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Dosages of Laidlomycin Propionate for Receiving and Growing Diets Fed to Steer Calves

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Summary

The inophore laidlomycin propionate[2] (LP) became available in 1995 to improve ADG of cattle fed in confinement. Initial efficacy studies focused on finishing diets and yearling cattle. Limited data are available to quantify the benefits of using LP in calf grower programs. To evaluate LP efficacy for calves, receiving-grower diets based on corn silage were formulated to contain 0, 5.5, or 11 g/T LP and were fed to recently weaned steer calves. Five pens of 10 steers (initial BW = 483 lb) were assigned to each diet. The grower phase was terminated after 98 days on feed. Final diet ionophore concentrations of 4.6 and 9.6 g/T were below formula specifications. Assays of supplements indicated a significant loss of ionophore during feed manufacture. The cause of this loss was not identifiable from the sampling procedures used. The higher dosage of LP reduced ($P<.05$) DMI through the initial 56 days on feed while having no effect on average daily gain. After 56 days on feed, steers fed the higher LP diet exhibited greater ($P<.05$) ADG and better ($P<.05$) feed efficiency than steers fed the low LP diet. Cumulative steer performance included an improvement ($P<.05$) in feed efficiency when LP was fed at 9.6 g/T.

Key Words: Steers, Calf, Corn Silage, Laidlomycin Propionate, Ionophore

Materials and Methods

Steer calves (287 head) were secured from two ranches in western South Dakota. They were weaned and transported to the SDSU Brookings feedlot on November 1, 1994. Upon arrival steers were gate cut into 10 head groups and allowed overnight access to long grass hay and water. The morning after arrival all calves were processed. Processing included applying individual eartags; recording BW; vaccination using Resvac 4/Somubac[3] (MLV IBR, BVD, PI_3, BRSV and Haemophilus somnus), One Shot[3] (pasteurella haemolytica bacterin-toxoid) and Ultrabac 7[3] (Cl. chauvoei, Cl septicum, Cl novyi, Cl sordellii and Cl perfringes types C & D); deworming with Synanthic[4]; and ectoparasite control with DeLice[5].

After processing steers were returned to their pens and 3.5 lb of the receiving diet (Table 1) was delivered on top the long hay. Delivery of this diet continued once daily to cattle appetite for a 7-day receiving period. Access to long hay was discontinued 72 hours after steer arrival at the feedlot. All steers were reweighed the morning of November 8 and this BW was used for allotment purposes. Any morbid steers or individuals that lost BW during the receiving period were deleted from the allotment scheme. The heaviest steers were also deleted to reduce the group to 150 steers. Ranch of origin identity was maintained and stratified in each pen. Allotment of 10 steers per pen was accomplished with a balanced weight stratification, first among treatments and subsequently among replicates within treatment. The experiment was designed for three diet treatments with five 10-head replicate pens per treatment.

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Table 1. Receiving and grower diet formulations[a]

Ingredient	Diet: Receiving	Grower 1-76 days	Grower 77-98 days
Corn silage	73.23	76.38	–
Oat silage	–	–	48.49
Rolled corn	15.00	12.00	39.89
Ground corn[b]	–	–	2.11
SBM, 44%[b]	10.42	10.54	8.43
Limestone[b]	.75	.68	.68
Dicalcium phosphate[b]	.10	–	–
Trace mineralized salt[b]	.50	.40	.40

[a]%, DM basis.
[b]Included in a pelleted supplement. Complete supplement formulations are noted in Table 2.

At 0700 on November 10, 1994, steers were sorted to their assigned pens. They were then weighed and implanted with Synovex-S. This BW was used as the initial BW for the test. Feed and water had been withheld since 1600 hours the previous day to minimize BW variations due to digestive fill. After processing feed deliveries including diet treatments were made. The three treatments included 1) control, no nonnutritive additive, 2) 5.5 g laidlomycin propionate/ton, and 3) 11 g laidlomycin propionate per ton. All diets had similar formulations (Table 1) except for the additive inclusion rate in the pelleted supplement.

Bunks were reviewed daily at 0730 to make daily feed calls. Steers were fed once daily generally between the hours of 0800 to 1100. Feed ingredients were sampled each week and analyzed for DM, CP, ADF, NDF and ash. Weekly summaries of DMI were calculated from feed batch sheets and assayed DM of each ingredient. When carryover feed accumulated, the feed was removed from the bunk, weighed and sampled for DM determination. Weekly DMI summaries were corrected for this discarded feed. This system allowed a weekly estimate of diet supplement content corrected for fluctuations in feed moisture content. Each batch of supplement was assayed for ionophore concentration and when combined with actual diet supplement levels allowed accurate estimates of dietary ionophore concentration and ionophore intake. When corn silage inventories were depleted, a second grower diet was fed (77 to 98 days on feed) to complete the experiment.

Cattle were weighed at 0730 after 28, 56, 77 and 98 days on feed. Interim weights were "full." Feed and water were withheld 16 hours prior to the day 98 BW determination which was used as the final BW. Individual BW were measured and averaged for each pen. The pen mean BW was used with average daily DMI/steer in all feedlot performance variable calculations.

Steers were observed twice daily for visual signs of illness. Therapies were conducted as per established health protocols. One steer had to be removed from the experiment because of a urinary disorder. Pen mean data were corrected deleting this steer from all files used in the analysis of variance.

All performance data were analyzed on a pen mean basis using the GLM package in SAS. Mean separations tests were described with the PDIFF option to the LSMEANS calculation. This allows the reviewer to consider whichever mean comparisons are of interest but should only include pre-planned comparisons for data interpretation.

Results

Laidlomycin propionate (LP) concentrations in pelleted supplements were consistently lower than formulated values. Overall mean supplement LP concentrations of 36 and 73 grams per ton were 76 and 81% of expected values.

Because of this, the formulated diet ionophore concentrations of 5.5 and 11 g/T were actually 4.6 and 9.6 g/T (84 and 87%) of formulated concentrations (Table 2). The daily LP intake ($mg \cdot steer^{-1} \cdot d^{-1}$) was consistently two times higher for diet 3 than diet 2 although absolute LP intake amounts were lower than projected.

Range conditions were very dry during the 1994 grazing season and weaning weights of calves were about 75 lb lighter than observed in the two previous years. This probably contributed to excellent ADG on the relatively low energy grower diets fed (Table 3). The extraordinary ADG and feed/gain observed during the initial 28 days on test reflects fill effects as well as calf body condition. During this period the higher level of LP depressed DMI without compromising ADG. The higher LP treatment caused a numerical reduction in DMI during each interim period. This reduction was significant only during the initial 56 days on feed. Cumulative DMI tended (P=.07) to be reduced when the higher LP was fed.

Table 2. Diet ionophore concentration and daily ionophore intake

		Diet			
		2		3	
Week of:	Days	mg/steer	g/T	mg/steer	g/T
Nov 10	7	25	4.8	49	9.6
Nov 17	7	31	5.0	59	10.0
Nov 24	7	32	4.7	62	9.4
Dec 1	7	33	4.6	63	9.4
Dec 8	7	34	4.4	65	8.9
Dec 15	7	33	4.1	65	8.5
Dec 22	7	33	4.6	63	9.5
Dec 29	7	35	4.8	67	10.1
Jan 5	2	43	5.4	79	10.5
Jan 7	5	49	5.3	92	10.5
Jan 12	7	48	5.3	90	10.3
Jan 19	7	35	4.0	90	10.5
Jan 26	7	36	3.4	85	8.4
Feb 2	7	42	4.3	93	9.8
Feb 9	7	40	4.0	90	9.1
$\bar{X}$		36.6	4.6	74.1	9.6

Table 3. Feedlot performance variables by period

	Diet			
		Laidlomycin propionate		
	Control	5.5 g/T	11 g/T	SEM
Initial BW	483	485	485	2.6
1 to 28 days				
ADG	4.11	4.24	4.13	.121
DMI	12.54[a]	12.71[a]	12.14[b]	.156
F/G	3.06	3.00	2.96	.074
Day-28 BW	598	604	600	3.7
29 to 56 days				
ADG	2.56	2.53	2.42	.138
DMI	15.00[a]	15.09[a]	14.08[b]	.232
F/G	5.90	5.99	5.86	.247
Day-56 BW	669	675	668	4.8
57 to 77 days				
ADG	3.26[a]	3.80[b]	3.89[b]	.146
DMI	17.48	17.80	17.11	.262
F/G	5.40[a]	4.71[b]	4.42[b]	.176
Day-77 BW	734	754	750	6.9
78 to 98 days				
ADG	2.25[ab]	2.04[a]	2.35[b]	.101
DMI	20.15	20.10	19.61	.271
F/G	8.98[ab]	9.83[a]	8.39[b]	.428
Final BW	785	797	799	6.3
1 to 98 days				
ADG	3.09	3.19	3.21	.063
DMI	15.93	16.07	15.36	.211
F/G	5.17[a]	5.04[a]	4.79[b]	.053

[a,b]Means without common superscripts differ ($P<.05$).

The interim ADG were affected by diet during the 57 to 77- and 78 to 98-day periods. There were elevated (P<.05) ADG due to feeding LP in the 57 to 77-day period and an apparent rebound effect where the lower LP diet caused lower (P<.05) ADG during the 78 to 98-day period. Overall there were no differences (P>.15) in ADG due to diet.

Similar ADG and reduced DMI caused by feeding ionophores did improve feed conversions (F/G). The differences in F/G became evident as cattle reached heavier BW and caloric intake limitations became an important component of growth. Cumulative F/G was improved 3% (P=.11) for the lower LP treatment and 7.5% (P<.001) for the higher LP treatment. The F/G response appeared dose dependent in this experiment (Table 4). During periods when actual diet ionophore concentrations were greater, the percentage of improvement in F/G was greater. Low LP concentrations (3.9 g/T) during the final 21 days apparently minimized the F/G response for this treatment.

A primary objective of this study was to identify an appropriate LP dosage range for high roughage grower diets. Effective LP dosages slightly lower than 5 g/T were not effective in improving steer performance although consistent numerical advantages existed in the data set. An effective dosage of 9 to 10 g/T did clearly improve F/G. This was accomplished by reducing DMI without compromising ADG. The limited conclusions that can be drawn from this are that LP should be fed at levels of 9 to 10 g/T in grower diets, but that the initial 28-day LP concentration should be in the 5 to 9 g/T concentration range.

Table 4. Ionophore intake and feed conversions

	Diet					
	1		2		3	
Period	Ionophore concen-tration	Feed per gain	Ionophore concen-tration	ΔFeed per gain, %	Ionophore concen-tration	ΔFeed per gain, %
1-28	—	3.06	4.8	-1.2	9.6	-3.3
29-56	—	5.90	4.5	+1.5	9.3	-.7
57-77	—	5.40	5.0	-12.8	10.5	-18.1
78-98	—	8.98	3.9	+9.5	9.1	-6.6