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Treatment of Feedlot Cattle in Alberta for Gastrointestinal Nematodes

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SUMMARY

The effects of a single treatment at entry with three anthelmintics on rates of weight gain and feed conversion efficiency over a 70 day period were studied in 200 feedlot steers. None of the anthelmintic treatments used appeared to confer any improvement in the above parameters under the conditions of this experiment. The results are discussed in relation to routine anthelmintic treatment in western Canada.

RÉSUMÉ

Traitement des bouvillons d'un parc d'engraissement de l'Alberta, contre les nématodes gastro-intestinaux

Cette expérience visait à étudier l'effet d'un seul traitement de 200 bouvillons, avec l'un ou l'autre de trois anthelminthiques, lors de leur arrivée au parc d'engraissement, sur le taux du gain de poids et de la conversion alimentaire, durant une période de 70 jours. Ni l'un ni l'autre de ces anthelminthiques ne sembla provoquer une amélioration quelconque des paramètres mentionnés ci-haut, dans les conditions de l'expérience. On commente les résultats en fonction du traitement anthelminthique conventionnel utilisé dans l'Ouest canadien.

INTRODUCTION

Nematode parasites of the gastrointestinal tract of cattle cause economic losses to farmers throughout the world. Under most conditions of management of beef cattle in Canada reinfection with nematodes while in the feedlot is unlikely to occur. Thus, the worm burden that they have on entry to the feedlot is unlikely to increase and usually gradually diminishes (2, 5). If cattle are to benefit from treatment with anthelmintics they should be treated as close to their date of entry into the feedlot as possible. It is presumed that the degree by which the animals benefit from such treatment will depend upon the numbers and species of susceptible nematodes present in the animals at that time.

In the southern and central states of the U.S.A. economic advantages have resulted from treating cattle in feedlots (6), but in the northern states there is conflicting evidence on the advantage of such treatment (1, 3, 9). In view of the rarity of clinical disease due to gastrointestinal nematodes in the prairie provinces and the low numbers of fecal eggs usually found in routine examination of cattle in Alberta we set up the clinical trial to be described here.

MATERIALS AND METHODS

Two hundred steers, approximately 18 months old, of mixed breeding and from the Peace River district of Alberta were assembled during the course of a week. Two days after assembly the steers were weighed, numbered with ear tags and rectal fecal samples collected from them. The cattle were ranked according to weight, assigned random numbers and divided into groups of 25 animals so that the mean weight per animal per group was approximately the same. The animals ranged from 340-413 kg in weight. The next day the steers were given on one occasion only

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the four treatments as follows: two groups received levamisole[1] by subcutaneous injection at a dose rate of 182 mg/22.68 kg body weight, two groups of steers were injected subcutaneously with indigo carmine as a placebo, two groups received morantel tartrate[2] orally at a dose rate of 10 mg/kg and two groups received thiabendazole[3] orally at a dose rate of 5 g/55.36 kg. Thus, in all there were two replicate groups for each treatment. Total feed consumption per group was measured and from this daily feed consumption per head of cattle was estimated.

The steers were weighed and fecal samples were taken 42 and 71 days after treatment. The animals were on a mainly roughage ration for the first week after arrival at the feedlot which was gradually converted to a concentrated feed.

The ova counts per gram of feces were made using the method of Todd *et al* (7). The fecal cultures were performed as follows: samples from five animals in the same pen were pooled, cultured and the larvae were identified (4). Thus, five samples were obtained from each group, as there were 25 animals/group, and because there were two groups per treatment a total of ten samples for each treatment were cultured.

The statistical test used to analyse the data on rate of weight gain and efficiency of feed conversion was the analysis of variance ($p<0.05$).

RESULTS

All three anthelmintics appeared to be highly effective against gastrointestinal trichostrongylids in feedlot steers as measured by the reduction in mean fecal egg counts per gram (Table I). There was also a slow decline in mean fecal egg counts per gram in the control steers.

TABLE I
MEAN EGGS PER GRAM OF FECES OF THE STEERS AT DIFFERENT SAMPLING DAYS

Treatment	Day 0	Day 42	Day 72
Controls	24.5	17.5	11.5
Levamisole	16.0	1.0	1.0
Morantel tartrate	25.5	2.5	1.5
Thiabendazole	20.5	<1.0	<1.0

TABLE II
MEAN DAILY WEIGHT GAINS AND FEED CONVERSION RATES OF STEERS

Treatment	Weight Gain*	Conversion†
Control	1.63[a]	6.78[b]
Levamisole	1.63[a]	6.64[b]
Morantel tartrate	1.70[a]	6.49[b]
Thiabendazole	1.59[a]	6.86[b]

[a, b] — No statistically significant difference using F test between figures with the same superscript ($p<0.05$)
* Kilograms/day
† Kilograms of feed/Kilograms weight gained

There were no significant differences in daily rates of weight gain or feed conversion efficiency between any of the treated or untreated groups of steers after analysis of the data obtained (Table II).

Treatment with anthelmintics had a marked effect on the composition of the gastrointestinal nematode populations (Table III). In all three groups *Ostertagia* spp. became approximately 90% of the fecal egg population and *Trichostrongylus* spp. less than 10%, with a concomitant almost complete disappearance of *Haemonchus* sp. and *Cooperia* spp. In the control group of calves there was a reduction in the numbers of eggs produced by *Haemonchus* sp. at day 42. In the same groups, the percentage composition of *Ostertagia* spp. remained fairly constant while that of *Trichostrongylus* spp. increased and that of *Cooperia* spp. declined at the 42 day and 72 day samplings.

DISCUSSION

From a comparison of the reduction of fecal eggs per gram counts between the three treated groups and the control group, it is immediately apparent that all three anthelmintics used were highly effective in removing adult nematodes. Also, there was a gradual reduction of worm burden in the absence of reinfection in the control group. This latter phenomenon has also been noted by other workers (2, 5). We assume that the change in composition of fecal egg counts to 90% *Ostertagia* spp. and to less than 10% *Trichostrongylus* spp. in the treated groups was due to the effectiveness of the three drugs in

[1]Tramisol, Cyanamid Canada Inc., Montreal, Quebec.
[2]Exhelm E, Rogar/STB, London, Ontario.
[3]Thiabenzole, Merck Sharp & Dohme Canada Limited, Dorval, Quebec.

TABLE III

THE PERCENTAGE COMPOSITION OF GENERA OF TRICHOSTRONGYLIDS IN FECAL SAMPLES FROM THE STEERS

Treatment	Nematode Genera	Day		
		0	42	71
Control	*Haemonchus*	16.7[a]	+	0.0
	Ostertagia	32.2	35.1	39.9
	Trichostrongylus	19.6	42.2	47.6
	Cooperia	31.1	20.6	11.2
Levamisole	*Haemonchus*	16.2	0.0	0.0
	Ostertagia	39.6	93.0	90.8
	Trichostrongylus	25.1	7.0	7.2
	Cooperia	18.5	0.0	0.0
Morantel	*Haemonchus*	24.8	0.0	0.0
	Ostertagia	32.7	88.4	84.2
	Trichostrongylus	26.0	15.08	13.0
	Cooperia	15.7	0.0	0.0
Thiabendazole	*Haemonchus*	22.65	0.0	0.0
	Ostertagia	25.75	92.25	95.9
	Trichostrongylus	15.6	3.0	1.5
	Cooperia	35.5	+	2.0

[a]Mean of ten values

+Worms present at >0.0% but <1.0%

removing adult worms and the subsequent recruitment of inhibited larvae from the abomasal mucosa. However, these results were obtained from feces which contained only 2.5 or fewer eggs/gram and thus represent a very low level of infection.

Although all three anthelmintics were highly effective in reducing the worm burdens of cattle, none conferred any advantage in terms of daily weight gain or feed conversion efficiency when compared to the control group (Table II). This is in contrast to a study by Stewart *et al* (6) who found an increase of 5% rate of gain in body weight of treated cattle compared to that of control cattle. However, in three other trials to examine the effect of anthelmintic treatment on feedlot cattle in Colorado, Nebraska and Idaho no beneficial effect in terms of increased weight gains occurred (1, 3, 9). In the Nebraska trial fecal egg counts were similar to those reported here. Furthermore, in at least two trials conducted in Georgia, comparable weight gains were made by treated and untreated cattle under feedlot conditions (2, 8).

The differences in the benefits of treating cattle at entry into feedlots presumably arise from the differences in worm burden of the animals at that time. In areas such as Georgia where conditions are favorable to translation or transmission of nematode infection most of the year such treatment would appear to be of benefit. In areas such as the northern plains states and the prairie provinces conditions for translation are poor. This is reflected in low worm burdens in cattle and low fecal egg counts. We infer that unless cattle are known to have high burdens of nematodes at entry to feedlots, and this may be assessed by clinical signs and diagnostic parasitological procedures, it is unlikely that any financial advantage will result from anthelmintic treatment of feedlot cattle in the prairie provinces.

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LETTERS TO THE EDITOR

Author of "The Dog Crisis" Lists Her Credentials

DEAR SIR:

Your review in the April issue of my book The Dog Crisis has just caught up with me.

The reviewer, Dr. B.P. Pukay, suggests that my credentials to write this book may be lacking. Pukay interviewed me in Ottawa last November and the first question he asked was what my credentials were to write the book and I replied that in the first place I am a professional writer, experienced in writing and researching numerous complex social issues. Specifically, in order to write The Dog Crisis I spent almost three years researching the literature, attending meetings and symposia, in personal communication with public health officials, veterinarians, MDs of various disciplines, spokesmen of numerous animal welfare organizations, dog trainers and breeders, executives of pet food manufacturing companies, advertising, marketing and public relations agencies, directors of trade associations and countless miscellaneous authorities, travelling in Canada, the U.S. and England to do so. The enormous amount of research undertaken to write The Dog Crisis is documented in 24 pages of references and bibliography.

Certain professionals enjoy quibbling about credentials, implying that without first-hand experience credentials are lacking. On that basis who is qualified to write about the Persian wars, or Shakespeare, or for that matter any homicide? Carrying that argument to its logical conclusion I would ask Pukay what his credentials are for writing book reviews. He is a veterinarian.

Sincerely,
IRIS NOWELL
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Reviewer of "The Dog Crisis" Replies

DEAR SIR:

In my review I did not question Nowell's credentials to write the book but rather, I stated "Iris Nowell's credentials *as an expet* on the subject are lacking". I feel she is very qualified to write a book such as "The Dog Crisis", but I just do not think that three years of research necessarily makes her an expert, especially on as wide a range of topics as public health, medicine, the pet food industry, etc., etc.

Credentials are an important factor in evaluating the credibility of any work and to see this concern as "quibbling" is irresponsible.

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