THE EFFECT OF LAIDLOMYCIN PROPIONATE AND TYLOSIN ON PERFORMANCE AND CARCASS CHARACTERISTICS OF FEEDLOT STEERS

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Story in Brief

One hundred and forty Angus and Hereford X Angus crossbred steers were used to evaluate the efficacy of laidlomycin propionate supplemented at 10 g/ton alone and in combination with tylosin (9 g/ton). Administration of laidlomycin propionate resulted in a heavier final live weight. Daily gains (live weight basis) during the first half of the trial were increased 8.3% by laidlomycin propionate. Tylosin alone increased daily gain 10.2% during the second half of the trial. Daily gains for the 111 day trial (live weight basis) were improved 8.1% by laidlomycin propionate and 7.3% by tylosin. Lack of a significant interaction would imply that these two drugs were additive, but examination of means revealed that adding tylosin to the laidlomycin propionate diet provided little if any benefit except for reducing the incidence of liver abscesses. Laidlomycin propionate increased the efficiency of feed utilization 9.0% during the first half of the trial and 8.9% over the entire trial. Tylosin also improved feed efficiency over the entire trial by 4.0% (6.9% with controls vs .85% with the laidlomycin propionate diet). Laidlomycin propionate did not increase marbling scores or quality grades nor were any differences noted in ribeye muscle cooking properties or tenderness among the treatment groups. This ionophore-antibiotic combination should be economically important for cattle producers.

(Key Words: Laidlomycin Propionate, Tylosin, Feedlot, Steers, Ionophore.)

Introduction

Laidlomycin propionate is a new ionophore that increases daily gain and improves feed conversion (Gill et al., 1987; Spires et al., 1990; Mader et al., 1991). The efficacy of feeding laidlomycin propionate alone or in

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combination with tylosin, an antibiotic already cleared to reduce liver abscesses, was studied in this trial. Laidlomycin propionate increases the concentration of propionate in rumen fluid (Spires and Algeo, 1983) allowing feedlot steers to utilize their diets more efficiently and may inhibit bacteria that produce lactic acid. Still under investigation for FDA approval, laidlomycin propionate is not yet available to the commercial producer.

Materials and Methods

One hundred and forty Angus and Hereford X Angus crossbred steers, originating from a single ranch in Nebraska, were selected from a larger group based on uniformity of size, weight and breed. Steers were blocked by initial weight and allotted to pens and treatments in a randomized block design. Five pens of seven steers each were allocated to each of four treatments. Dietary treatments consisted of controls (basal diet), laidlomycin propionate (10 g/ton), tylosin (9 g/ton) and the combination of laidlomycin propionate (10 g/ton) and tylosin (9 g/ton). Upon arrival, steers were individually weighed, identified, vaccinated with IBR-PI_3 (MLV) IM, Clostridia chauvoei, septicum, novyi, sordellii and perfingens types C and D bacterin, and dewormed with Ivermectin. Steers were not implanted. Steers were allowed free access to hay and water overnight after arrival.

Steers were given ad libitum access to high concentrate diets from self-feeders for the entire feeding period. Cottonseed hulls plus chopped alfalfa, used as roughage sources, were sequentially removed from the diet to aid in adaptation of cattle to the final diet (Table 1). Steers were allowed a 9-day adaptation period before the drug treatments were initiated. Steers were receiving their final ration by day 17 of the study. After obtaining the 111-day weight, all cattle were placed on the control ration for a drug withdrawal period of ten days prior to slaughter.

Initial weights were obtained directly off the truck. Following the 9-day adaptation period, cattle were shrunk (no feed or water) for 18 hours on two consecutive days in order to obtain an initial shrunk weight at the initiation of drug treatments. Gains and feed efficiency were calculated based on shrunk period weights (96% of full weight except for the initial and 111 day weight) to account for fill. Two steers were removed from the laidlomycin propionate treatment for reasons not associated with drug treatments. Cattle were trucked to Dodge City, Kansas for slaughter. At the time of slaughter, livers were examined for the presence and severity of liver abscesses. Carcass data were obtained 24 hour postmortem and yield and quality grades were determined (USDA, 1989). Approximately 8 inches of Longissimus muscle (ribeye) corresponding to the 9-12th rib section was removed from the left side of each carcass and vacuum packaged. Ribeye sections were

Table 1. Composition of diets (dry matter basis).

Ingredient	Diet Sequence 1	2	3	4	Final
			(%)		
Corn, rolled	38.08	48.08	58.08	68.08	79.58
Alfalfa hay, pelleted	30.00	25.00	18.75	12.50	4.50
Cottonseed hulls	20.00	15.00	11.25	7.50	4.00
Molasses, cane	3.75	3.75	3.75	3.75	3.75
Pelleted supplement[a]	8.17	8.17	8.17	8.17	8.17

Calculated Composition:

Nutrients	Diet DM %	Diet As Fed %	Supplement DM %	Supplement As Fed %
Dry matter, %	100.00	87.80	100.00	91.76
NEm, Mcal/cwt	92.26	81.00	65.47	60.07
NEg, Mcal/cwt	61.01	53.57	43.64	40.04
Crude protein, %	12.76	11.20	51.34	47.11
Crude fiber, %	5.92	5.19	10.07	9.24
K, %	.69	.60	1.21	1.11
Ca, %	.50	.44	4.48	4.11
P, %	.33	.29	.98	.90

[a] Supplement composition: Soybean meal 45.00%; cottonseed meal 34.18%; calcium carbonate 10.49%; urea 4.89%; salt 3.67%; dicalcium phosphate 1.46%; trace mineral mixture .16%; vitamin A (30,000 IU/g) .13%; Laidlomycin propionate premix 0 or .12%; Tylosin premix 0 or .14%.

aged for 10 days at 33°F before a one inch thick steak (12th rib end) was removed for broiling (medium degree of doneness). Cooking time, cooking shrinkage and shear force (tenderness) were determined for each steak. Data were analyzed on a pen basis using the general linear model of SAS with the main effects of weight block, laidlomycin propionate, tylosin and the interaction of laidlomycin propionate and tylosin included in the model. Least squares means are reported. When the interaction was not significant (P>.10), main effect means were contrasted statistically.

Results and Discussion

Effects of laidlomycin propionate and tylosin on cattle performance are reported in Table 2. Except for KPH percentage (Table 3), no interactions of these two drugs were detected (P>.10). Hence overall treatment means are presented and discussed. Cattle supplemented with laidlomycin propionate had greater (P<.05) weights at 111 days than control cattle. Daily gains of cattle supplemented with laidlomycin propionate averaged 8.3% higher (P<.05) during the first half of the trial; while daily gains during the second half were 10.2% greater (P<.05) with tylosin. Averaged over the 111 days, daily gains were increased 8.1% by laidlomycin propionate (P<.05) and by 7.3% with tylosin (P<.10). This increase in daily gain is similar to the findings of Spires et al. (1990) and Mader et al. (1991). Laidlomycin propionate may allow cattle to adapt to their high concentrate diets faster and thereby increase gain, because this ionophore has been reported to inhibit lactic acid production in the rumen. Tylosin may reduce digestive upsets occurring late in the feeding period as demonstrated by higher gains during this time. Improved liver health, discussed later, also might explain this benefit. Gains based on carcass weight, though tending to increase (4.8% with laidlomycin propionate and 3.6% with tylosin) were not significantly improved (P<.19, P<.60). The difference observed between live weight and carcass adjusted daily gains may be due to the 10-day withdrawal period required for laidlomycin propionate.

Although no differences in feed intake were detected, groups differed in efficiency. Supplementation with laidlomycin propionate to the diet improved (P<.01) the efficiency (9.0%) of feed utilization during the first half of the trial. Efficiency of feed utilization averaged across the 111 days was 8.9% greater (P<.01) with laidlomycin propionate and 8.1% greater (P<.10) with tylosin. Calculated metabolizable and net energy values for diets containing laidlomycin propionate were greater (P<.05) supporting the concept that energy utilization was improved. These data are consistent with earlier studies in which laidlomycin propionate improved feed conversion (Gill et al., 1987; Spires et al., 1990; Mader et al., 1991). Tylosin improved (P<.10) feed efficiency over the total trial by 4.0% based on live weights, but the 4.5% advantage in NEg with tylosin, based on hot carcass weight after the 10 day withdrawal was not significant (P<.59). The difference between live weight, feed efficiency and carcass adjusted NE_g maybe a result of the 10-day withdrawal period required for all drugs in this study.

Carcass characteristics were similar between treatments except for KPH, percent yield grade 4's or greater, and condemned livers. For KPH%, an interaction (P<.06) was detected. Administration of laidlomycin propionate or tylosin alone tended to increase KPH as compared to the combination of these two drugs. The increased percentage of yield grade 4's

Table 2. Effects of laidlomycin propionate or tylosin on steer performance.

Item	Laidlomycin Propionate / Tylosin	Treatment					Effect[ab]	
	Laidlomycin Propionate	0	+	0	+		Laidlomycin	
	Tylosin	0	0	+	+	SEM	Propionate	Tylosin
No. of pens		5	5	5	5			
No. of steers		35	33	35	35			
Weight, lb:								
Initial		719	722	718	717	1.47		
111 days		1115	1149	1139	1146	7.77	*	
Daily Gains, lb:								
0-55		4.20	4.59	4.36	4.50	.10	*	
55-111		2.95	3.12	3.24	3.25	.09		*
0-111		3.57	3.85	3.79	3.87	.07	*	†
Carcass, ADG[c]		3.36	3.51	3.44	3.52	.09		
Daily feed, lb DM:								
0-55		22.75	22.63	22.38	22.13	.31		
55-111		23.06	22.38	22.97	22.88	.38		
0-111		22.91	22.50	22.68	22.51	.30		
0-slaughter		22.57	22.13	22.39	22.24	.29		

Table 2. (Continued)

		Treatment					Effect[ab]	
	Laidlomycin Propionate	0	+	0	+			
Item	Tylosin	0	0	+	+	SEM	Laidlomycin Propionate	Tylosin
Feed/gain								
0-55		5.43	4.95	5.14	4.93	.10	**	
55-111		7.83	7.21	7.12	7.07	.27		
0-111		6.42	5.87	5.98	5.82	.12	**	†
0-Slaughter		6.74	6.31	6.51	6.32	.15	†	
Metabolizable energy, Mcal/kg		2.88	3.01	2.94	2.99	.04	*	
Net energy, Mcal/cwt								
Maintenance		83.97	89.50	86.26	88.78	1.82	*	
Gain		55.77	59.50	57.47	59.14	1.22	*	

[a] † = P<.10, * = P<.05, ** = P<.01
[b] Interactions not significant (P>.10).
[c] Carcass average daily gain (carcass weight/.638)/121 days.

Table 3. Effects of laidlomycin or tylosin on carcass characteristics.

Item	Treatment					Effect[ab]	
Laidlomycin Propionate	0	+	0	+			
Tylosin	0	0	+	+	SEM	Laidlomycin Propionate	Tylosin
Carcass wt, lb.	718	732	724	730	6.55		
Dressing %[c]	64.4	63.7	63.5	63.6	.40		
Ribeye area, sq. in.	12.35	12.48	12.28	12.42	.16		
KPH, %[d]	2.23[e]	2.36[f]	2.36[f]	2.30[ef]	.04		
Fat thickness, in.	.51	.55	.48	.51	.03		
Marbling score[g]	463	463	448	460	13.99		
Maturity[h]	134.6	136.3	135.7	134.7	1.78		
Choice, %	85.7	76.0	80.0	88.6	8.14		
USDA Yield Grade	3.05	3.19	3.04	3.08	.10		
Percent YG4	0	5.71	0	8.57	2.86	*	
Condemned liver, %	22.9	21.1	11.4	0	5.96		*

Table 3. (Continued).

Item		Treatment					Effect[ab]	
	Laidlomycin Propionate	0	+	0	+		Laidlomycin Propionate	Tylosin
	Tylosin	0	0	+	+	SEM		
Raw, wt., oz		8.78	8.90	8.48	8.71	4.33		
Cooking time, min/3 oz		20.43	20.94	20.23	20.60	.62		
Cooking shrink, %		26.65	26.59	27.23	26.77	.48		
Shear force, lbs		7.82	8.15	8.02	8.06	.09		

[a] Significant effect of Laidlomycin propionate or Tylosin † = P < .10, * = P < .05, ** = P < .01.
[b] Interaction were not significant (P < .10) except for KPH.
[c] Calculated by dividing gross 111-day weight by carcass weight.
[d,e,f] Interaction significant (P < .10), means with different superscripts differ P < .10.
[g] 300-399, slight; 400-499, small.
[h] Calculated by averaging lean maturity and skeletal maturity.

or greater found with laidlomycin propionate feeding probably reflects the increased carcass weight or additive effect of heavier carcass weights, with slightly higher KPH. When hot carcass weight was included as a covariate Mader et al. (1991) also reported greater fat deposition in the form of KPH and marbling when cattle were supplemented with laidlomycin propionate. Tylosin, as previously reported (Strasia et al., 1987; Stock et al., 1986), decreased ($P<.05$) the percentage of cattle with condemned livers. However, considering healthy animals alone, tylosin feeding during the second half of the trial still increased ($P<.08$) ADG suggesting tylosin's effects on gain were not due to liver abscesses alone. No ($P>.10$) differences were noted for cooking time, cooking shrinkage or tenderness (shear force).

Supplementation of laidlomycin propionate and tylosin increased daily live weight gain, improved live feed conversion, and reduced the incidence of condemned livers. This ionophore-antibiotic combination should be economically useful for cattle producers.

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