Relationship Between Treatment of North Dakota Beef Cows and Calves with Fenbendazole and Weaning Weight of Calves

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Introduction

Several reports indicate a positive relationship between weaning weights of beef calves and treatment of beef cows and/or calves with anthelmintics[1-7]. This study was conducted to determine the effect on the weaning weight of calves when North Dakota beef cows and their calves were treated with fenbendazole. This study involved two calf crops in four different herds over a two-year period (1988-1989).

Materials and Methods

Herds

Four herds located in North Dakota (east, central and northwestern regions) were chosen following the advice of local practitioners. Selection criteria included functional handling facilities, record keeping and routine herd health practices. Herd 1 (HR1) was a commercial herd of Angus cows in the central region. Herd 2 (HR2) included Angus, Hereford, AngusxHereford and HerefordxSimmental commercial cows in the northwestern region. Herds 3 and 4 (HR3, HR4) were in the east region and included HerefordxAngus, HerefordxLimousine, Simmental, Red Angus and Amerifax commercial cows. Routine vaccinations, insecticidal ear tags and fall pregnancy examinations were standard procedures in all four herds, but anthelmintics had not been administered to the cows for at least six years prior to this study. Cows and calves were individually identified with ear tags. The birthdate of each calf was recorded. Each calf was individually weighed at weaning. Weaning weights were also adjusted to 205 days of age. Cows were checked for pregnancy, each year in the fall.

Each herd was divided into two groups during the spring of the first year (1988). Cows in Herds 1, 3 and 4 were allotted by using a systematic assignment method (every other cow was treated as they came through the chute) to Group A (treatment) or Group B (control) during the spring of 1988, when they were first treated. Cows in Herd 2 were divided into two groups based on the owner's established breeding practices. Groups A and B cows were maintained for the duration of the trial in all four herds; some cows were culled each year and the replacement heifers were systematically added to either the treatment or control group.

Treatment

Group A: Cows were treated each spring (late May or early June) immediately before being turned to pasture. Treatment was fenbendazole 10% drench (Safe-Guard[R] or Panacur[R], Hoechst-Roussel Agri-Vet Company, Sommerville, NJ, USA) at 5 mg/kg, orally, In addition, during mid-July cows in Group A and their calves had free-choice access to fenbendazole deworming blocks (EN-PRO-AL[R]/Safe-Guard[R] Medicated Deworming Supplement Block, Hoechst-Roussel Agri-Vet) at the rate of one 25/lb block (with 750 mg fenbendazole) per 6 cow/calf pairs, until consumed. Creepfeeders, salt and mineral mixes were removed before use of medicated blocks. Non-medicated, adaptation blocks (EN-PRO-AL[R]AT-9 adaptation-type block) were provided, free-choice, to cows and their calves 7 to 10 days immediately before treatment with medicated, deworming blocks. All blocks were placed near water sources and rest areas; consumption patterns were observed daily.

Group B: This group served as concurrent controls; neither the cows nor their calves were treated with fenbendazole before or during the grazing seasons. Non-medicated, adaptation blocks (EN-PRO-AL[R]AT/9) were offered free-choice to cows and calves at the rate of one 25 lb. block//6 cow-calf pairs at the time that animals in Group A were offered adaptation and medicated blocks.

Fecal Samples

Each year, during spring treatment, fecal samples (freshly voided stools and/or rectal grab) were collected at random from a number of cows in each group (at least 15%). Samples were examined for nematode ova by the Wisconsin fecal flotation technique[8]; results were reported as eggs per 5 gram of feces (EP5G).

Statistical Analysis

Calf weaning weights were tested for significance by an analysis of variance. Data were analyzed as a 4 (herd) x 2 (year) x 2 (treatment) factorial with all possible 2-way interactions allowed. The error term was the 3-way interaction. All computations were made by using the General Linear Models, Statistical Analysis System (SAS)[9]. Differences were considered statistically significant if the two-sided P value was 0.05.

Results

A total of 1,229 calves were weaned over the 2-year period; 628 in 1988 and 601 in 1989 (Table 1). The mean weaning weight of calves over the 2-year period was 506.98 lb. for Group A and 458.95 for Group B. The mean adjusted weaning weight was 577.13 lb. in Group A and 546.60 in Group B (Fig. 1). There was an advantage of 48.03 lb. in mean weaning weight of all calves in Group A when compared to controls. Mean weaning weights - actual and adjusted at 205 days - of calves in Group A were consistently higher than those calves in Group B (Tables 2 and 3). This advantage was not statistically significant ($p = 0.08$) due to variations among herds and the magnitude of standard deviations. (Table 4). The analysis, however, revealed significant differences in response to treatment among herds. This difference was consistent for both 1988 and 1989 (Fig. 2). Over 71% of all calves in this study were in Herd 1.

TABLE 1. Number of calves weaned in four North Dakota beef herds over a 2-year (1988-1989) evaluation of anthelmintic treatments (*).

Year	1988				1989				88 & 89
	Group A(+)		Group B		Group A		Group B		Total
HERD	Hfrs.	Steers	Hfrs.	Steers	Hfrs.	Steers	Hfrs.	Steers	
HR 1	96	118	109	127	106	117	98	111	882
HR 2	27	31	19	14	32	30	13	22	188
HR 3	10	14	7	11	3	14	3	7	69
HR 4	14	15	10	6	11	16	7	11	90
Totals	147	178	145	158	152	177	121	151	1229
	325		303		329		272		

(*) Fenbendazole [FBZ], (Hoechst-Roussel Agri-Vet Co.)
(+) Group A:Cows drenched with FBZ 10% suspension, during spring, @ year
Calves & dams treated with FBZ deworming blocks, @ year in July
Group B:Neither cows nor calves dewormed (Untreated controls)

TABLE 2. Mean weaning weights (lb) of North Dakota beef calves in four herds used to evaluate an anthelmintic treatment during a 2-year period (1988-1989) *

Year	1988				1989			
	Group A (+)		Group B		Group A		Group B	
HERD	Hfrs.	Steers	Hfrs.	Steers	Hfrs.	Steers	Hfrs.	Steers
HR 1	496.9	506.6	423.9	430.2	495.2	514.7	466.1	494.9
HR 2	492.7	511.5	497.1	489.7	515.2	566.6	445.4	520.2
HR 3	503.5	536.1	431.4	485.0	470.0	453.6	438.3	462.1
HR 4	505.1	572.3	517.0	500.1	472.7	509.4	427.1	440.0
Average	499.6	531.6	467.4	476.3	488.3	511.1	444.2	479.3

* Fenbendazole [FBZ] (Hoechst-Roussel Agri-Vet Company)
(+) Group A:Cows drenched with FBZ suspension,during spring
Calves & dams treated with FBZ deworming blocks in July
Group B:Neither cows nor calves dewormed (Untreated controls)

TABLE 3. Mean adjusted weights (lb) of North Dakota beef calves in four herds used to evaluate an anthelmintic treatment during a 2-year period (1988-1989) *

Year	1988				1989			
	Group A (+)		Group B		Group A		Group B	
HERD	Hfrs.	Steers	Hfrs.	Steers	Hfrs.	Steers	Hfrs.	Steers
HR 1	575.3	597.3	529.2	544.3	556.9	576.4	524.2	550.2
HR 2	555.6	609.0	564.3	567.3	530.5	566.6	500.1	561.2
HR 3	647.1	678.0	587.1	640.7	516.4	524.0	516.8	498.8
HR 4	529.1	605.8	564.9	585.5	567.3	614.4	525.4	612.0
Average	576.8	622.5	561.4	584.5	542.8	570.4	516.6	555.6

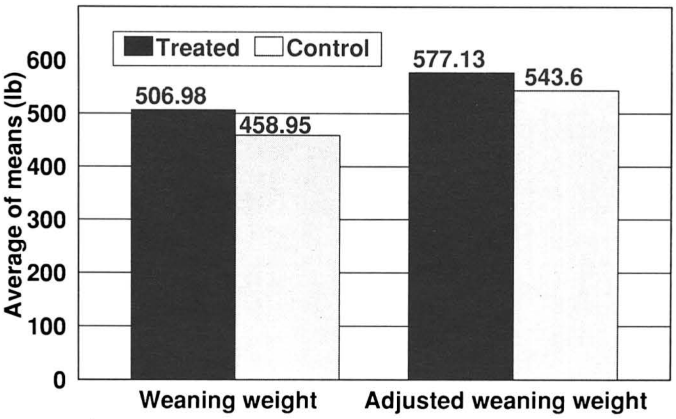
* Fenbendazole [FBZ] (Hoechst-Roussel Agri Vet Company)
(+) Group A.Cows drenched with FBZ suspension,during spring
Calves & dams treated with FBZ deworming blocks in July
Group B:Neither cows nor calves dewormed (Untreated controls)

TABLE 4. Means of actual and adjusted (205 days) weaning weights of beef calves in four North Dakota herds used to evaluate an anthelmintic treatment (*) during a 2-year period (1988-1989).

Year	1988				1989			
Treatment	Group A(+)		Group B		Group A		Group B	
	Wng wght	Adj. W.wgt	Wng wght	Adj. W.wgt	Wng wght	Adj. W.wgt	Wng wght	Adj. W.wgt
HERD 1	502.2	587.4	427.3	537.4	505.4	567.1	481.4	538.0
(SD)++	(46.2)	(56.1)	(53.7)	(60.9)	(55.1)	(54.5)	(60.1)	(55.9)
HERD 2	502.7	584.1	493.9	566.4	530.9	547.9	492.4	538.5
(SD)	(77.2)	(69.4)	(87.1)	(65.8)	(57.2)	(53.7)	(88.9)	(68.0)
HERD 3	522.5	665.1	464.2	619.8	456.5	522.6	455.0	504.2
(SD)	(49.7)	(44.1)	(59.9)	(67.6)	(54.8)	(51.5)	(60.9)	(47.0)
HERD 4	540.2	568.8	510.9	572.6	494.4	595.5	435.0	578.3
(SD)	(47.7)	(54.4)	(46.9)	(48.0)	(45.4)	(45.6)	(40.5)	(49.8)

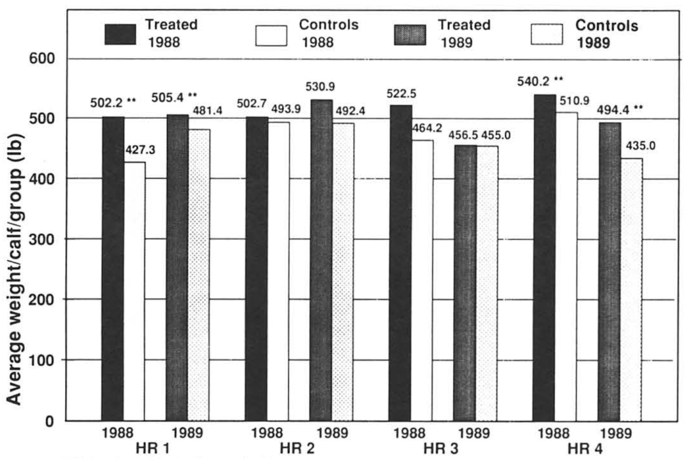
(*) Fenbendazole [FBZ] (Hoechst-Roussel Agri-Vet Co.)
(+) Group A:Cows drenched with FBZ suspension, during spring
Calves & dams treated with FBZ deworming blocks, each year in July.
Group B:Untreated controls.
++ (SD)=Standard deviation

Fig. 1: Mean weaning weights of North Dakota beef calves during a 2-year (1988-1989) trial with an anthelmintic.★



* Fenbendazole (Hoechst-Roussel, Agri-Vet)

Fig. 2: Mean weaning weights of North Dakota beef calves in four herds during a 2-year (1988-1989) trial with an anthelmintic (★).



(*) Fenbendazole (Hoechst-Roussel, Agri-Vet.) ** Statistically significant (p <0 05)

There was a 49.45 lb advantage in mean weaning weight of calves in Group A over controls in Herd 1. This advantage was significant (p 0.0001) each year. In Herd 4 there was an advantage of at least 30 lb. in mean weaning weight of calves in Group A over controls; this difference was also significant ($p = 0.028$) each year.

There were no differences in pregnancy rates between Group A and Group B during the duration of this trial.

Examination of fecal samples collected from cows in both groups each year prior to being turned to pasture revealed nematode ova in samples from all herds. The greatest number of eggs in any sample was 108 EP5G (Herd 2, control group, 1989). The mean and ranges of nematode ova detected are summarized (Table 5). Samples collected during the first year of the study (spring of 1988) had similar EP5G in Group A and Group B. During the second year (spring of 1989) samples from cows treated the previous year tended to have fewer nematode ova. *Ostertagia sp., Haemonchus sp., Cooperia sp.* and *Oesophagostomum sp.* were the nematodes predominant in samples examined (Table 6). It took from 5 to 15 days for cows and calves to consume the adaptation blocks. Consumption time of deworming (medicated) blocks ranged from 5 to 12 days (Table 7).

Discussion

At least on the surface, the results of this study may seem ambivalent. There was no significant difference in mean weaning weights between all calves in Group A (treated) and those in Group B (controls), when all herds combined were analyzed.

A detailed analysis however, revealed significant dif-

TABLE 5. Mean nematode eggs per 5 gram of feces collected in late spring (May-June) from beef cows in North Dakota used to evaluate an anthelmintic treatment(*) during 1988-89.

		HERD 1		HERD 2		HERD 3		HERD 4	
Group	Year	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Group A	1988	38	< 1-70	29	< 1-61	24	< 1-55	44	< 1-74
(Treated)	1989	13	< 1-37	21	< 1-43	4	< 1-10	20	< 1-42
Group B	1988	40	< 1-64	32	< 1-63	23	< 1-48	48	< 1-87
(Controls)	1989	37	< 1-60	53	<1-108	27	< 1-59	31	< 1-59

(*) Fenbendazole (Hoechst-Roussel Agri-Vet Company)

TABLE 6. Highest nematode ova counts(*) in fecal samples from North Dakota beef cows during a two-year period (1988-1989).

	1988					1989				
Species (Spp.)	HR1	HR2	HR3	HR4	Mean	HR1	HR2	HR3	HR4	Mean
Ostertagia	12	54	21	10	24.3	36	42	36	12	31.5
Haemonchus	14	54	27	43	34.5	30	18	6	6	15
Cooperia	40	18	20	16	23.5	42	6	18	0	15.5
Oesophagostomum	3	12	8	14	9.25	18	60	24	0	25.5
Trichostrongylus	6	6	3	9	6	2	2	12	0	4
Nematodirus	3	0	3	3	2.3	0	0	0	0	0
Bunostomum	1	0	0	1	0.5	0	0	6	0	1.5
Strongyloides	0	100+	0	0	+	0	0	10+	0	+
Capillaria	0	0	0	0	0	0	0	0	0	0
Neoascaris	0	0	0	0	0	0	0	0	0	0
Trichuris	0	0	0	0	0	0	0	0	0	0

(*) Expressed as eggs per 5 gram of feces

TABLE 7. Days required by North Dakota beef cows & calves to consume "adaptation" and medicated blocks during a two-year trial (1988-1989) with an anthelmintic (*).

	1988				1989			
	Treated		Controls		Treated		Controls	
	Adapt	Medic	Adapt	Plac	Adapt	Medic	Adapt	Plac
Herd 1	7	5	8	6	10	11	9	9
Herd 2	13	10	15	12	14	12	13	10
Herd 3	10	12	11	10	5	6	5	5
Herd 4	10	12	12	12	8	7	7	5

(*) Fenbendazole (Hoechst-Roussel Agri-Vet Co.)
Adapt = Non-medicated, adaptation block
Medic = EN-PRO-AL block with fenbendazole
Plac = Adaptation block, used as placebo

ferences among herds. The treatment benefits were significan in Herd 1 (p=0.0001) and Herd 4 (p=0.028) but not in Herds 2 and 3. The timing of treatment, the results of fecal examinations and group allotments were similar in all herds. Parity and age of cows were uniform in both groups (treated vs. control). The length of calving seasons, however, varied among herds. Calving seasons in Herd 1 and Herd 4 were at least 25 days shorter than Herd 2 and Herd 3 each year of this study. Consequently there was a greater variation in age and weaning weights in calves from Herds 2 and 3; calves from Herds 1 and 4 had more uniformity in age and weight at weaning. Intrinsic differences between herds (i.e. genetic makeup, nutrition adequacy, environmental quality, etc.) were not measured, but the benefits of deworming cows and calves were statistically significant in the two herds with shorter calving seasons. (HR1, HR4). Usually, no single management practice stands alone in the cow and calf enterprise. Nevertheless the advantages of an anthelmintic treatment could be negligible if a total herd management is absent. Use of anthelmintics is part of, not a replacement for management.

The epidemiology of nematode parasites of beef cattle in North Dakota is mostly unknown. The predominance of certain endoparasites (*Ostertagia sp., Haemonchus sp. Cooperia sp.,* and *Oesophagostomum sp.*) following fall/winter housing and calving stresses is worth being noticed. The need to determine optimum time(s) to deworm North Dakota beef cows or their calves cannot be overlooked. Realizing the maximum biologic and economic advantages of deworming is no guessing game, but rather the application of epidemiologic knowledge.

Summary

A two-year field study was carried out in North Dakota to determine the benefit of deworming beef cows and their calves with fenbendazole (Safe-Guard^R^ or Panacur^R^, Hoechst-Roussel Agri-Vet, Sommerville, NJ, USA) at 5mg/kg, orally. Four herds were used; each herd was divided into two groups. Group A: Cows were treated twice each year with fenbendazole, the first time in late spring and the second in mid to late July. Calves were treated only in July, 6-8 weeks after being turned out to pasture with their dames. Group B: Neither the cows nor their calves were treated with fenbendazole. A total of 1,229 calves were weaned over the 2-year period. Calves in Group A were heavier at weaning than calves in Group B, but the extra weight at weaning was significant (p 0.05) only in two of the four herds. The two herds with significant weight differences had shorter calving seasons when compared to the other two.

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