IMPACT OF TREATMENT OF BEEF COWS WITH IVERMECTIN ON HERD PRODUCTIVITY

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INTRODUCTION

Internal parasite control in commercial beef cow-calf operations in western Canada has, until recently, not been considered an important part of herd management. Recent epidemiological studies conducted in the region indicate however, that the cow is an important source of pasture contamination and hence infection for the calf (1). Studies conducted in North Dakota have demonstrated improved productivity and economic returns associated with treatment of the cow herd with ivermectin (2,3). Similar studies have not been published for western Canada.

The objective of this study was to evaluate the productivity impact of a fall treatment with ivermectin of commercial beef cows. The effect of treatment was evaluated by monitoring the body condition and reproductive performance of cows and by measuring calf weight gains.

MATERIALS AND METHODS

Test site and animals: The study was conducted on a commercial cow-calf ranch in the foothills of southern Alberta, Canada. The trial included two hundred and thirty six, 2-4 year old, Horned Hereford cows and their spring-born calves. Routine management procedures including castration, vaccination and implanting were done according to ranch protocol. All animals were uniquely identified with a numbered ear tag.

Cows and calves in both treatment groups remained together throughout the study. During the winter period, cows were maintained on winter pasture with supplementary hay and grain provided daily and weekly respectively. Both treatment groups were turned out onto a single 640 acre pasture on May 29, 1990 where they remained until the termination of the trial on October 19, 1990. The breeding period for the trial was from May 29 to July 12, 1990 and a cow:bull ratio of 25:1 was used.

Allocation and treatment: Cows were paired by age, weight and ultra-sound backfat thickness. Cows were randomly allocated to treatment with either ivermectin 0.5% w/v solution (IVOMEC Pour-On, MSD AGVET, Kirkland, Quebec) at 500 mcg/kg bodyweight topically or fenthion 20% w/v solution (Spotton, Bayvet, Etobicoke, Ontario) at 3-4 mls/100 kg bodyweight topically. Cows were treated on November 21, 1989. Calves did not receive any antiparasitic treatment.

Evaluations: Cows were weighed and ultra-sound backfat measurements were taken prior to treatment, on January 23 (pre-calving), May 10 (post-calving) and on October 19 (weaning). Backfat thickness was measured over the 12th rib using a Krautkramer USK-7 ultrasound device (5 Mhz transducer). Calves were weighed at birth and on May 10, July 27 and October 19. At each weighing, fecal samples were obtained from 15 randomly selected cows and calves in each group and analysed using the modified Wisconsin procedure (4).

Differences in reproductive performance between treatment groups were evaluated by comparing the length of the post-partum anestrus interval and pregnancy rates. The post-partum anestrus interval was measured by using hormone treated teaser heifers fitted with chin ball markers. From April 7 to May 31, a technician observed the test animals daily for 1 hour prior to sunrise and 1 hour after sunset and those cows showing estral activity were recorded. Cows were pregnancy tested on October 19, 1990.

Statistical analyses: Body weight, cow backfat measurements, average daily gain (ADG) of calves, fecal egg counts, date of first estrus and the length of the post partum anestrus interval were tested for differences between the treatment groups utilizing ANOVA (SAS, North Carolina). Least squares means and standard errors were computed for each variable tested. Data for pregnancy were analyzed by Chi-square and Fisher's exact test. For all analyses, differences were declared significant if $p<0.05$.

RESULTS

Calf weight: Mean calf body weight and average daily gain (ADG) are presented in Table 1 and differences in mean calf body weights are displayed in Figure 1. There was no significant difference ($p>0.05$) in birth weight between the two groups of calves.

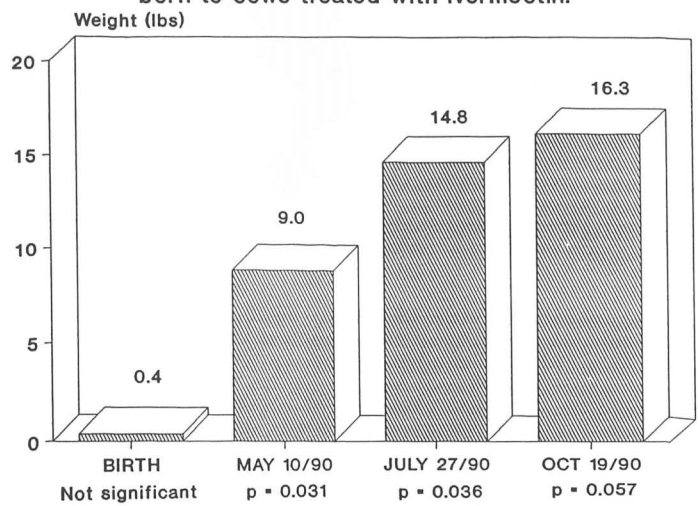
Calves from ivermectin-treated cows were born, on average, 2 days earlier than calves from fenthion-treated cows but this difference was not statistically significant ($p>0.05$) and by May 10, 1990, calves from ivermectin-treated cows weighed 9.0 lbs (4.08 kg) ($p=0.031$) more than calves born to control cows. Average daily gain from birth to May 10 was 0.12 lb/head/day (0.05 kg/head/day) ($p=0.045$) more for calves from the ivermectin treated cows. The mean body weight of calves from ivermectin-treated cows was significantly ($p=0.036$) greater than that of calves from fenthion-treated cows at the mid-summer evaluation. At weaning, calves from ivermectin-treated cows weighed 16.3 lbs (7.4 kg) more than calves from control cows ($p=0.057$).

TABLE 1
MEAN BODY WEIGHTS AND AVERAGE DAILY GAIN
OF CALVES FROM TREATED AND CONTROL COWS

Date	Weight (lbs)		Average daily gain (lb/day) from birth	
	Ivermectin	Control	Ivermectin	Control
Birth	88.6	88.2		
May 10	170.9[a]	161.9[b]	1.69[a]	1.57[b]
Jul 27	365.6[a]	350.8[b]	2.19	2.11
Oct 19	536.3*	520.0*	2.13	2.07

All data are expressed as least squares means.
a,b - Means in the same row with different superscripts are significantly different ($p<0.05$).
* $p = 0.057$

Figure 1: Mean body weight advantage of calves born to cows treated with ivermectin.



Cow weight and backfat: At the start of the trial, control cows were significantly heavier than ivermectin-treated cows (p=0.017) but this difference (5.3 lbs) is likely of no biological significance. Thereafter, there were no statistically significant differences between groups for cow body weight (Table 2). There were no significant differences (p>0.05) in backfat thickness between treatment groups at any time during the study. However, in both groups, mean backfat thickness decreased from trial initiation until May 10, 1990. The October 1990 mean backfat thicknesses exceeded the pretreatment values.

TABLE 2
MEAN BODY WEIGHTS AND BACKFAT MEASUREMENTS OF TREATED AND CONTROL COWS

Date	Weight (lb)		Backfat (mm)	
	Ivermectin (N = 118)	Control (N = 118)	Ivermectin (N = 118)	Control (N = 118)
Nov 10/89	1112.8[a]	1118.1[b]	6.1	6.2
Jan 23/90	1168.1	1172.3	4.9	5.1
May 10/90	1121.1	1128.0	3.1	3.1
Oct 19/90	1275.2	1282.3	7.2	7.6

All data are expressed as least squares means.
a,b - Means in the same row with different superscripts are significantly different (p<0.05).

Fecal egg counts: Fecal egg counts were very low for cows and calves in both treatment groups. Cow fecal egg counts varied from 0.24 eggs per gram (EPG) at the initiation of the study to 3.44 EPG in May. In the calves, mean fecal egg counts never exceeded 1.35 EPG on any evaluation. The only treatment difference observed was in cows on January 23. The mean fecal egg count of ivermectin-treated cows on this date was significantly lower (p=0.029) than that of the control cows (0.77 vs 3.65 EPG).

Reproductive performance: Although ivermectin-treated cows calved on average two days earlier than fenthion-treated cows, there was no statistically significant difference (p>0.05) in mean calving date or date of first estrus between the cows in the treated and control groups. Control cows had a significantly (p=0.023) shorter post partum anestrous interval than ivermectin-treated cows (48.4 days vs 53 days). There was no significant difference in pregnancy rate between the two groups of cows (88.1% vs 91.7% for the ivermectin-treated and control cows respectively).

DISCUSSION AND CONCLUSIONS

Treatment of mature beef cows with 0.5% w/v ivermectin topical solution did not result in statistically significant differences in body condition, body weight, date of first estrus or pregnancy rate. Although the mean post-partum anestrus interval was 4.6 days shorter for control cows than for ivermectin-treated cows, this was of no consequence since cows in both groups had resumed estrus activity prior to bull exposure.

Calves from ivermectin-treated cows were significantly heavier than calves from control cows around the time of turnout and at the mid-summer weighing. At weaning, a 16.3 lb advantage in mean body weight was still observed for calves from ivermectin-treated cows ($p=0.057$).

Fecal egg counts for cows and calves of both groups were very low in this trial. The trial design resulted in cattle of both treatment groups grazing the same pasture. Ivermectin-treated cows either became reinfected from overwintering larvae or from control cow contamination. This is a likely reason that treatment effects for fecal egg counts were not observed during the latter part of the grazing season.

The results indicate that fall treatment with ivermectin of the pregnant mature beef cow was beneficial despite the apparent low level of infection with gastrointestinal nematodes. Calves born to ivermectin-treated cows had significantly higher ADG from birth to May 10 ($p<0.05$) and were 16.3 lbs heavier ($p=0.057$) at weaning than calves born to fenthion-treated cows.

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SUMMARY

The impact of fall treatment with ivermectin on herd productivity was determined by allocating 236 mature cows to two similar groups and treating the animals with either ivermectin topical solution or fenthion. Treatments were administered once in the fall of 1989. Calves were not treated and animals in both groups remained together throughout the study.

There were no significant differences between treatments for body weight or backfat thickness of cows at the post-treatment evaluations. A significant difference in the length of the post partum anestrus interval was observed (48.4 days vs 53.0 days for control and ivermectin-treated cows respectively). This delay of 4.6 days did not affect reproductive efficiency as there was no statistical difference in pregnancy rate.

Calves from ivermectin-treated cows had significantly greater ($p<0.05$) mean body weight prior to turnout to summer pasture and at mid-summer. At weaning, calves from the ivermectin treated cows were 16.3 lbs (7.4 kg) heavier than calves born to control cows ($p=0.057$).

The results show that, despite very low nematode infections, fall treatment of the mature beef cow with ivermectin improved calf productivity.