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RESEARCH REPORT

Study offers comparative data on pour-on dewormers for stocker beef cattle

*Jonathon L. Beckett, Animal Science Department
California Polytechnic State University, San Luis Obispo*

Introduction

Cattle ranchers can choose from many deworming medications to eliminate the harmful effects of parasites on their stock. Since many of these dewormers have alternate methods of administration, the same chemical may be delivered with differences in effectiveness. Due to these differences, the effective life of the medication must be considered, along with cost, when determining dewormer application. In addition to the labor involved in treating cattle more frequently with short service-life medications, there is decreased growth performance due to the stress on the animals.

In recent years, several companies have developed pour-on dewormers that decrease labor inputs during application and eliminate the possibility of injection site blemishes. The dewormers are formulated to allow the active ingredients to be absorbed through the skin and distributed internally to the areas of the body affected by parasites. This study compared the efficacy of pour-on dewormers containing moxidectin, ivermectrin, doramectin and eprinomectin on stocker cattle on the west coast of the United States. In addition, dewormed cattle versus control cattle which were not dewormed throughout the grazing season were compared.



*Dewormers can improve
cattle health and provide
for a faster growth rate.*

Hypothesis and Objectives

The working hypothesis for this study was that increased productivity (weight gain) is realized in cattle medicated with the most effective dewormer, as indicated by fecal testing. Specifically, the following objectives were tested:

- ◆ Determination of the most effective pour-on deworming product for stocker cattle.
- ◆ Identification of parasite type that is most effectively protected against by the various products.
- ◆ Quantification of the value of deworming stocker cattle.

Materials and Methods

The study was conducted at a beef cattle facility owned and maintained by Cal Poly Foundation. Pastures were grazed from February 2, 2000 through July 19, 2000 by approximately 500 stocker cattle, selected from 527 weaned calves. Calves were primarily Angus and Hereford cross calves, with several containing up to 50 percent Charolais breeding. Calves were then assessed for general health. A total of 261 steers and 234 heifers were in the trial at the end of the grazing season (four animals were removed due to death or sickness, and one animal was dropped due to incorrect treatment application). Fecal samples were collected from 25 percent of each treatment group at each weigh day, and counts of nematode eggs were conducted to confirm the presence of patent nematode infections.

The study was laid out as a randomized block design with five treatment groups including a control. The animals were selected based upon uniformity of weight. Cattle were weighed on day minus one (-1) and blocked by sex, then by body weight. The first block contained the five heaviest steers, the second contained the next heaviest steers and so on until approximately 50 blocks were created. One animal within each block was then randomly assigned to each of the five treatment groups, thereby forming five treatment groups with approximately 50 head per group. This process was repeated to assign all heifers to treatments.

All five treatment groups were maintained and rotated together through the pastures on the rangeland and commingled from day three through the remainder of the study. For the three days following initial or secondary treatments, the five treatment groups were

Experimental Design			
Treatment	Description	Day 0 treatment	Animals/treatment
A	Moxidectin, 500 µg/kg	Pour-on	100
B	Ivermectin, 500 µg/kg	Pour-on	100
C	Eprinomectin, 500 µg/kg	Pour-on	100
D	Doramectin, 500 µg/kg	Pour-on	100
E	Control, non-medicated	N/A	100

housed in separate pastures to ensure that dewormers were not transferred to cattle on other treatments through contact. The end of the trial was determined by the end of the grazing season, at 130 days.

On day 0, selected animals were weighed and received doses calculated on the basis of day -1 body weight. Animals in treatments A-D were given their respective treatments. All treatments were applied at the rate of 500 mg/kg. Cattle in Treatment E received no medication, but were subjected to the same handling procedures as the treated groups on Day 0. After 72 hours the cattle were placed in the same pasture and commingled.

Fecal samples were collected from a randomly selected 25 animals from each treatment on day 0. Nematode egg counts were determined using the modified Wisconsin method (sensitivity 1 egg/gram) standard to the research facility and the results recorded.

Data Management and Analysis

The response variables to be analyzed were eggs per gram of feces (EPG), body weights and body weight gain recorded at each observed time point. EPG counts were determined from the fecal samples collected from specific animals on Days 0, 28, 70, 105 and 130. Body weights for each animal were determined simultaneously. Additionally, calves were weighed on two consecutive days at the initiation and conclusion of the study, and initial and final weights will be recorded as the average of the consecutive weights. Body weight gain on each post-treatment day was calculated based on the average of Day -1 and Day 0. Weight gain, EPG, and body weight were analyzed on each observation day using the PROC GLM model of SAS. The animal was the experimental unit.

The EPG count data was transformed by the logarithmic base 10 transformation, $Y = \log_{10}(1 + \text{count})$ before any analyses were conducted. The transformed data (Y) for EPG counts and body weight were analyzed on each observation day by a repeated measures statistical model using the PROC MIXED model of SAS to properly account for both random and fixed effects. The animal was the experimental unit. The statistical analysis for EPG counts was conducted only if there were at least six infected animals in the control group. For each observation day, least square means (LSMEAN) of the transformed EPG count, body weight, and body weight gain were calculated for each observation day for the five treatment groups and compared using the two-sided least significant difference (LSD) test at the five percent level.



Top: Cattle can be susceptible to parasite infestation from parasite load in the forage.

Center: Brown stomach worm.

Bottom: Cattle hookworm.

Results and Discussion

Average body weights were increased at 105 days after initiation of the trial by 36.1, 32.8, 31.6 and 27.6 lbs for Eprinex, Cydectin, Dectomax and Ivomec, respectively, over nondewormed control cattle. This was the result in differences in average daily gain throughout the study. The control group was consistently lower in average daily gains compared with the dewormed groups. The Ivomec group had the lowest average daily gain in the early period of grazing. However, these cattle demonstrated gains that were equal to the other dewormed groups from days 29-105. This compensatory gain in the Ivomec group was not sufficient to be equal to the other dewormed groups.

Total fecal egg counts increased in the first 70 days of the trial. From day 70 to the end of the grazing period, fecal egg counts decreased dramatically. This likely is due to the second deworming on day 70 and the decreased moisture thereby reducing the survivability of eggs and larvae. Trichostrongyle egg counts increased dramatically in non-dewormed cattle during the first 28 days of the trial. After the first four weeks, the trichostrongyle egg counts decreased in the next 42 days, and finally reached a plateau that was 14 percent of the peak egg count in the control cattle. Nematodirus egg counts remained low throughout the beginning of the study. By 70 days into the trial, only one treatment (Ivomec) showed any *Nematodirus* eggs, and that level was not significantly different from the remaining four treatment groups.

The data clearly support the use of dewormers in a stocker production system on the West Coast. Over the course of the trial, dewormed cattle gained 31.7 lbs more, on average, than control cattle. However, within the dewormed treatments, only the Ivermectin product resulted in significantly lower gains than the other three products. This was only true when forage resources were sufficient to meet the requirements of



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the cattle. Once cattle growth became constrained by forage quality and/or quantity, all of the dewormers were equally effective in improving gain over the control animals. By the end of the good grass season (105 days), the eprinomectin and moxidectin products resulted in approximately three percent increased gain versus the ivermectin product, although this difference was not statistically significant. At 70 and 105 days into the trial, cattle receiving the moxidectin product showed lower egg counts than any of the other treatment groups. This difference was statistically significant between moxidectin cattle and the control and ivermectin groups.

In summary, with two treatments, the moxidectin, eprinomectin and doramectin products appeared to be equally effective in allowing stocker cattle to gain to their genetic potential without impairment by parasites. Response to the ivermectin product was poorer than to the other three dewormers. This was true regarding total body weight gain and average daily gain, and is supported by the fecal egg count data. Producers must weigh all of the advantages offered by each of the products including but not limited to efficacy. These advantages may include persistency, ease of administration, rain fastness, flame resistance and customer service. These advantages must be considered with price in developing a strategic deworming program that is effective for each specific production system. Finally, regardless of the effective drug, deworming should be incorporated as a normal management practice in stocker cattle.

Further work must be conducted to determine the cost effectiveness of a strategic deworming program in a retained ownership stocker program. If cattle demonstrate increased growth during the stocker phase in the presence of anthelmintics, they may be better prepared to outperform their nondewormed contemporaries in the feedyard due to greater feed intake, decreased parasite burden, etc. Additionally, recent evidence showing that intramuscular fat deposition requires sustained nutrient availability would suggest that increased growth throughout the stocker phase would increase marbling potential. Therefore, cattle that are dewormed during the stocker phase would show greater marbling scores resulting in increased quality grades.

Principal Investigator

Jonathon L. Beckett, Professor
Animal Science Department
California Polytechnic State University,
San Luis Obispo
Phone: (805) 756-7011
Email: jbeckett@calpoly.edu

Co-Principal Investigators:

Craig Reinemeyer, DVM
East Tennessee Clinical Research
4315 Papermill Drive
Knoxville, TN 37909
Phone: (865) 212-0004
Email: creinemey@aol.com

Tim Richards, DVM
Kahua Ranch, LTD
P.O. Box 837
Kamuela, HI 93734
Phone: (808) 882-4646
Email: tplc@aol.com

ARI Administration

California Agricultural Technology Institute
California State University, Fresno
2910 E. Barstow Ave. M/S OF115
Fresno, CA 93740-8009
Phone: (559) 278-2361
Fax: (559) 278-4849
ARI Website: ari.calstate.edu

ARI Executive Director

Joe Bezerra, Director of Operations
California Agricultural Technology Institute
California State University, Fresno

Acknowledgements

Funding and administrative support for this project was provided by the California State University Agricultural Research Initiative (ARI), administered by the California Agricultural Technology Institute at California State University, Fresno. Additional support was provided by Fort Dodge Animal Health, East Tennessee Clinical Research, and Kahua Ranch.

For More Information

This research report contains summarized results of Jonathon Beckett's study entitled "Efficacy of Pour-on Dewormers Differing in Active Ingredient and Carrier on Weight Gain and Fecal Egg Count in Stocker Beef Cattle," ARI Project No. 00-3-030 (Research Focus Area: *Production and Cultural Practices*). To view and/or obtain a copy of the complete final report, or to obtain additional information about this or other research projects, visit the ARI website at ari.calstate.edu. For information on projects specific to Cal Poly San Luis Obispo, visit the Cal Poly ARI website at ari.calpoly.edu.

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