

Effect of Injectable Moxidectin Treatment of Cattle on Prevalence and Strongyle Egg Output under Communal Grazing Management in Uganda

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Key words

Cattle – *Nematoda* – Moxidectin – Pastures – Uganda.

Summary

The effect of moxidectin on the prevalence of nematode infection in cattle, fecal egg output and pasture contamination of common pastures was assessed in Tororo district, Uganda. In the first experiment, a treated and an untreated group of 40 head of cattle each were monitored for a period of 12 weeks, while in the second experiment a treated and an untreated group of 30 head of cattle each were monitored for seven months. In the first experiment, the prevalence of nematode infections and mean fecal egg count (FEC) of the treated group remained significantly ($P < 0.05$) lower than that of the untreated group from day 7 to 84. In the second experiment, strategic treatments initially led to 100% reduction of FEC in the treated cattle as compared to 82% in the untreated one. Thereafter, mean FEC in the treated cattle remained below 60 for six months, while that in the untreated cattle fluctuated between 63 and 400, depending on the amount of rainfall. In addition, contamination with infective larvae on pasture of the treated cattle was significantly ($P < 0.05$) lower than that of the untreated group during the wet season. Infestation with *Haemonchus* spp., *Bunostomum* spp., *Oesophagostomum* spp. and *Trichostrongylus* spp. was three-, five-, four- and two-fold lower, respectively, on pasture in treated than in untreated cattle. Moxidectin could be used in strategic parasite control under communal grazing management in tropical Africa by selective treatment of the most affected cattle age-groups during the middle and end of the wet season to reduce the level of pasture contamination.

INTRODUCTION

Gastrointestinal nematode infections and fasciolosis in cattle are widespread in Uganda, especially under traditional management (2, 3, 5), and constrain cattle health and productivity. Control methods like control of pasture contamination through controlled grazing and routine treatment of cattle with anthelmintics most available to farmers in Uganda are limited by a number of factors. Use of controlled grazing is not feasible under the traditional communal grazing system where grazing areas are shared and yet no farmer takes charge of pasture management. Climatic conditions in Uganda favor continuous survival of helminth larvae on pastures of communal grazing areas, hence cattle are frequently

re-infected and need frequent dosing, which renders short duration anthelmintics costly to farmers. Under such circumstances, broad-spectrum anthelmintics with an extended antiparasitic activity such as moxidectin are desirable for farmers. Although the efficacy of moxidectin against nematode infections in cattle has been successfully evaluated in temperate regions (1, 8, 9), there are few reports on its efficacy in tropical Africa and none from Uganda. Therefore, a study was undertaken to evaluate the effect of the injectable moxidectin treatment of cattle on the prevalence and strongyle egg output under communal grazing management practice in Uganda.

MATERIALS AND METHODS

The study was conducted during the dry season between November 1998 and March 1999 in Tororo district (Figure 1). The vegetation in Tororo district is composed of savannah grassland

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Figure 1: Map of Uganda showing Tororo district where the study area was located.

interspersed with *Lantana camara* shrubs. The district receives 1200-1500 mm rainfall annually. The rainfall is bimodal with two wet seasons (March-May and September-November) and two dry seasons (December-February and June-August). The area has a mean relative humidity of 65% and daily mean temperatures range between 15°C minimum and 27°C maximum.

Eighty zebu cattle aged 6-18 months kept under a communal grazing system and belonging to eight different herds were used in the experiment. The cattle were randomly allocated to a treatment (n = 40) and a control group (n = 40). Each herd had five treated and five control animals. On day 0 animals in the treated group were injected subcutaneously with 1% moxidectin (Cydectin®, Cyanad Animal health, UK) at a dose rate of 0.2 mg/kg, while control animals were left untreated. Fecal samples were taken from animals of both groups on day 0 and every 7 days thereafter until day 84. During sampling, fecal samples were taken directly from the rectum and then each sample was placed in a separate plastic bag, clearly labeled with the eartag number of the individual animal before they were dispatched in a cool box to the laboratory for immediate examination. Fecal egg counts were made on each sample using the modified McMaster technique method accurate to 50 eggs per gram of feces (7), with nematode eggs classified as strongyle-type. The suppression effect of moxidectin was assessed by comparing the mean fecal egg count and prevalence of nematode infection of the treated cattle to those of the untreated cattle grazing on common pastures.

■ RESULTS AND DISCUSSION

Over 88% of the 80 cattle used in the first experiment secreted strongyle worm eggs before treatment. From the findings of the present study, nematode infections in treated cattle were cleared by day 7 posttreatment and the animals remained free of infection until day 56. Though re-infection appeared by day 56, the prevalence of nematode infection in treated cattle remained significantly (P < 0.05) lower than that in untreated cattle until

day 84 (Figure 2). Likewise mean fecal egg counts of the treated group dropped to zero by day 7 posttreatment and remained at that level until day 56 posttreatment (Figure 3). After re-infection of treated cattle between day 56 and 84, the mean fecal egg count of treated cattle remained significantly (P < 0.05) lower than that of untreated cattle.

In this study, moxidectin suppressed the prevalence of nematode infections and fecal egg output in cattle under communal grazing management for 11 weeks during the dry season. In other studies, injectable moxidectin has been reported to have an efficacy of 98.9% seven days after dosing, then to gradually decrease to

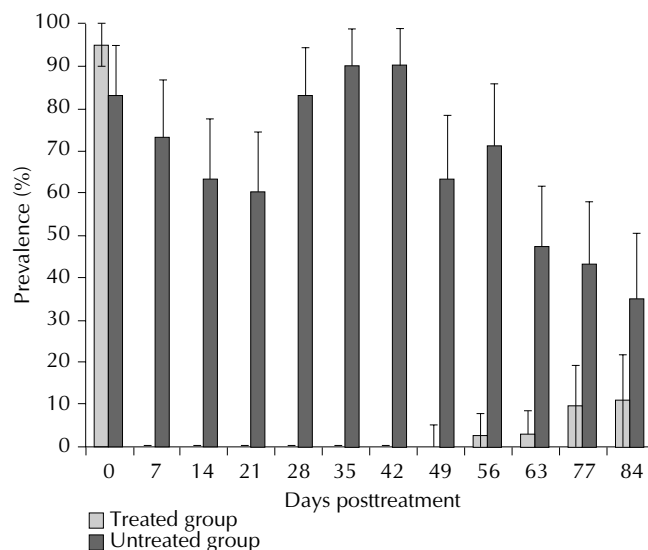


Figure 2: Prevalence of nematode infections in moxidectin-treated and untreated cattle grazing on communal pastures in Tororo district, Uganda, 1999.

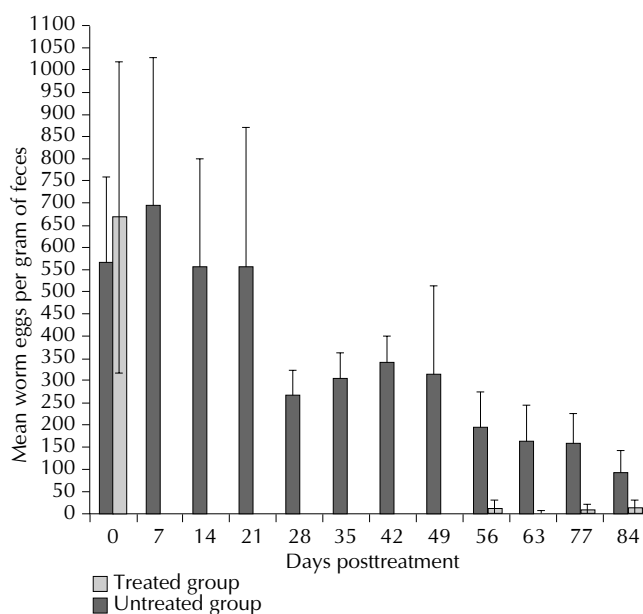


Figure 3: Mean fecal egg counts of moxidectin-treated and untreated cattle grazing on communal pastures in Tororo district, Uganda, 1999.

52.4% after 28 days (6). In this study, injectable moxidectin maintained over 90% efficacy for 11 weeks, contrary to other studies that revealed a persistence of six weeks (1, 8, 9). This long period of suppression of nematode infections in cattle by moxidectin treatment has been attributed to its deterrent effect on the build-up of infective larvae on pasture, a probable effect of macrocyclic lactones on worm fecundity or host immunity (4). Moxidectin is almost exclusively sequestered in fat, where it is only slightly metabolized and has a half-life of 12 to 14 days (6), other factors, such as treated groups having had low exposure to infections due to the dry season, could have been responsible for the reductions in fecal egg counts observed 84 days posttreatment (4). Treatment of cattle during the dry period when there is nutritional stress would reduce the effect of eggs per gram, fecal egg counts and subsequent pasture contamination with parasite eggs at the onset of the next wet season. Such treatment would include dosing livestock immediately after long and after short rains.

These findings showed that moxidectin was effective against *Strongyloides* spp., *Haemonchus* spp., *Trichostrongylus* spp., *Bunostomum* spp., *Oesophagostomum* spp. and *Cooperia* spp., which are the common nematode genera found on pastures in Tororo district (2).

■ CONCLUSION

The long antiparasitic activity of moxidectin makes it suitable for a sustained control of nematode infections in cattle in tropical Africa, especially for farmers practicing communal grazing management under which use of controlled grazing is impractical and repeated use of short duration anthelmintics is prohibitively expensive. Moxidectin could be used in strategic prophylactic parasite control by selective treatment of the most affected cattle age-groups, such as postweaning young, during the dry season to reduce the level of pasture contamination.

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Résumé

Magona J.W., Musisi G. Effet de traitement par injection de moxidectine sur la prévalence et la production d'œufs de strongles chez des bovins dans un système de pâturage communal en Ouganda

L'effet de la moxidectine sur la prévalence des infections par les nématodes chez les bovins, ainsi que sur la production d'œufs des fèces et la contamination sur des pâturages collectifs a été évalué dans le district de Tororo en Ouganda. Dans le premier essai, un groupe traité et un autre non traité de 40 bovins chacun ont été suivis pendant une période de 12 semaines, alors que dans le deuxième essai un groupe traité et un autre non traité de 30 bovins chacun ont été suivis pendant sept mois. Dans le premier essai, la prévalence d'infection par les nématodes ainsi que le nombre moyen d'œufs des fèces du groupe traité sont restés significativement ($p < 0,05$) moins importants que ceux du groupe non traité du 7^e au 84^e jour. Dans le deuxième essai, les traitements stratégiques ont d'abord entraîné une réduction du nombre d'œufs de 100 p. 100 chez les bovins traités, alors que cette réduction a été de 82 p. 100 chez les bovins non traités. Par la suite, le nombre moyen d'œufs des fèces du groupe traité est resté en dessous de 60 pendant six mois, alors que celui du groupe non traité a fluctué en fonction de la pluviométrie entre 63 et 400. De plus, la contamination au pâturage par des larves infestantes des bovins traités a été significativement ($p < 0,05$) plus faible que celle du groupe non traité pendant la saison humide. Les infestations au pâturage par *Haemonchus* spp., *Bunostomum* spp., *Oesophagostomum* spp. et *Trichostrongylus* spp. ont été respectivement trois fois, cinq fois, quatre fois et deux fois moins importantes chez les bovins traités que chez les bovins non traités. La moxidectine pourrait être utilisée dans la lutte stratégique contre les parasites dans les conditions de gestion communale des pâturages en Afrique tropicale par le traitement sélectif des groupes d'âges de bovins les plus affectés à la mi- et à la fin de la saison des pluies pour réduire la contamination au pâturage.

Mots-clés : Bovin – *Nematoda* – Moxidectine – Pâturages – Ouganda.

Resumen

Magona J.W., Musisi G. Efecto del tratamiento con moxidectina inyectable en ganado sobre la prevalencia de huevos de estróngilos

Se estudió el efecto de la moxidectina sobre la prevalencia de la infección por nemátodos en ganado, producción de huevos en heces y contaminación del pasto en pastos comunales en el distrito de Tororo, Uganda. Durante el primer experimento, se siguió un grupo tratado y un grupo no tratado de 40 cabezas de ganado cada uno, durante un período de 12 semanas, mientras que durante el segundo experimento se siguió un grupo tratado y uno no tratado, de 30 cabezas cada uno durante siete meses. En el primer experimento, la prevalencia de infecciones por nemátodos y el conteo promedio de huevos en heces (FEC) en el grupo tratado se mantuvo significativamente ($P < 0,05$) más bajo que en el grupo no tratado, desde el día 7 al 84. En el segundo experimento, los tratamientos estratégicos llevaron inicialmente a una reducción del 100% de FEC en el ganado tratado, en comparación con 82% en el no tratado. Por otro lado, la FEC promedio en el ganado tratado se mantuvo bajo 60 durante seis meses, mientras que en el ganado no tratado fluctuó entre 63 y 400, según la cantidad de lluvia. Además, la contaminación con larvas infectivas en el pasto del ganado tratado fue significativamente ($P < 0,05$) más baja que en el grupo no tratado durante la estación húmeda. La infestación por *Haemonchus* spp., *Bunostomum* spp., *Oesophagostomum* spp. y *Trichostrongylus* spp. fue tres-, cinco-, cuatro- y dos- veces más baja, respectivamente, en los pastos del ganado tratado que en los del no tratado. La moxidectina podría ser utilizada para el control estratégico de los parásitos bajo manejo de pastoreo comunal en África tropical, mediante tratamiento selectivo de los grupos de edad afectados durante la mitad y el fin de la estación húmeda con el fin de reducir el nivel de contaminación de los pastos.

Palabras clave: Ganado bovino – *Nematoda* – Moxidectin – Pastizales – Uganda.