VIRGINIAMYCIN VERSUS MONENSIN FOR FEEDLOT STEERS

D.R. Gill[1], C.A. Strasia[2], J.J. Martin[3], F.N. Owens[1] and H.G Dolezal[4]

Story in Brief

Two hundred yearling feedlot steers were used to compare virginiamycin (an antibiotic under preliminary evaluation) at 10/grams per ton to diets containing either no feed additives or monensin at 25/grams per ton. Virginiamycin tended to increase rate of gain (.22 lb/day) as compared to the control cattle and .25 lb as compared to steers fed monensin. The cattle receiving 10 grams of virginiamycin tended to consume more feed, especially during the first 28 days on feed. Feed efficiency was improved 5.27% by virginiamycin compared to the control and by 2.10% compared to monensin fed steers. No difference in carcass traits were detected although severity of liver abscesses was reduced by feeding virginiamycin.

(Key Words: Virginiamycin, Monensin, Feedlot, Antibiotic, Steers.)

Introduction

Improvements in the efficiency and safety of beef production are necessary to keep beef competitive in the market. The development of safe and more effective additives is a continual process. Virginiamycin is an antibiotic which may improve rate and efficiency of feedlot gains. This trial is one of a series of tests to determine its proper feeding level, effects on gain, feed efficiency, and the incidence of liver abscesses, and to compare it to the established feed additive, monensin.

Virginiamycin is currently being tested by SmithKline Animal Health Products to obtain an FDA clearance for use in feedlot cattle. In vitro studies (Nagaraja et al., 1987) have shown virginiamycin inhibits lactic acid production. Volatile fatty acid concentrations within the rumen varies with concentration of virginiamycin. This and other test data suggest

[1]Regents Professor [2]Area Livestock Specialist [3]Professor [4]Assistant Professor

virginiamycin may improve feedlot performance. **However, virginiamycin is not cleared for feeding to cattle.**

Materials and Methods

Two hundred yearling steers were selected for uniform size and weight from a group of 800 cattle. Steers were Hereford x Angus cattle from western Nebraska. The cattle were processed on October 15 at a commercial feedlot near Guymon, Oklahoma. Processing consisted of IBR-PI3-Lepto, 4-way clostridial vaccination and deworming with Ivermectin. Steers were implanted with Synovex-S at the start of the study. The cattle were fed a receiving ration over the weekend, then trucked approximately 10 miles to the trial site at Goodwell, Oklahoma on October 18, 1988. Upon arrival, steers were individually weighed and divided into four weight blocks of 50 head each (5 pens of 10 steers). Within each weight block, one pen was designated as control whereas two pens were fed supplemental virginiamycin (10 grams per ton) and two pens were fed supplemental monensin (25 grams per ton).

Steers were allowed ad libitum access to a high concentrate diet (Table 1) for the entire feeding period. Chopped alfalfa hay and cottonseed hulls were used to dilute the ration to 50% concentrate (Ration 1 of Table 1) in order to facilitate starting the cattle on feed. Roughage level was decreased sequentially in four steps until cattle were receiving the final ration by day 15 of the trial.

Initial weights were obtained off the truck, whereas unshrunk period weights were taken on all cattle. Gains and feed efficiency were calculated based on shrunk weights (96% of each weight except the initial weight) to account for fill. The feeding trial lasted 118 days. Due to the drug withdrawal requirement for virginiamycin, all cattle were fed the nonmedicated control ration for six days (days 113 to 118) prior to slaughter. They were then trucked to Booker, Texas (75 miles) for slaughter. At slaughter, livers were examined for presence of liver abscesses and flukes. Carcass data was obtained 24 hours post-mortem. Because only half as many pens received the control as the test diets, data were analyzed using least squares procedures. Least squares means were separated using the least significant difference procedure protected by an initial F-test.

Results and Discussion

Effects of feeding monensin or virginiamycin on cattle performance are presented in Table 2. Cattle supplemented with 10 grams virginiamycin per

Table 1. Composition of diets on a dry matter basis.

Ingredient	Ration sequence 1	2	3	4	Final
	(%)				
Corn, steam flaked	39.52	49.52	59.52	69.52	81.52
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]	6.73	6.73	6.73	6.73	6.73

Calculated composition of the final ration:

Nutrients	Ration composition DM %	Ration composition As Fed %	Supplement composition DM %	Supplement composition As Fed %
NEm, mcal/cwt	95.04	80.39	67.55	62.39
NEg, mcal/cwt	61.56	52.07	44.85	41.42
Crude Protein, %	12.25	10.36	51.33	47.41
Crude fiber, %	5.46	4.62	9.55	8.82
K, %	.69	.58	1.03	.95
Ca, %	.45	.38	4.73	4.37
Phos, %	.33	.28	1.11	1.02
Dry matter, %	100.00	85.00	100.00	92.26

[a]supplement composition: Cottonseed meal 77.04%, calcium carbonate 11.03%, urea 5.60%, salt 4.24%, dicalcium phosphate .92%, trace mineral .18%, vitamin E .14%, 30,000 IU vitamin A .17% and virginiamycin premix (Stafac-10) or monensin (Rumensin 60) as required. Calculated NEg = 44.85.

ton of feed consumed more feed, particularly during the first 56 days, and gained ($P<.05$) at a higher rate. In the first 28 days of the test, the virginiamycin cattle gained .71 lb more weight per day ($P<.01$) than the control cattle (4.25 vs 3.54 lb/day). Many cattle feeders have stated that ionophore feeding allows cattle to be fed higher concentrate diets sooner. In this test, the monensin cattle did outgain the controls (4.09 vs 3.54 lb/day, $P<.05$) during the first 28 days on feed. These test cattle were purposely fed concentrate diets earlier. These data suggest that virginiamycin may make it possible to adapt cattle to a concentrate diet rapidly even though there were no signs of distress in the control or monensin cattle. Feed efficiency over the total trial was improved 5.36% with virginiamycin and 3.33% with monensin (live weight basis). On a carcass adjusted weight basis, these differences were 4.11% for virginiamycin and 4.59% for monensin.

Virginiamycin at 10 grams per ton tended to improve feed efficiency and gain partly by increasing feed intake. The calculated energy values of the test rations were not different among diets, although values from both additives were about 3% above the control. Carcass traits (Table 3) were not altered

Table 2. Effects of Virginiamycin or Monensin on steer performance.

	Control	Virginiamycin 10 g.	Monensin 25 g.
No. of pens	4	8	8
No of head	40	80	80
Weight, lb:			
Initial	771	771	771
56 days	1036[a]	1062[b]	1044[ab]
112 days	1230[a]	1255[b]	1227[a]
Daily gains, lb:			
0-56	3.98[a]	4.44[b]	4.13[ab]
57-112	3.33	3.31	3.12
0-112	3.66[a]	3.87[b]	3.63[a]
Carcass,ADG[1]	3.95[a]	4.15[b]	3.99[ab]
Daily Feed, lb DM:			
0-56	24.62	25.52	24.39
57-112	25.63[a]	25.06[ab]	23.94[b]
0-112	25.14	25.29	24.17
0-Slaughter	24.98	25.15	24.06
Feed/gain			
0-56	6.23	5.76	5.91
57-112	7.74	7.59	7.75
0-112	6.90	6.53	6.67
0-Slaughter	6.33	6.07	6.04
Metabolizable energy, Mcal/kg	3.07	3.16	3.17
Net energy, Mcal/cwt.			
Maintenance	92.53	96.92	97.28
Gain	61.14	63.58	63.84

[1]Carcass average daily gain (carcass weight/.62).
[a,b]Means in the same row with different subscripts differ (P<.05).

Table 3. Effect of Virginiamycin or Monensin on carcass characteristics.

Item	Control	Virginiamycin	Monensin
Carcass wt, lb	767.20	781.78	769.78
Dressing %[1]	62.36	62.25	62.76
Ribeye area, sq in	12.91	12.75	12.81
KPH, %	1.94	2.04	1.98
Fat thickness, in	.47	.49	.48
Marbling score[2]	438	441	433
Percent choice	82.50	76.25	80.00
Percent YG 4	5.00	6.25	6.25
USDA yield grade	2.96	3.12	3.02
Liver abscess:			
Incidence, %	25.00	27.50	26.25
Severity3	1.96	1.43	1.57

[1]Calculated by dividing gross 112-day weight by carcass weight.
[2]300-399, slight; 400-499, small.
[3]0=no abscesses; 1=one or two small, well organized, inactive abscesses; 2=two to four well organized abscesses without inflammation; 3=one or more active abscesses with inflammation, only among cattle with abscesses.

by treatment. Liver abscesses were detected in 53 of the 200 cattle. No differences in abscess incidence was detected but virginiamycin tended to decrease the liver severity score ($P < .10$) compared to the control steers.

Literature Cited

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.