Effects of extended-release eprinomectin on productivity measures in cow-calf systems and subsequent feedlot performance and carcass characteristics of calves

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Summary and Implications

The objective of this study was to estimate the impact of a single injection of extended-release eprinomectin on economically relevant production variables in beef cows and calves as well as subsequent feedlot health, performance and carcass traits of calves compared to a traditional, short-duration anthelmintic. Animals from 13 cooperator herds across 7 states were stratified within herd and assigned to 1 of 2 treatments; injectable doramectin (DOR) or injectable extended-release eprinomectin (EPR). There were no differences in pre-weaning cow or calf performance including weight, ADG, reproductive success, or weaning weight. Although EPR cows did have a lower incidence of pinkeye, there were no differences in pinkeye incidence of calves. Fecal samples collected at the start and end of the grazing season indicated a greater reduction in fecal egg counts (FEC) for EPR cows, however, FEC at each timepoint were well below threshold indicative of clinical parasitism. When evaluating feedlot performance, EPR calves tended to have lower incidence of morbidity, however there were no differences in growth performance. When evaluating carcass traits, calves treated with EPR during the pre-weaning phase had a greater marbling score and a greater average quality grade. While there were noted improvements for EPR calves during the feedlot phase including improved morbidity and quality grade, we believe that a lack of parasitic infection during the grazing season may have resulted in a lack of performance differences in this study.

Introduction

It has been well documented that gastrointestinal parasites can be detrimental to cattle health and performance. Anthelmintic treatment has long been used in all sectors of the beef industry to mitigate the negative effects of parasitic infection. In cow-calf production, anthelmintic treatment has been shown to improve cow BW and BCS, reproductive success, and calf performance. The effects of anthelmintic treatment during the feeding phase have been shown to improve live performance as well as carcass characteristics. Studies have also linked calfhood deworming treatment to improved lifetime performance including growth and health.

In 2012, Merial, Inc. released the extended-release version of their injectable anthelmintic drug, eprinomectin. This product label claims 100-150 days of parasite protection with one injection. To date, little research has been published regarding the effects of extended-release eprinomectin on cow-calf performance. Therefore, the objective of this study was to assess economically relevant performance parameters in cow herds following administration of extended-release eprinomectin at the start of the grazing season and to assess subsequent feedlot performance of progeny.

Materials and Methods

To study the effects of extended-release eprinomectin on cow-calf systems, twelve cooperator herds located in seven states (Iowa, Missouri, Indiana, Kentucky, Tennessee, Ohio, and Georgia) participated in the study. The total number of animals enrolled in the trial was 1,768 cow-calf pairs and included both spring- and fall-calving herds. Animals were stratified within herd by cow age, calf birth date, calf birth BW, and calf sex and assigned to 1 of 2 treatments; injectable doramectin (DOR; Dectomax™, Zoetis, Animal Health, Parsippany, NJ; n=879) or injectable eprinomectin (EPR; LongRange™, Merial, Duluth, GA; n=889). Calves were either treated directly through anthelmintic treatment or indirectly through treatment of the dam.

Performance parameters of interest are included in Table 1. Cow body weights (BW) and body condition scores (BCS) were taken at time of treatment and again at the end of the trial. Calves were weighed at time of treatment and at weaning. Birth weights of fall calves were evaluated to determine if summer treatment impacted fetal growth.

Fecal samples were randomly collected from a subset of cows at both treatment and the end of grazing to evaluate fecal egg count (FEC).

Available herd health records were used to analyze incidence of pinkeye over the course of the grazing season. In July, fly counts were conducted on a subset of five herds to evaluate fly burden. Herds included in the analysis consisted of both spring- and fall-calving herds.

For all herds, overall breeding season pregnancy rates were collected for both spring and fall herds and conception rates to AI were evaluated where applicable. For all spring-calving herds, calving distribution for the 2017 calving season as well as calving interval between 2016 and 2017 were evaluated.

After weaning, a subset of calves from each herd at the discretion of the cooperator were then sent to a Tri-County Steer Carcass Futurity (TCSCF) feedlot for the finishing phase. While at TCSCF, feedlot performance and health were monitored. Following slaughter, carcass data were collected. Feedlot performance, morbidity, and carcass parameters were analyzed.

Performance variables were analyzed using the MIXED procedure of SAS. Reproductive end points, health outcomes, and quality grade distribution were analyzed using the GLIMMIX procedure in SAS (SAS Inst. Inc., Cary, NC).

Results and Discussion

Cow performance data is presented in Table 2. There were no differences in initial or final BW ($P \geq 0.32$) as well as no differences in ADG or change in BW ($P \geq 0.12$) over the course of the grazing season. Subsequently, there were no differences in initial or final BCS ($P \geq 0.23$).

While extended-release eprinomectin is not labeled for fly control, one of the objectives of the current study was to evaluate claims of reduced fly burden and incidence of pinkeye. There was no difference in fly burden between EPR and DOR cows ($P \geq 0.62$). Interestingly, EPR cows tended ($P = 0.06$) to have a lower incidence of pinkeye, although this reduction is not explained by differences in fly burden. There was no difference in incidence of pinkeye between treatment groups for calves ($P = 0.43$). There has been speculation that the fly control associated with extended-release eprinomectin is correlated with the reduction in pinkeye within treated herds. Fly control following treatment with extended-release eprinomectin is believed to be a result of residue in manure pats that disrupt egg and larval development in a manner similar to an insect-growth regulator (IGR). Studies have shown that treatment with extended-release eprinomectin can reduce horn fly burdens in grazing stocker cattle. However, there are no data on its effectiveness on face flies, the main transmitters of pinkeye within a grazing herd. Additionally, face flies can travel long distances and spend minimal time on an animal. This makes control of these pests difficult with products such as IGR. Therefore, it is hard to identify a causal relationship between fly control and pinkeye with this product.

Initial FEC were not different between treatment groups in this study ($P = 0.89$; Table 3). Final FEC were lower ($P = 0.02$) in EPR cows compared to DOR cows. Subsequently, EPR cows had a greater overall reduction in FEC compared to DOR cows ($P = 0.01$). However, FEC of both treatments at both initial and at final performance measurements were far below a threshold that would be indicative of clinical parasitism.

Evaluation of reproductive success indicated no difference in conception to AI, overall breeding season pregnancy rates, calving distribution or calving interval ($P \geq 0.33$; Table 3). It is important to note that in the Midwest and Eastern Corn belt, where a large majority of producers on this study were located, anthelmintic treatment, and subsequently pasture turnout, often coincide with initiation of the breeding season. Therefore, it is unlikely that there was enough time for deworming to impact spring breeding season success due to altered plane of energy.

Results for calf growth and performance are reported in Table 4. There were no differences in birth BW for calves regardless of tier or calving season ($P = 0.57$). Calf BW at time of treatment for calves in tier two was not different ($P = 0.50$). Likewise, weaning weights were not different between the two treatment groups regardless of tier or calving season ($P = 0.75$) and there was no difference in overall pre-weaning ADG ($P = 0.57$).

Feedlot performance and carcass measurements are presented in Table 5. There were no differences in final BW or ADG during the feeding period BW ($P \geq 0.13$). However, when evaluating health of calves in the feedlot, EPR calves were treated for various health issues fewer times compared to DOR calves ($P = 0.05$) indicating improved health status.

Subsequent carcass measurements (Table 5) showed no differences due to treatment including HCW, KPH, or backfat (BF; $P \geq 0.22$). Likewise, REA and YG were similar ($P \geq 0.60$) between treatments. Calves treated with EPR had a higher marbling score as well as higher average quality grade ($P \leq 0.01$). This resulted in difference in quality grade distribution where EPR calves have a greater percentage of carcasses grade average choice or higher compared to DOR (38.4% DOR; 49.7% EPR; $P = 0.03$).

Conclusion

The results of this study show no difference in cow performance or reproductive success over the course of the grazing season when comparing extended-release eprinomectin to a conventional, short duration anthelmintic. Likewise, there were no improvements in calf pre-weaning performance or feedlot performance. While carcass characteristics were largely unchanged due to treatment, there was an improvement in quality grade for EPR treated calves. Improved immunocompetency via extended parasite protection during the preweaning phase may have had long-term impacts on feedlot morbidity resulting in improved quality grade measurements. This was evidenced by a lower percent of illness during the feeding phase, increased marbling score, a higher average quality grade, and a higher percent of EPR calves grading average choice or higher.

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Table 1: Requirements for cooperator herd participation.

Cow Response Variables of Interest	Calf Response Variables of Interest
Body weight • Treatment • Off-study	Body weight • Treatment • Weaning • Birth weight (fall herds)
BCS • Treatment • Off-study	
Health outcomes • Pinkeye • Fly burden	Health outcomes • Pinkeye • Fly burden • BRD treatments in feedlot
Fecal egg counts • Initial • Final	
Reproduction end points • Conception to AI • Overall breeding season pregnancy rates • Calving distribution 2017 • Calving Interval between 2016 and 2017	Feedlot performance • Feedlot ADG • Health • Carcass characteristics • Carcass value/income

Table 2: Performance of cows treated with different anthelmintic treatments during the grazing season.

	Treatment[1]			
Item	DOR	EPR	SEM	P-Value[3]
BW, lbs.				
Treatment	1273	1275	25.1	0.85
Weaning	1283	1282	25.1	0.40
Change in[4], lbs.	18.77	26.8	10.4	0.13
Change in[4], %	1.95	2.67	0.81	0.12
Performance				
ADG[4], lbs.	0.12	0.17	0.08	0.23
BCS				
Treatment	5.57	5.57	0.07	0.99
Weaning	5.58	5.60	0.09	0.59
Change in	0.00	0.02	0.08	0.67

[1]Treatment: DOR = doramectin (Dectomax; Zoetis Animal Health, Parsippany); EPR = eprinomectin (LongRange; Merial, Duluth, GA).
[2]Larger SEM presented (n = 828 DOR; n = 832 EPR).
[3]*P*-value: Significant $P \leq 0.05$; Tendency $0.05 < P \leq 0.10$.
[4]Calculations based on weight changes from treatment to weaning/end of grazing season.

Table 3: Health and reproductive success of cows treated with different anthelmintic treatments during the grazing season.

Item	Treatment[1] DOR	Treatment[1] EPR	SEM	P-Value[3]
FEC				
Initial	2.07	2.97	0.49	0.18
Final	1.76	0.71	0.34	0.02
Change in	-0.30	-2.12	0.60	0.01
Health				
Cow Pinkeye, %	8.4	4.6	---	0.06
Live Fly Counts	62	60	11.3	0.62
Picture Fly Counts	50	58	11.8	0.69
Reproduction, % (no./no.)				
Conception to AI	47 (157/334)	50 (164/327)	---	0.51
Pregnancy Rate[4]	88 (729/828)	88 (733/832)	---	0.45
Calving Interval[5], d	371	370	2.1	0.72

[1]Treatment: DOR = doramectin (Dectomax; Zoetis Animal Health, Parsippany); EPR = eprinomectin (LongRange; Merial, Duluth, GA).
[2]Larger SEM presented (n = 828 DOR; n = 832 EPR).
[3]P-value: Significant $P \leq 0.05$; Tendency $0.05 < P \leq 0.10$.
[4]Pregnancy rate for 2016.
[5]Calving interval from 2016 to 2017 calving.

Table 4: Performance and health of calves who were treated with different anthelmintic treatments during the grazing season.

Item	Treatment[1] DOR	Treatment[1] EPR	SEM	P-Value
BW, lbs.				
Birth	78	78	2.0	0.57
Treatment	314	311	16.3	0.50
Weaning[4]	452	452	17.6	0.75
Performance, lbs.				
Treatment ADG[5]	2.27	2.29	0.09	0.34
Weaning ADG[6]	2.32	2.31	0.05	0.66
Health, %				
Pinkeye	18.6	21.1	---	0.43

[1]Treatment: DOR = doramectin (Dectomax; Zoetis Animal Health, Parsippany); EPR = eprinomectin (LongRange; Merial, Duluth, GA).
[2]Larger SEM presented (n = 828 DOR; n = 832 EPR).
[3]P-value: Tendency $0.05 < P \leq 0.10$.
[4]Actual weaning weight.
[5]Calculation based on weight change from time of anthelmintic treatment to weaning.
[6]Calculation based on weight change from birth to weaning.

Table 5: Feedlot and carcass characteristics of calves who were treated with different, pre-weaning anthelmintic treatments.

	Treatment[1]			
Item	DOR	EPR	SEM[2]	P-Value[3]
BW, lbs.				
Initial	810	825	32.0	0.20
Re-Implant	974	998	24.6	0.07
Final	1222	1235	21.2	0.13
Performance, lbs.				
ADG	3.57	3.52	0.33	0.33
Health				
Treated, %	22.4	13.6	---	0.05
Carcass Quality				
HCW[5], lbs.	760	767	13.0	0.22
Dress[6], %	61.7	61.9	0.00	0.24
Backfat, cm.	1.39	1.37	0.07	0.55
KPH[7], %	2.28	2.23	0.08	0.12
Ribeye area[8], $cm.^2$	81.90	82.25	1.14	0.58
Yield grade[9]	2.55	2.58	0.11	0.61
Marbling score[10]	1081	1101	12.6	0.01
Quality grade[11]	12.27	12.56	0.14	<0.01
% QG Distribution[12]				
Avg choice or Higher	40.38	51.43	---	0.03
Low choice	47.31	41.43	---	0.63
Select and lower	12.31	7.14	---	0.37

[1]Treatment: DOR = doramectin (Dectomax; Zoetis Animal Health, Parsippany); EPR = eprinomectin (LongRange; Merial, Duluth, GA).
[2]Larger SEM presented (n = 238 DOR; n = 259 EPR).
[3]*P*-value: Significant $P \leq 0.05$; Tendency $0.05 < P \leq 0.10$.
[4]Hot carcass weight.
[5]Dressing percent.
[6]Kidney, pelvic, heart fat.
[7]Marbling score: small: $1{,}000^0$, modest: $1{,}100^0$, moderate: $1{,}200^0$, etc.
[8]USDA quality grade: 12: $Choice^-$, 13: $Choice^0$, 14: $Choice^+$, etc.
[9]Percentage of steers in each treatment by quality grade, within treatment total is 100%.