Agricultural Experiment Station U. S. Department of Agriculture

Department of Animal and Range Sciences
CLAYTON LIVESTOCK RESEARCH CENTER
PROGRESS REPORT

Route 1 Box 109 Clayton, New Mexico 88415 505-374-2566

Progress Report No. 96 (June, 1995)

Effects of Dietary Ionophore Type and Level on Performance by Newly Received Beef Calves[1]

G. C. Duff, M. L. Galyean, K. J. Malcolm-Callis, and D. R. Garcia

Both Rumensin and Bovatec are commonly used in diets for newly received beef calves. Limited data are available comparing the two ionophores in such diets. In addition, dietary concentration of an ionophore, particularly Rumensin, may be an important factor in receiving diets. Our objective was to evaluate the effects of Rumensin included at 20 or 30 g/ton and Bovatec at 30 g/ton on performance by newly received beef calves.

Two hundred fifty crossbred (British x Continental) calves were shipped in two separate loads from southern Arkansas to the Research Center. Calves in Load 1 were 15.25 h in transit and experienced a shrink of 6.06% from a pay weight of 414 lb. Load 2 calves were in transit 18.5 h and had a 5.82% shrink from a pay weight of 418 lb. Both loads of calves were received on a Friday. Initial processing immediately after arrival included an individual weight and ear tag, branding, vaccination with Bovishield 4 and a seven-way clostridial preparation, treatment with Synanthic and Neguvon, and injection with vitamin A/D_3. In addition, all calves received 1.5 mL of Micotil per 100 lb of body weight. After initial processing, calves in both loads were placed in two pens with access to large round bales of sudangrass hay and a 70% concentrate diet that did not contain an ionophore (approximately 3 lb/animal). On Monday morning, calves were again individually weighed, castrated (69 and 70 bulls for Load 1 and Load 2, respectively), and horn tipped (37.6% and 44.8% for Load 1 and Load 2, respectively). Fecal samples were collected from 40 calves in Load 2 (five calves/pen) before the start of the experiment and also on days 14 and 28. Estimates of the presence of coccidial oocysts were made at the Texas A & M University Veterinary Medical Diagnostic Laboratory in Amarillo, TX. Calves were placed in their assigned pens (two pens of 15 to 16 calves per load for each treatment based on random allotment at processing) and given ad libitum access to a 70% concentrate diet (Table 1). Treatments were 1) Control - no ionophore, 2) Rumensin included at 20 g/ton + Tylan at 10 g/ton of dietary dry matter, 3) Rumensin included at 30 g/ton + Tylan at 10 g/ton of dietary dry matter, and 4) Bovatec included at 30 g/ton + OTC at 8 g/ton of dietary dry matter. Small bales of sudangrass hay also were available to the calves during the first week after arrival. Each calf was weighed, revaccinated with Bovishield 4, and implanted with Synovex S on day 14 after arrival. Individual ingredient samples were obtained at 2-week intervals for dry matter determination. Feed bunks were swept, and unconsumed feed was weighed on days 14 and 28 for each pen. Bunk samples were obtained at weekly intervals for analysis of dry matter, ash, acid detergent fiber, and crude protein. Only 12 calves were treated for bovine respiratory disease during the experiment.

The sudangrass hay fed to the calves during the first week of the experiment was 91.2% dry matter and contained (dry matter basis) 6.8% ash, 5.4% crude protein, and 40.1% acid detergent fiber. Averaged across all treatments, the 70% concentrate diets were 84.6% dry matter and contained 8.1% ash, 14.2% crude protein, and 17.6% acid detergent fiber on dry matter basis.

Table 1. Composition of diets fed during the 28-day receiving period

Ingredient	% of dry matter
Sudangrass hay	9.4
Alfalfa hay	20.1
Whole corn	10.1
Steam-flaked milo	46.1
Soybean meal	3.5
Molasses	5.1
Fat	2.0
Limestone	.8
Dicalcium phosphate	.5
Salt	.4
Urea	.5
Ammonium sulfate	.5
Premix[a]	1.0

[a]Wheat midds-based premix supplied Vitamin A (1,134 IU/lb of diet) and Vitamin E (45 IU/lb of diet), and either Rumensin (20 or 30 g/ton) plus Tylan (10 g/ton), or Bovatec (30 g/ton) plus oxytetracycline (8 g/ton). A trace mineral package containing 4.17% Mn, 10% Zn, 5.8% Fe, .83% Cu, .17% Co, and 16.67% Mg was included at 12% of the premix.

No differences were noted among treatments for daily gain during days 0 to 14, 15 to 28, or 0 to 28 (Table 2). Daily dry matter intake of concentrate and total dry matter intake were decreased ($P < .04$) during days 0 to 14 for ionophore treatments compared with the control diet and decreased ($P < .05$) for Rumensin 30 compared with Rumensin 20. No differences were noted among treatments for sudangrass hay intake during days 0 to 14. Likewise, no differences ($P > .10$) were noted among treatments for daily dry matter intake during days 15 to 28. Daily dry matter intake was decreased ($P < .08$) for ionophore treatments compared with control for days 0 to 28 (Table 2). No differences ($P > .10$) were noted among treatments for feed:gain during days 0 to 14, 15 to 28, or 0 to 28.

Although not statistically analyzed, 74.36% of the calves that were fecal sampled had some degree of coccidiosis before the study was initiated (day 0), and incidence of coccidiosis was distributed evenly across the treatments. Numerically, the percentage of calves with coccidial oocysts on day 14 was less with the three ionophore-containing diets than with the control diet. By day 28, incidence of coccidial oocysts had decreased to 10 to 22.2% across treatments.

Based on our results, both Rumensin at 20 or 30 g/ton or Bovatec at 30 g/ton can be used in the diet of newly received beef calves without adversely affecting daily gain. Decreased daily dry matter intake with ionophore-containing diets should, however, be an important factor to consider when determining the type and level of ionophore to feed. Decreased feed intake may play a critical role in the health and(or) performance of the animals. With ionophores at levels that tend to

[1]We thank Elanco Animal Health for supplying Rumensin and Tylan and partial financial support, Roche Animal Nutrition and Health for supplying Bovatec, and Syntex Animal Health for supplying Synanthic and Synovex S.

decrease daily dry matter intake, crude protein and(or) vitamin and mineral concentrations may need to be increased to offset decreased feed intake. Nonetheless, some type of coccidiostat should be incorporated into the feeding program to prevent an acute outbreak of coccidiosis during times of stress. Additional research is needed to further evaluate effects of ionophore type and level on feed intake by newly received beef cattle.

Table 2. Effects of ionophore type and level in the receiving diet on performance by beef steers

	Treatment					Contrast[b]		
Item	Control	Rumensin, 20 g/ton	Rumensin, 30 g/ton	Bovatec, 30 g/ton	SE[a]	1	2	3
Initial body weight, lb	388.7	391.8	391.0	393.2	3.06	-	-	-
Final body weight, lb	486.6	477.1	481.1	485.7	8.89	-	-	-
Daily gain, lb								
Days 0 to 14	2.46	2.17	2.22	2.43	.227	NS	NS	NS
Days 15 to 28	4.53	3.93	4.21	4.18	.336	NS	NS	NS
Days 0 to 28	3.50	3.05	3.22	3.31	.235	NS	NS	NS
Daily dry matter intake, lb/steer								
Days 0 to 14								
Hay	.98	.96	.99	.94	.032	NS	NS	NS
Concentrate	8.87	8.39	7.34	8.19	.304	.04	.05	NS
Total	9.84	9.34	8.32	9.13	.279	.03	.04	NS
Days 15 to 28	14.03	13.15	12.67	13.67	.503	NS	NS	NS
Days 0 to 28	11.94	11.25	10.50	11.40	.375	.08	NS	NS
Feed/gain								
Days 0 to 14	4.01	4.62	3.75	3.83	.429	NS	NS	NS
Days 15 to 28	3.14	3.51	3.07	3.29	.257	NS	NS	NS
Days 0 to 28	3.42	3.77	3.29	3.47	.207	NS	NS	NS
Incidence of coccidial oocysts, %[c]								
Day 0	80.0	66.7	90.0	60.0	-	-	-	-
Day 14	45.5	22.2	20.0	30.0	-	-	-	-
Day 28	18.2	22.2	10.0	20.0	-	-	-	-

[a]Pooled standard error of treatment means, n = 4 pens per treatment.

[b]Observed significance level of contrasts: 1 = Control vs ionophores; 2 = Rumensin 20 g/ton vs Rumensin 30 g/ton; 3 = Bovatec vs the average of Rumensin at 20 and 30 g/ton. NS = P > .10.

[c]Fecal samples were collected on day 0 for qualitative determination of coccidial oocysts from 10, 9, 10, and 10 calves for Control, Rumensin 20 g/ton, Rumensin 30 g/ton, and Bovatec treatments, respectively. The same calves were sampled on days 14 and 28; however, one extra calf was sampled in the Control group, resulting in 11, 9, 10, and 10 calves for Control, Rumensin 20 g/ton, Rumensin 30 g/ton, and Bovatec treatments, respectively.

Department Head
Animal and Range Sciences
New Mexico State University

Department of Animal and Range Sciences
New Mexico State University
Box 30003, Department 3-I
Las Cruces, NM 88003-0003

Non Profit Organization
U. S. Postage Paid
Permit No. 162
Las Cruces, NM