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Performance and Health Effects of Zuprevo 18% in Newly Received, Highly Stressed Beef Cattle

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Introduction

The objective of this study was to determine the health and performance effects of Zuprevo 18% (tildipirosin, 4 mg/kg body weight) during a 42-day backgrounding period when administered to high-risk transported cattle within 24 hours after arrival.

Experimental Procedures

A total of 729 high-risk calves, over 4 phases from 2012–2013, were procured from an order buying facility in Dickson, TN. Calves were individually identified, weighed, tested for persistent infection with bovine viral diarrhea (BVD-PI), and randomly assigned to treatment group pre-shipment. Eight animals that tested positive for BVD-PI were removed from the group before shipment. Calves were then transported to the Kansas State University Beef Stocker Unit. Upon arrival, calves were housed in dirt-surfaced pens overnight with free access to long-stemmed prairie hay and water. Within 24 hours of arrival, calves were individually weighed (mean weight 462 lb); vaccinated with Cavalry 9 (Schering-Plough Animal Health; Omaha, NE) and either Vista 5 (Intervet; Millsboro, DE) or Vista Once (Intervet); dewormed using Safe-guard (Intervet) oral drench; and implanted with Ralgro (Schering-Plough Animal Health). In addition, calves were mass-medicated with Zuprevo (Merck Animal Health; Summit, NJ) or not (Control). Calves were allocated to 56 pens, each containing 12 to 14 animals. There were 24 pens (309 head) of Control animals and 32 pens (412 head) of calves allocated to the Zuprevo treatment during the four study phases.

All animals were housed and managed the same, with *ad libitum* access to water and a common diet throughout the 42-day study period. Animals were evaluated once daily for clinical signs of bovine respiratory disease and observed to ensure appropriate animal care management for the duration of the experiment. Personnel responsible for daily health monitoring were blinded to treatments. Health status was characterized using a clinical scoring system from 0 to 4, with 0 being normal and 4 being moribund, and a clinical score for each abnormal animal was recorded daily. Animals with clinical scores of 1 (mildly depressed) or 2 (moderately depressed) and a rectal temperature greater than 104°F, or animals with clinical scores of 3 (severely depressed) or greater received antibiotic therapy. First, second, and third antibiotic treatments for the Zuprevo group consisted of Resflor Gold (Intervet, Roseland, NJ), Baytril 100 (Bayer Animal Health, Shawnee Mission, KS), and either Bio-mycin 200 (Boehringer Ingelheim, St. Joseph, MO) or Excede (Zoetis, Exton, PA), respectively. For the control group, first-round treatments consisted of Zuprevo or Resflor Gold, second-round treatments consisted of Resflor Gold or Baytril, and third-round antibiotic treatments, when required, consisted of Baytril or Excede. Three-day post-treatment moratoriums were observed after each antibiotic treatment, with an exception for animals with clinical scores of 3 or greater that were eligible for retreatment after 48 hours. Animals treated ≥ 3 times

were deemed chronic. All animals removed from the study for respiratory disease were weighed at time of removal, and all mortality cases were necropsied to determine cause of death. All animals were individually weighed on day 42 of the studies, and these final weights were used to calculate average daily gains and gain efficiencies.

Results and Discussion

Health

Compared with no metaphylaxis at arrival processing (Control), full processing with Zuprevo metaphylaxis decreased respiratory disease sickness by 41.8% ($P < 0.01$), increased first-treatment success rates by 17.9% ($P = 0.051$), decreased chronicity rate by 55.9% ($P < 0.01$), and decreased mortality rate by 25.6% ($P = 0.31$). Comparisons of respiratory disease morbidity rates, case fatality rates, and overall mortality rates all revealed significant differences between the control and Zuprevo treatment groups (Table 1).

Performance

Compared with no metaphylaxis at arrival, full processing with Zuprevo metaphylaxis at arrival increased average daily gain 10.5% ($P = 0.03$) on a dead-out basis, but not when calculated on a dead-in basis ($P = 0.36$). A non-significant ($P = 0.07$) trend was detected for an interaction between treatment and days on feed for feed intake, which is demonstrated in Figure 1. The main effects of days on feed and treatment both were significant ($P < 0.01$). Gain feed efficiency model-adjusted mean pounds of feed per head per day for Zuprevo cattle (11.51; SEM = 0.41) were 1.3 pounds higher than means for the control, no metaphylaxis treatment (10.21; SEM = 0.41), demonstrating that Zuprevo metaphylaxis improved feed intakes during the receiving period. No significant treatment effects were observed for feed:gain; means and standard errors are displayed in Table 2.

Implications

Cattle given Zuprevo had lower bovine respiratory disease morbidity rates than cattle in the Control group that were not mass-medicated. The number of calves requiring three treatments (chronics) was lower for the Zuprevo group compared with Controls, and cattle in the Zuprevo group were more efficient when feed efficiency was calculated on a dead-out basis.

Acknowledgements

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Table 1. Model-adjusted means and corresponding 95% confidence intervals (CI), by treatment group, for important health outcomes¹

Item	<i>P</i> -value ²	Control (24 pens; 309 head)			Zuprevo (32 pens; 412 head)		
		Mean (SEM)	Lower CI	Upper CI	Mean (SEM)	Lower CI	Upper CI
Respiratory disease morbidity, %	<0.01	65.6 (5.10)	54.9	74.9	38.2 (5.01)	28.9	48.5
First-treatment success rate, %	0.051	48.0 (3.82)	40.5	55.6	58.0 (4.19)	50.1	66.1
Case fatality rate, %	0.97	9.9 (2.75)	5.6	16.8	9.3 (2.92)	5.3	17.3
Chronicity rate (≥ 3 treatments), %	<0.01	19.7 ^a (3.04)	14.3	26.4	8.7 ^b (1.64)	5.8	12.5
Overall mortality rate, %	0.31	7.07 (1.93)	4.1	12.0	5.25 (1.45)	3.0	9.0

¹Models included random effects to account for the lack of independence among pens within study phases.

²Where the *P*-value for an overall treatment effect was ≤ 0.10 , treatment group means with different superscripts within rows differed significantly ($P < 0.05$).

Table 2. Model-adjusted means and standard errors (SEM) based on results from linear mixed models¹

Item	<i>P</i> -value	Control		Zuprevo	
		Mean	SEM	Mean	SEM
Deads-out basis ²					
Average daily gain, lb	0.03	2.46	0.15	2.75	0.13
Feed:gain	0.40	4.41	0.28	4.59	0.25
Deads-in basis					
Average daily gain, lb	0.36	2.33	0.38	2.49	0.37
Feed:gain	0.52	4.81	1.79	6.01	1.60

¹Models included random effects to account for the lack of independence among pens within study phases.

²Deads-out data were not included for Phase 1 [analyses will be re-run on receipt of these data].

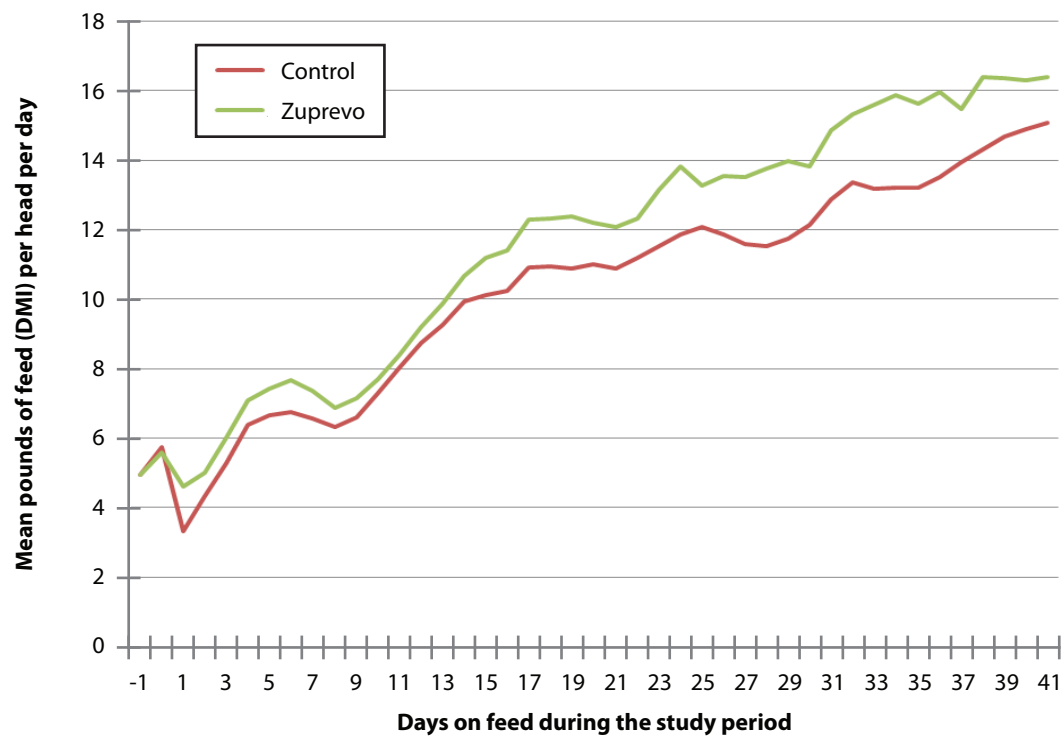


Figure 1. Daily dry matter intake (DMI) by treatment group over the feeding period.