THE EFFECT OF VIRGINIAMYCIN ON PERFORMANCE OF FEEDLOT CATTLE

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Story in Brief

Three hundred twenty yearling steers (686 lb) were fed virginiamycin at levels of 0, 10, 17.5 or 25 grams per ton in a feedlot trial. Regardless of level of use, virginiamycin did not alter rate of gain or feed intake. Virginiamycin fed at the 25 gram level improved feed efficiency (2.6%) and tended to decrease the incidence of liver abscesses when compared to steers fed the control ration (9 vs 15%). Virginiamycin tended to increase numerical yield grade of steers slaughtered at similar days on feed. Further testing of this product appears necessary to identify appropriate conditions for its use and optimal feeding level.

(Key Words: Virginiamycin, Feedlot Steers, Antibiotics.)

Introduction

It is widely accepted that the addition of several antimicrobial feed additives to the diets of domestic livestock enhances growth rate and improves feed efficiency. Virginiamycin is currently being tested for commercial use in feedlot cattle. In vitro studies (Nagaraja et al., 1987) have shown virginiamycin to effectively inhibit ruminal lactic acid production. Volatile fatty acid production varied, however, with concentration of virginiamycin. This suggests virginiamycin may be beneficial in improving feedlot performance. Therefore, our objective was to evaluate the performance of feedlot steers fed increasing levels of virginiamycin to determine effectiveness and optimal level of use.

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Materials and Methods

Three hundred twenty head of yearling steers were selected for uniform size and weight from a group of 500 cattle removed from "grazeout" wheat near Dalhart, Texas. Steers were of various breed type and crosses thereof. The cattle were processed April 30 at a commercial feedlot near Dalhart. Processing consisted of IBR-PI3-Lepto, 4-way clostridial vaccination and deworming with Ivermectin. No anabolic implants were administered. The cattle were fed a receiving ration for two days and then trucked approximately 75 miles to the trial site at Goodwell, Oklahoma. Upon arrival, all cattle were individually weighed and offered grass hay and water. The following day, steers were divided into 10 weight blocks of 32 head each. Within each weight block, steers were randomly assigned to one of four treatments (4 pens of 8 steers). A trained evaluator subjectively classified the steers as one of six breed categories (Table 1) and breed type was equalized across treatment. Treatments were virginiamycin (Stafac 10) at levels of 0 (controls) 10, 17.5 and 25 grams/ton. Steers in weight blocks one to seven (224 head) were fed in a separate barn than those in weight blocks eight to ten (96 head).

Steers were allowed ad libitum access to a high concentrate diet (Table 2) for the entire feeding period. Chopped alfalfa hay and cottonseed hulls were used to dilute the ration to 50 percent concentrate in order to facilitate starting the cattle on feed. These roughages were decreased sequentially in four steps until cattle were receiving the final ration by 28 days on feed.

Initial weights were those obtained upon arrival at Goodwell, whereas period weights were taken full on all cattle. Steers in weight blocks one to seven were weighed on days 29, 57, 85 and 113. Remaining steers were weighed the following day. The off test weight for steers in blocks four to ten was day 129. Steers in weight blocks one to three were fed an additional two

Table 1. Breed type classification[a].

Class	Description	Number of steers	Example
1	Straight-bred British	63	Hereford
2	Cross-bred British	73	Hereford X Angus
3	British X Continental	52	Hereford X Limousin
4	British X <= 3/8 Brahman	86	Brangus
5	British X > 3/8 Brahman	33	Hereford-Brahman X Brahman
6	Straight-bred Continental or Continental X Brahman	11	Simmental Simbrah

[a]Classification determined using color, conformation, muscle pattern, ear length and hump development.

Table 2. Composition of diets on a dry matter basis.

Ingredient	Ration sequence 1	2	3	4	Final
	(%)				
Corn, steam rolled	39.94	49.94	59.94	69.94	81.94
Alfalfa hay	25.00	20.00	15.00	10.00	5.00
Cottonseed hulls	25.00	20.00	15.00	10.00	3.00
Cane molasses	3.75	3.75	3.75	3.75	3.75
Supplement[a]	6.31	6.31	6.31	6.31	6.31

Calculated composition of the final ration:

Nutrients	Ration composition DM %	Ration composition As fed %	Supplement DM %	Supplement As fed %
NEm, mcal/cwt	95.22	80.50	68.06	62.70
NEg, mcal/cwt	61.70	52.16	45.65	42.06
Crude protein, %	12.25	10.36	54.17	49.90
Crude fiber, %	5.26	4.45	6.85	6.31
K, %	0.70	0.59	1.30	1.20
Ca, %	0.45	0.38	5.05	4.65
P, %	0.33	0.28	1.16	1.07
Dry matter, %	100.00	84.54	100.00	92.13

[a]Supplement composition: Cottonseed meal 40.16%, soybean meal 33.91%, calcium carbonate 10.95%, urea 5.96%, salt 4.52%, dicalcium phosphate 2.27%, trace mineral .19%, vitamin E .04%, 30,000 IU vitamin A .18% and virginiamycin premix (Stafac-10) as required.

weeks and therefore had a final live weight taken on day 143. In this report, all full weights were reduced 4% to account for digestive tract fill. Due to a drug withdrawal requirement for virginiamycin, all cattle were fed a non-medicated control ration for 6 additional days before slaughter at Booker, Texas. Total feeding time before slaughter was 135 days for steers in weight blocks four to ten (224 head) and 149 days for steers in weight blocks one to three (96 head). Livers were examined for abscesses and presence of flukes (Hicks et al., 1989) and carcass data obtained 24 hours postmortem. During the course of the study one, steer was removed due to injury and another due to rectal prolapse. In addition, one steer died after the feeding trial (during the drug withdrawal period). His data, however, were included in the live performance analysis. Cause of death appeared unrelated to treatment. All data were analyzed using a general linear model with treatment, breed and weight block as main effects. Interactions deemed non-significant ($P > .30$) were deleted from the model for each respective variable.

Results and Discussion

No significant differences in average daily gain or feed intake among the different treatment groups were observed (Table 3). However, feed efficiency over the entire trial was improved with increasing level of virginiamycin (linear effect, $P<.01$). Virginiamycin fed at the 25 gram level improved feed efficiency ($P<.05$) by 2.6% when compared to steers fed either the control ration or the 10 gram level of treatment.

Carcass characteristics were generally not altered by virginiamycin (Table 4) with the exception of yield grade and percent yield grade 4 carcasses. Steers fed virginiamycin at 10 g/ton had greater numerical yield grades than control steers ($P<.05$) and the percentage of yield grade 4 carcasses for virginiamycin-fed cattle was higher than for the controls ($P<.05$). It is difficult to explain how the percent of yield grade 4 carcasses increased without a corresponding rise in hot carcass weight, fat thickness and percent KPH or a decrease in ribeye area. Distribution in any one of the variables used in calculating yield grade or an additive effect among these variables may be responsible. Incidence of liver abscesses tended to decrease with virginiamycin use (9 vs 15%), however, this reduction was not statistically significant.

Table 3. The effect of virginiamycin on cattle performance.

	Virginiamycin level (grams/ton)			
Item	0	10	17.5	25
Steers, number	79	80	79	80
Weight, lb:				
Starting[d]	683	687	692	684
Starting	690	690	690	690
Day 129[d]	1105	1096	1097	1108
Day 129	1100	1094	1097	1108
Final[cd]	1155	1155	1142	1162
Final[c]	1152	1147	1137	1161
Daily gains, lb:				
0-129[d]	3.19	3.11	3.16	3.22
0-129	3.12	3.09	3.13	3.19
0-slaughter[cd]	3.36	3.33	3.35	3.39
0-slaughter[c]	3.31	3.29	3.33	3.39
Daily feed, lb DM				
0-129	19.16	19.03	19.06	19.13
0-slaughter[c]	19.09	18.97	19.02	19.06
Feed/gain:				
0-129	6.13[ab]	6.15[a]	6.07[ab]	5.98[b]
0-slaughter[c]	5.76[a]	5.76[a]	5.70[ab]	5.62[b]

[a,b]Means with different superscripts differ ($P<.05$).
[c]Based on carcass weight divided by .63, (mean dressing percent).
[d]Least squares means.

Table 4. The effect of virginiamycin on carcass parameters[d].

Item	Virginiamycin level (grams/ton)			
	0	10	17.5	25
Carcass weight, lb	730	730	732	736
Dressing percentage	63.14	63.33	63.16	63.25
Ribeye area, in^2	12.2	12.0	12.2	12.2
Fat thickness, in	.52	.55	.55	.55
KPH, %	1.87	1.92	1.94	1.92
Marbling score[c]	430.89	429.17	412.69	432.64
Percent choice	67.03	68.58	67.65	64.34
Yield grade	3.08[a]	3.42[b]	3.21[ab]	3.24[ab]
Percent YG 4	7.66[a]	21.15[b]	18.67[b]	22.14[b]
Liver abscesses, %	15.35	11.80	7.82	9.07
Liver flukes, %	26.85	26.11	40.36	31.38

[a,b]Means with different superscripts differ (P<.05).
[c]300-399, slight; 400-499, small.
[d]Least squares means.

Literature Cited

Hicks, R.B. et al. 1989. Impact of liver flukes on the performance of feedlot steers. Okla. Agr. Exp. Sta. Res. Rep. MP-127:123.

Nagaraja, T.G. et al. 1987. In vitro lactic acid inhibition and alterations in volatile fatty acid production by antimicrobial feed additives. J. Anim. Sci. 65:1064.