

## EFFICACY OF SPRING TIME WORMING AMONG BEEF COW CALF PAIRS

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### RESEARCH SUMMARY

A study was conducted with three spring calving beef cow herds near Belfield, North Dakota, Camp Crook, South Dakota, and Wibaux, Montana, to evaluate under field use conditions the efficacy of doramectin at 200  $\frac{\mu\text{g}}{\text{kg}}$  subcutaneously in beef cows and their calves when compared to ivermectin at 500  $\frac{\mu\text{g}}{\text{kg}}$  topically and nonmedicated controls. Spring calving herds ranging from 145 to 252 cow/calf pairs harboring natural nematode infections and grazing together on native pastures from June to November were utilized. The pairs were randomly allocated to one of three treatment groups with group one (T1) receiving no anthelmintic, group two (T2) treated subcutaneously with doramectin, and group three (T3), treated with ivermectin topically applied. The three groups were commingled and grazed on one to nine breeding pastures throughout the study. Individual fecal samples for parasite egg evaluation were collected from 20 randomly selected pairs (cow and calf) from each treatment group on Day 0. Fecal samples were again collected from the same calves on Days 56 and at the end of the trial. Individual weights and body condition scores were assessed for all cows at the start and end of the trial. Individual calf weights were assessed on Days 0, 56, 112, and trial's end. The cows were rectally, ultrasound-examined for pregnancy; ages of the fetuses were calculated and recorded. There were no significant differences between the doramectin-treated animals and the ivermectin-treated animals, or between the treated animals and the nonmedicated controls in any variable measured with the following exceptions: The trichostrongylid-type nematode egg counts and the all-genera nematode egg counts were significantly lower (P.05) for the doramectin-treated and ivermectin-treated

calves than the control calves on Day 56 for the North Dakota and Montana herds. Also, the trichostrongylid-type nematode egg counts and the all-genera nematode egg counts were significantly lower ( $P .05$ ) for the doramectin-treated than the ivermectin-treated calves on Day 56 for the Montana herd. Additionally, in the South Dakota herd, the doramectin-treated group (T2) exhibited a significantly greater ( $P .05$ ) calf weight than the control group (T1) on Day 112, and a significantly greater ( $P .05$ ) calf weight and average daily gain than the control group on Day 141. No adverse reactions to treatment were observed at any time during the study.

## MATERIALS AND METHODS

Spring calving beef cow/calf pairs (145 pair near Belfield, ND; 172 pair near Camp Crook, SD; and 252 pair near Wibaux, MT;) were randomly allocated to one of three treatment groups and placed on multiple breeding pastures throughout the study. On Day 0, the cow/calf pairs allotted to treatment group two (T2) were treated subcutaneously with 200  $\mu\text{g}/\text{kg}$  of doramectin. The cow/calf pairs allotted to treatment group three (T3) were treated with 500  $\mu\text{g}/\text{kg}$  of ivermectin applied topically down the midline of the back. The cow/calf pairs in treatment group one (T1) received no anthelmintic treatment and served as a nonmedicated control group. Treatment groups were commingled after treatment on Day 0. Individual fecal samples were collected from 20 randomly selected pairs (cow and calf) from each treatment group on Day 0. Fecal samples were again collected from the same calves on Days 56 and at the end of the trial. The Day 56, 84 and 112, data collection dates are  $\pm 1$  day for the South Dakota and Montana herds (See Table 1 Schedule of Operations). The trial ended on Day 133, Day 141, and Day 111 for the North Dakota, South Dakota and Montana herds respectively. All fecal samples were quantitatively examined for parasite eggs by a parasitologist at South Dakota State University. Individual weights and body condition scores were assessed for all cows at the start and end of the trial. Individual calf weights at all three locations were assessed on Days 0, 56, 112. Additionally weights were collected on Day 133 at the North Dakota location and Day 141 at the South Dakota location. On Days 84, 55, 56, for ND, MT, and SD, respectively, the cows were rectally, ultrasound-examined for pregnancy; ages of the fetuses were calculated and recorded.

## NORTH DAKOTA SITE DESCRIPTION

The study site was part of a commercial livestock operation in Southwestern North Dakota. Native grass pastures were used that had been grazed annually for numerous seasons prior to the study. Each pasture had access to a

permanently built holding corral and alleyway. At the time of each processing, the study director provided a portable tub and scale. The pastures contained 1,840 acres of native grass and were stocked with 145 head of crossbred cows and their calves. One hundred forty-five (145) cows ranging from 2 to 13 years of age with calves at their sides were used for the study. The calves were born the spring of 1997 on the ranch. The bulls were placed with the cows on June 20 (Day 14 of the study) and removed on August 25 (Day 80 of the study). The cattle placed in each pasture were randomized by age of the dam to each of the three treatment groups. The calves ranged from 6 to 92 days of age at the commencement of the study. Each calf received treatment identical to its dam. The bulls received Dectomax injectable as per label on Day 0 of the study. Cows and calves were grazed on the pasture until completion of the study with no additional supplemental feeding. All cattle had individual ear tags for purpose of identification. Four cow/calf pairs were removed from the database for the purpose of data analysis. Cow, #206 (T3), had lost her calf after randomization and prior to Day and cow #808 died thus these animals did not meet the criteria of a cow/calf pair for the study. Cow #792 (T1) and cow #231 (T2) were both mistreated with product on Day 0, and therefore both they and their calves were removed from the study by the investigator.

## **MONTANA SITE DESCRIPTION**

The study site was part of a commercial livestock operation in extreme eastern Montana and conducted on native grass pastures. The nine pastures utilized had been grazed annually for numerous seasons prior to the study. The pastures contained 4,000 acres of native grass and were stocked with 252 head of purebred cows and their calves. At the time of each processing, the study director provided a portable tub and scale. Two hundred fifty-two (252) cows ranging from 2 to 14 years of age with calves at their sides were used for the study. The calves were born the spring of 1997 on the ranch. The bulls were placed with the cows prior to the commencement of the study. The cattle placed in each pasture were randomized by age of the dam to each of the three treatment groups. The calves ranged from 22 to 147 days of age at the commencement of the study. Each calf received treatment identical to its dam. The bulls and any additional pairs in the pastures received Dectomax injectable as per label on Day 0 of the study. Cows and calves were grazed on the pasture until completion of the study with no additional supplemental feeding. All cattle had individual eartags for purpose of identification. Seven cow/calf pairs were removed from the database for the purpose of data analysis. One of these pairs, #E23/#21G (T 1), had lost her calf after randomization and prior to Day 0, and therefore did not meet the criteria of a cow/calf pair for the study. Five pairs from T2 had either missing data or conflicting data and were removed from the study. The calf from pair #303/#706

(T3) was mistreated with product on Day 0, and therefore the pair was removed from the study by the investigator.

## **SOUTH DAKOTA SITE DESCRIPTION**

The study site was part of a commercial livestock operation in extreme northwestern South Dakota. The pasture consisted of native grass on Custer National Forest land. Water was provided via wells and natural creeks. The pastures had been grazed annually for numerous seasons prior to the study. At the time of each processing, the cattle were rounded-up from the forest land and herded to the adjacent farmstead that had a permanently built holding corral and alleyway. At the time of each processing, the study director provided a portable tub, squeeze chute and a scale. The pastures contained 4,800 acres of native grass and were stocked with 218 head of crossbred and purebred Angus cows with their calves. One hundred seventy-two (172) cows ranging from 2 to 14 years of age with calves at their sides were used for the study. The calves were born the spring of 1997 on the ranch. Prior to the beginning of the study, approximately June 1, the bulls were placed with the cows. The cattle were randomized by age of the dam to each of the three treatment groups with all groups grazed in a common pasture. The calves ranged from 19 to 98 days of age at the commencement of the study. Each calf received treatment identical to its dam. The bulls and any additional cow/calf pairs not selected for the study, but present in the pasture, received Dectomax. injectable as per label on Day 0 of the study. Cows and calves were grazed on the pasture until completion of the study with no additional supplemental feeding. All cattle had individual ear tags for purpose of identification. Twenty-eight cow/calf pairs were removed from the database for the purpose of data analysis. Nine of these cow/calf pairs came from the control group (T1); nine from the doramectin-treated group (T2); and ten from the ivermectin-treated group. In all cases, either the cow or calf of these pairs was not present for all of the processing functions due to size of the pasture, timber and rugged terrain. Therefore these animals did not meet the criteria of a cow/calf pair for the study.

## **DATA MANAGEMENT AND STATISTICAL ANALYSIS**

Data collected were analyzed by Biometrics and Data Management Services, Pfizer Animal Health, Lee's Summit, Missouri. The data were analyzed with a mixed procedure or frequency procedure (SAS/STAT Software: Changes and Enhancements through Release 6.12). A repeated measures mixed general linear model which included pasture as block was used to analyze cow body weight, cow body condition score, calf body weight, calf body weight

gain, calf average daily gain, and calf nematode egg counts (eggs per gram). Pairwise comparisons among treatments were made for each data collection time point (day of study). The model for cow body weight also included covariates of age of the cow, body condition score on Day 0, and age of the calf. The model for cow body condition score also included a covariate of age of the calf. The model for calf body weight, calf body weight gain, and calf average daily gain included age of the calf and weight of the calf on Day 0 as covariates; and sex, and sex by day of study as fixed effects. The models for calf nematode egg counts also included age of the calf as a covariate. A general linear mixed model which included pasture as a block was used to analyze fetal age in days and cow nematode egg counts (eggs per gram). All nematode eggs per gram were transformed to the natural log (EPG + 1) before analysis and after analysis were back-transformed to geometric means for presentation. Fisher's Exact test was used to test for an association between pregnancy status at the end of the study and treatment.

## RESULTS AND DISCUSSION

Treatment of cow/calf pairs harboring natural gastrointestinal nematode infections and grazing native pastures in eastern Montana, western North Dakota, or northwestern South Dakota with a single dose of doramectin subcutaneously (T2) did not result in significant differences as compared to controls (T1) or to the ivermectin pour-on (T3) treated pairs in weight gain of the cows, change of body condition score in the cows ([Table 2](#)), rate of pregnancy, or age of the fetus. There were no significant differences among treatments in calf weights or average daily gain of the calves for any period of the study in Montana or North Dakota ([Tables 4 & 5](#)). However the calves in the doramectin-treated (T2) group in the South Dakota herd did exhibit a significantly greater ( $P \leq .05$ ) calf weight and average daily gain than calves in the control group (T1) on Day 141 ([Tables 4 & 5](#)). Calves in the doramectin-treated (T2) and calves in the ivermectin-treated (T3) groups exhibited significantly lower ( $P \leq .05$ ) trichostrongylid-type egg counts and all-genera nematode egg counts at Day 56 compared to calves in the control group (T1) in the North Dakota and the Montana herds. Also, the Montana calves in the doramectin-treated (T2) group exhibited significantly lower ( $P \leq .05$ ) trichostrongylid-type egg counts and all-genera nematode egg counts at Day 56 compared to calves in the ivermectin-treated group (T3). There were no significant differences in trichostrongylid-type egg counts or in all-genera nematode egg counts between treatments on Days 0 or at the end of the trial. No adverse reactions to treatment were observed at any time during the study.

## CONCLUSION



This study comparing the efficacy of doramectin applied subcutaneously and ivermectin pour-on to nontreated controls in western North Dakota, eastern Montana, and western South Dakota herds revealed no significant differences in weight gain of the cows, change of body condition score in the cows, rate of pregnancy, or age of the fetus. There was significant improvement in calf weaning weights and average daily gain in the South Dakota herd compared to the nonmedicated controls. Meanwhile the North Dakota and Montana calves in the doramectin treated group had significantly less trichostrongylid-type egg counts and all-genera nematode egg counts than the control groups. Additionally, the Montana doramectin treated group also revealed significantly lower trichostrongylid-type egg counts and all-genera nematode egg counts than the ivermectin group on Day 56. When all three herds were analyzed together, no significant differences were found in weight gain of the cows, change of body condition score in the cows, rate of pregnancy, age of the fetus, calf weight or calf gain, (Day 56, 112, or End). There were no significant differences in trichostrongylid-type egg counts or in all-genera nematode egg counts between treatments on Days 0, 56, 112, or at the end of the trial for the combined herds.

## ACKNOWLEDGMENT

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<b>Table 1. Schedule of Operations</b>											
Trial Day	North Dakota Processing Date	Montana Processing Date	South Dakota Processing Date	Fecal Test Cows	Weigh Cows	BCS Cows	Treat Cows	Fecal test Calves	Weigh Calves	Treat Calves	Pregnancy Exam Cows
0	06-06-97	06-13-97	06-16-97	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
56 Day #	08-01-97 56	08-07-97 55	08-11-97 56					Yes	Yes		
	08-29-97	08-07-97	08-11-97								Yes
112	09-26-97	10-02-97	10-07-97						Yes		

Day #	112	111	113						Yes		
Wean Day#	10-02-97 133	10-02-97 111	11-04-97 141		Yes	Yes		Yes	Yes		

<b>Table 2-Treatment Least-Squares Means of Cow Weight (lb) (ND, SD, MT)</b>		
Treatment <sup>1</sup>	Day of Study 0	Day of Study End
T1 Nonmedicated	1152.3	1235.0
T2 Doramectin SC	1159.1	1247.8
T3 Ivermectin Pour-On	1150.9	1239.1
<sup>1</sup> treatment differences not significant (P .05)		

<b>Table 3-Treatment Least-Squares Means of Cow Body Condition Score (ND, SD, MT)</b>		
Treatment <sup>1</sup>	Day of Study 0	Day of Study End
T1 Nonmedicated	5.4	5.6
T2 Doramectin SC	5.5	5.7
T3 Ivermectin Pour-On	5.5	5.7
<sup>1</sup> treatment differences not significant (P .05)		

<b>Table 4-Treatment Least Squares Means of Calf Weight (LB)</b>		
Treatment <sup>1</sup>	Day of Study 0	Day of Study End
T1 Nonmedicated		
T2 Doramectin SC		
T3 Ivermectin Pour-On		
<sup>1</sup> treatment differences not significant (P .05)		

Treatment	Day of Study 0	Day of Study 56	End of Study
<b>COMBINED: ND, SD, MT</b>			
T1 Nonmedicated	246.3	388.9	548.4
T2 Doramectin SC	246.8	394.8	558.3
T3 Ivermectin PO	244.5	391.0	552.6
<b>NORTH DAKOTA</b>			
T1 Nonmedicated	208.4	339.3	507.1
T2 Doramectin SC	210.4	342.7	510.8
T3 Ivermectin PO	208.7	345.1	513.3
<b>MONTANA</b>			
T1 Nonmedicated	278.8	433.6	577.4
T2 Doramectin SC	279.7	439.0	585.1
T3 Ivermectin PO	276.9	432.6	583.7
<b>SOUTH DAKOTA</b>			
T1 Nonmedicated	226.6	358.7	517.3 <sup>a</sup>
T2 Doramectin SC	227.2	371.1	536.5 <sup>b</sup>
T3 Ivermectin PO	227.9	366.3	523.4
a,b, values with different superscripts within a column differ at the $P \leq .05$ level. End = Day 133, 111, 141 for ND, MT, SD respectively			

<b>Table 5-Treatment Least Squares Means of Calf Gain (LB)</b>						
Treatment	Day of Study 0 to 56		Day of Study 56 to 112		Day of Study 0 to End	
	Calf Gain (LB)	ADG LB/DAY	Calf Gain (LB)	ADG LB/DAY	Calf Gain (LB)	ADG LB/DAY



**COMBINED: ND, MT, SD**

TI Nonmedicated	142.63	2.55	140.97	2.52	302.10	2.21
T2 Doramectin SC	148.04	2.64	144.08	2.57	311.49	2.27
T3 Ivermectin PO	146.54	2.62	146.62	2.62	308.14	2.25

**North Dakota**

TI Nonmedicated	130.91	2.34	167.81	2.18	298.72	2.25
T2 Doramectin SC	132.32	2.36	168.13	2.18	300.45	2.26
T3 Ivermectin PO	136.43	2.44	168.21	2.18	304.64	2.29

**MONTANA**

TI Nonmedicated	154.75	2.81	143.90	2.57	298.65	2.69
T2 Doramectin SC	159.25	2.84	146.12	2.61	305.37	2.75
T3 Ivermectin PO	155.78	2.83	151.10	2.70	306.88	2.76

**SOUTH DAKOTA**

TI Nonmedicated	132.16	2.36	129.41	2.27	290.70 <sup>a</sup>	2.06 <sup>a</sup>
T2 Doramectin SC	143.98	2.57	130.76	2.29	309.31 <sup>b</sup>	2.19 <sup>b</sup>
T3 Ivermectin PO	138.48	2.47	131.35	2.30	295.56	2.10

<sup>a,b</sup>, values with different superscripts within a column differ at the  $P \leq .05$  level.  
End = Day 133, 111, 141 for ND, MT, SD respectively

**Table 6-Pre-treatment Geometric Means of Cow Nematode Eggs Per Gram of Feces (ND, SD, MT)**

Treatment	Trichostrongylid-type			Total All Genera		
	MT	SD	ND	MT	SD	ND

T1 Nonmedicated	11.60	4.6	5.7	13.60	5.0	6.8
T2 Doramectin SC	12.60	5.9	9.0	14.90	6.8	10.1
T3 Ivermectin Pour-On	10.40	3.3	9.2	11.70	3.3	9.7
T1 vs T2	ns <sup>1</sup>	ns	ns	ns	ns	ns
T1 vs T3	ns	ns	ns	ns	ns	ns
T2 vs T3	ns	ns	ns	ns	ns	ns
<sup>1</sup> ns = no significant difference, * = significant difference (P .05)						

<b>Table 7-Treatment Geometric Means of Calf Nematode Eggs Per Gram of Feces</b>						
Treatment	Day of Study 0		Day of Study 56		End of Study	
	Trichostrongylid- type	Total of All Genera	Trichostrongylid- type	Total of All Genera	Trichostrongylid- type	Total of All Genera
<b>COMBINED: ND, SD, MT</b>						
T1 Nonmedicated	2.6	3.0	5.0 <sup>a</sup>	5.0 <sup>a</sup>	3.6	4.0
T2 Doramectin SC	3.9	4.2	1.1 <sup>b</sup>	1.1 <sup>b</sup>	2.6	3.0
T3 Ivermectin PO	3.2	3.4	1.8 <sup>b</sup>	1.8 <sup>b</sup>	2.4	2.7
<b>NORTH DAKOTA</b>						
T1 Nonmedicated	1.4	1.9	3.6 <sup>a</sup>	3.8 <sup>a</sup>	4.8	5.4
T2 Doramectin SC	2.2	2.6	0.7 <sup>b</sup>	0.8 <sup>b</sup>	3.2	3.5
T3 Ivermectin PO	1.8	2.2	0.9 <sup>b</sup>	0.9 <sup>b</sup>	2.8	3.0
<b>MONTANA</b>						
T1 Nonmedicated	5.3	6.3	11.4 <sup>a</sup>	12.4 <sup>a</sup>	4.6	5.3

T2 Doramectin SC	8.0	8.8	1.5 <sup>b</sup>	1.7 <sup>b</sup>	3.0	3.9
T3 Ivermectin PO	7.4	7.9	3.9 <sup>c</sup>	4.1 <sup>c</sup>	2.7	3.3
<b>SOUTH DAKOTA</b>						
T1 Nonmedicated	1.3	1.4	1.1	1.1	0.9	1.1
T2 Doramectin SC	1.7	1.9	0.4	0.4	0.8	1.1
T3 Ivermectin PO	1.2	1.2	0.6	0.6	0.9	1.2
a,b,c, values with different superscripts within a column and within state (or combined states) differ at the $P \leq .05$ level.						

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