseñanza, Investigación y Extensión en Ganadería Tropical-FMVZ-UNAM). The climate of the zone is humid tropical, with mean annual temperature is 24.4 °C, annual rainfall of 1990 mm and relative humidity of 85% (García, 1981).

The study was conducted between November 2002 and January 2003. During the research period mean monthly temperature, rainfall and relative humidity were 22.2 °C, 70 mm and 68.1%, respectively.

2.2. Study design

Thirty F1 cows (Holstein × Zebu) of more than one calving were used in the trial. The cows were naturally infected with gastrointestinal nematodes. The general pasture area used in the study consisted of individually fenced 1.5 ha pastures. Primary forage during time of the study consisted of African star grass (*Cynodon nlemfuensis*), native forage (*Paspalum* spp. and *Axonopus* spp.) with fresh water ad libitum. Cows were randomly allocated into two groups of 15 each (treated and control group) and identified with ear tags. A number was assigned to each cow and a random number generator was used for selection. Animals in the treated group received 0.5% moxidectin (Cydectin Pour-on®, Fort Dodge Animal Health, Mexico) at a dose of 0.5 mg/kg body weight on a single occasion (day 0). Moxidectin 0.5% pour-on was applied topically to the dorsal midline between the withers and the base of the tail of each animal. The other group remained as an untreated control group. Animals were weighed (mean weight of 448.6 kg, range 420–557 kg) with a calibrated scale on day 0 to determine the indicated dose of moxidectin. The animals were then released on the same pasture into two similar fenced off parts for the duration of the experiment. The cows were examined for local or general adverse reaction to 0.5% pour-on moxidectin 4, 8 and 24, 48 and 72 h after treatment. The study was conducted for 60 days.

2.3. Sample collection and analysis

Individual rectal fecal samples were taken on days 0 (pre-treatment) and 7, 14, 28 and 60 (post-treatment). Fecal egg-counts (eggs/g) were determined using a modified McMaster technique (Rodríguez-Vivas et al., 1994), mixing 2 g of faeces in 28 ml of saturated NaCl solution with a lower detection limit of 50 eggs per gram of faeces. Bulk fecal cultures were performed for each group on each sampling day for coproculture. Coprocultures were kept at room temperature and were harvested on day seven using the Corticelli–Lai technique (Rodríguez-Vivas et al., 1994). The gastrointestinal nematodes infective larvae (L_3) obtained from coprocultures were identified by their morphology and size (MAFF, 1986; Bowman and Lynn, 1999).

2.4. Statistical analysis

Percent efficacy of 0.5% pour on moxidectin, based on reduction in fecal egg counts was calculated for the undifferentiated trichostrongyle eggs as follows (Morin et al., 1996) at each time point that samples were collected.

$$\text{Efficacy}\,(\%) = \frac{\text{mean egg count control group} - \text{mean egg count treated group}}{\text{mean egg count control group}} \times 100$$

For each time of measurement, egg-counts were analyzed using the *U* Mann–Whitney at confidence