Effects of Eprinomectin on Bull Reproductive Performance

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Summary and Implications

Parasitic infections in cattle are known to negatively impact cattle performance. It has been demonstrated that anthelmintic treatment that reduces or eliminates worm load can positively influence cattle productivity by increasing a plethora of parameters including weight gain, reproductive efficiency, and carcass characteristics. While parasitic infections pose threats to all cattle, bulls have been found to be more susceptible than their female counterparts and tend to acquire higher worm loads more quickly. While an increased susceptibility in bulls is recognized, little research has been done to determine the effect of anthelmintic treatment on bull reproductive performance and semen quality. This study evaluated the effects of eprinomectin on performance parameters and reproductive function in bulls during the summer grazing and breeding season. We observed no differences in BW and BCS between treatment with either injectable eprinomectin or injectable doramectin. Likewise, semen and reproductive parameters including motility, morphology, scrotal circumference, and scrotal tone were not affected by treatment. Overall, both treatments effectively reduced internal parasite loads during the breeding season. Results from this study that eprinomectin does not negatively impact production or reproductive parameters in reproductively active bulls and is effective at reducing parasitic infection over the course of the breeding season.

Introduction

Commonly used commercial parasiticides such pyrethroid-based pour-ons have been implicated in potentially exerting a negative effect on reproductive function of beef cows and bulls. When used at label dose, however, recent studies have refuted claims of detrimental effects of pyrethroids on bovine reproduction. Nonetheless, research in this field has led to a heightened awareness of potential impacts of commercial pharmaceuticals used for suppression of internal and external parasites on reproductive performance in beef cattle.

Anthelmintic drugs have long been used in commercial cattle production as a means to prevent internal parasitic infection and improve production in both cow/calf operations and feedlot settings. In 2012, Merial, Inc. released the long-acting, injectable anthelmintic drug, eprinomectin. While this parasiticide has been proven to reduce worm loads in cattle and is cleared for use in both lactating cows and calves 90 days and older, the effect on bulls that are reproductively active has not been fully studied.

Little research has been conducted to study the effect of anthelmintic treatment on reproductive performance in bulls. Therefore, the goal of this study was to assess performance parameters and semen quality of bulls treated with eprinomectin during the breeding season. We hypothesized that treatment with eprinomectin would not negatively affect reproductive parameters in sexually active bulls.

Materials and Methods

To study the effects of Longrange on bull reproductive performance, 11 bulls were allocated by breeding group to one of two anthelmintic treatments. At the start of the breeding season, bulls were treated with either injectable dormaectin (DOR; Dectomax™, Zoetis, Animal Health, Parsippany, NJ; n=6; 1836 ± 133 lbs) or injectable eprinomectin (EPR; Longrange™, Merial, Duluth, GA; n = 5; 1727 ± 161 lbs) at a dosage rate of 1cc/110 lbs.

At time of treatment, initial BW, BCS and fecal samples were taken and a breeding soundness exam (BSE) was conducted. The BSE included a general health and locomotion evaluation, assessment of scrotal tone (ST), scrotal circumference (SC), external palpation of sex organs (scrotum, testes, and epididymis), internal palpation of accessory sex glands, visual assessment of penis and prepuce and collection of a semen sample.

Semen was collected via electroejaculation into a plastic collection bag. The sample was immediately transferred to a warming plate (37ºC). A small drop of ejaculate was placed on two warmed slides one of which received a cover slip in order to assess progressive motility and the other being stained with Eosin-Nigrosin for assessment of morphology. Morphology was analyzed using high power magnification (100X) and phase contrast modalities. One hundred sperm cells were assessed for morphological analysis. Morphological abnormalities were classified as primary or secondary and broken down by head, proximal droplet, distal droplet, and tail defects.

Following a 46 day breeding season, final BW, BCS and fecal samples were taken and BSE's were again conducted. Results were analyzed using PROC MIXED of SAS (SAS Inst. Inc., Cary, NC).

Results and Discussion

Performance and fecal results are reported in Table 1. Initial and final BW and BCS did not differ between treatments ($P > 0.18$). Change in BW, BCS and ADG during treatment period were also not different between groups ($P > 0.32$). While there was a tendency ($P = 0.07$) for EPR bulls to have a greater reduction in fecal egg counts

over the course of the treatment period, this is mostly a function of EPR bulls tending to have a greater internal parasite load at treatment. Overall, both treatments effectively mitigated internal parasites in cattle over the course of the breeding season. No differences ($P > 0.18$) in motility, scrotal tone, or scrotal circumference were noted between treatments (Table 2). No differences in sperm morphology were noted between treatments (Table 3). Overall, use of eprinomectin for anthelmintic control did not have a negative impact on sperm quality and bull fertility over the course of the breeding season. While limitations in observational units are acknowledged, data from this study suggest that eprinomectin is not detrimental to reproductive function. However, further research should be conducted to ensure these data are representative of a larger population of animals across a wider array of environmental and biological conditions.

Table 1: Effect of anthelmintic treatment on body weight, body condition score, and fecal egg counts over a 46 day summer breeding season.

	Treatment[1]			
Item	DOR	EPR	SEM	P-Value
BW, lbs				
Initial	1835.71	1726.71	161.23	0.64
Final	1578.96	1508.96	102.48	0.64
Change in	-256.75	-217.75	86.80	0.76
% Change in	-13.47	-12.35	4.14	0.85
Performance				
ADG[2], lbs	-3.29	-2.79	1.11	0.76
BCS[3]				
Initial	5.13	5.04	0.12	0.61
Final	5.01	4.6	0.19	0.18
Change in	-0.12	-0.42	0.2	0.32
EPG[4]				
Initial	2.72	19.72	5.39	0.06
Final	1.76	1.89	0.89	0.92
Change in	-0.96	-17.82	5.54	0.07

[1]Treatment: DOR = doramectin; EPR = eprinomectin
[2]Average daily gain calculated by final weight minus initial weight and divided by 46 days of trial period
[3]Based on industry standard (1-9) body condition score technique
[4]EPG = eggs per gram of fecal sample

Table 2: Effect of anthelmintic treatment on scrotal circumference, scrotal tone, and sperm motility over a 46 day summer breeding season.

	Treatment[1]			
Item	DOR	EPR	SEM	P-Value
Scrotal Circumference, cm				
Initial	36.33	35.74	1.42	0.78
Final	36.61	35.44	1.59	0.61
Change in	0.28	-0.30	0.91	0.66
Scrotal Tone				
Initial	3.32	3.65	0.36	0.53
Final	3.69	3.53	0.28	0.68
Change in	0.38	-0.13	0.62	0.58
Motility				
Initial	78.75	73.75	6.23	0.58
Final	59.44	67.78	7.40	0.44
Change in	-19.31	-5.97	6.39	0.18

[1]Treatment: DOR = doramectin; EPR = eprinomectin

Table 3: Effect of anthelmintic treatment on sperm morphology over the course of a 46 day summer breeding season.[1]

	Treatment[1]			
Sperm cells, %	DOR	EPR	SEM	P-Value
Normal				
Initial	73.69	73.03	5.95	0.94
Final	69.24	64.57	9.29	0.73
Change in	-4.46	-8.46	6.11	0.45
Abnormal				
Initial	26.31	26.97	5.95	0.94
Final	30.76	35.43	9.29	0.72
Change in	4.46	8.46	6.11	0.65
Head defects				
Initial	11.53	4.86	2.45	0.09
Final	5.63	9.63	2.44	0.28
Change in	-5.90	4.76	3.90	0.09
Proximal droplets				
Initial	0.60	0.76	0.80	0.88
Final	13.53	-3.63	7.13	0.13
Change in	12.93	-4.402	7.45	0.14
Tail defects				
Initial	12.97	21.64	7.13	0.41
Final	10.28	26.61	5.05	0.06
Change in	-2.69	4.97	6.16	0.40
Distal droplets				
Initial	1.21	-0.29	0.81	0.23
Final	1.33	2.83	1.85	0.58
Change in	0.13	3.13	2.14	0.35
Primary defects				
Initial	12.13	5.63	2.58	0.12
Final	19.15	5.99	6.67	0.20
Change in	7.03	0.36	7.69	0.55
Secondary defects				
Initial	14.18	21.35	7.23	0.50
Final	11.61	29.44	4.59	0.03
Change in	-2.57	8.10	5.51	0.21

[1]Treatment: DOR = doramectin; EPR = eprinomectin