VIRGINIAMYCIN VERSUS MONENSIN FOR FEEDLOT STEERS

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Story in Brief

Two hundred twenty-four yearling feedlot steers were used to compare Virginiamycin (an antibiotic under preliminary evaluation) at 10 grams or 17.5 grams per ton to diets containing either no feed additives or monensin at 25 grams per ton. Feed efficiency was improved 4.0% by virginiamycin when fed at the 17.5 grams per ton and 1.8% at the 10 gram level. For comparison, monensin at 25 grams per ton improved feed efficiency 3.4%. No difference in carcass traits were detected, although incidence of liver abscess was less for the 17.5 gram virginiamycin level than for monensin or the 10 gram level of virginiamycin, but were about the same as for the control cattle. Feeding virginiamycin or monensin improved the energy (NEg) values of the test rations with the higher level of virginiamycin improving NEg by 4.3%.

(Key Words: Virginiamycin, Monensin, Antibiotics, 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 examine virginiamycin for proper feeding level, effect on gain, feed efficiency, and the incidence of liver abscesses, as well as 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 previous studies at Oklahoma State University (Gill et al., 1989; Smith et al., 1989) virginiamycin has improved feed efficiency 5.7 and 2.6%. In vitro studies (Nagaraja et al., 1987) have shown that virginiamycin inhibits lactic acid

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production. Volatile fatty acid production within the rumen varies with concentration of virginiamycin. This and other test data suggest that virginiamycin is beneficial in improving feedlot performance. **However, virginiamycin is not cleared for feeding to cattle.**

Materials and Methods

Two hundred twenty-four yearling steers were selected for uniform size and weight from a larger group of cattle. Steers were Hereford x Angus crossbred cattle from western Nebraska and South Dakota. The cattle were processed and individually tagged on March 20, 1989 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 Compudose-200 at the start of the study. The cattle were fed a receiving ration for one week, then trucked approximately 10 miles to the trial site at Goodwell, Oklahoma on March 28. Upon arrival, steers were individually weighed and subdivided into seven weight replicates of 32 head each (4 pens of 8 steers). Within each weight replicate, one pen was designated as control, one as virginiamycin (10 g per ton), one as virginiamycin (17.5 g per ton) and one as monensin (25 g 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 60% concentrate (Ration 1 of Table 1) in order to facilitate starting the cattle on feed. Roughage level was decreased sequentially in three steps until cattle were receiving the final ration by 15 days of the trial.

Initial weights were obtained off-truck, whereas period weights were taken full on all cattle. Gain and feed efficiency were calculated based on shrunk weights (96% of each weight except the initial weight) to account for fill. The cattle were fed for 117 days and weighed off test. Two days later they were trucked to Booker, Texas (75 miles) for slaughter. At slaughter, livers were examined for presence of liver abscesses or flukes. Carcass data were obtained 24 h postmortem. Three steers were removed from the analysis of the data, two for causes related to injury and one due to death (bloat on the control treatment). The removals were not related to the experimental treatments. Least squares means were separated using the least significant difference procedure protected by an initial F test ($P < .05$).

Results and Discussion

Effects of feeding monensin or virginiamycin on cattle performance are presented in Table 2. In contrast to a previously reported trial at the same

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

Ingredient	Ration sequence 1	2	3	Final
	------------------------------(%)------------------------------			
Corn, steam flaked	49.53	59.53	69.53	81.53
Alfalfa hay	20.00	15.00	10.00	5.00
Cottonseed hulls	20.00	15.00	10.00	3.00
Cane molasses	3.75	3.75	3.75	3.75
Supplement[a]	6.72	6.72	6.72	6.72

Calculated composition of the final ration:

Nutrients	Ration composition DM %	As Fed %	Supplement composition DM %	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.

location, cattle receiving virginiamycin or monensin tended to consume slightly less feed. These results are similar to those reported by (Bartle et al., 1989) at Texas Tech where they reported about a 3% improvement in feed efficiency with 17.5 grams of virginiamycin in a similar trial. The differences for the 17.5 g virginiamycin level differed from the controls ($P < .05$). There were no differences in daily gain on either a live or on a carcass adjusted basis. In this trial improvements in feed efficiency were the result of reduced feed intake for both virginiamycin and monensin. This is in contrast to a previous test (Gill et al., 1989) where the virginiamycin cattle gained .71 lb

Table 2. **Effects of virginiamycin or monensin on steer performance.**

	Control	VM 10 g	VM 17.5 g	Monensin 25 g
No. of pens	7	7	7	7
No. of head	55	56	55	55
Weight, lb				
Initial	745	743	745	745
56 days	997	988	990	996
117 days	1198	1195	1200	1198
Daily gains, lb				
0-56	3.79	3.66	3.67	3.77
57-117	3.16	3.27	3.31	3.18
0-117	3.46	3.45	3.48	3.46
Carcadg[a]	3.58	3.53	3.62	3.55
Daily feed, lb DM				
0-56	21.37[b]	20.66[bc]	20.59[c]	20.71[bc]
57-117	21.57	21.32	20.88	20.80
0-117	21.47[b]	21.01[bc]	20.73[c]	20.75[c]
0-Slaughter	21.38[b]	20.91[bc]	20.62[c]	20.65[c]
Feed/gain				
0-56	5.66	5.68	5.62	5.52
57-117	6.84[b]	6.57[bc]	6.31[c]	6.54[bc]
0-117	6.21[b]	6.10[bc]	5.96[c]	6.00[bc]
0-Slaughter	5.99[b]	5.93[bc]	5.71[c]	5.83[bc]
Metabolizable energy, Mcal/kg	3.18[b]	3.20[bc]	3.29[c]	3.24[bc]
Net energy, Mcal/cwt				
Maintenance	97.43[b]	98.64[bc]	103.24[c]	100.85[bc]
Gain	64.13[b]	64.63[b]	66.90[c]	65.76[b]

[a] Carcass average daily gain (carcass weight/.64).
[b,c] Means in the same row with different subscripts differ ($P<.05$).

more weight per day ($P<.01$) than the control cattle (4.25 vs 3.54) in the first 28 days on feed. As in the previous studies these cattle received high levels of concentrate early. However, these test cattle were younger in age and may have been less prone to digestive upsets while receiving higher concentrate levels. One animal on the control treatment was foundered but its performance was considered normal and is included in the analysis. Feed efficiency over the total trial was improved 4.0% with virginiamycin 17.5 g, 1.8% with virginiamycin 10 g, and 3.4% with monensin (live basis). On a carcass adjusted weight basis, these differences were 4.7, 1.0 and 2.7%, respectively. Only the response to the higher virginiamycin level (17.5 g) differed significantly (P<.05) from the controls.

Carcass traits (Table 3) were not altered by treatment; however, the data suggest that the cattle receiving the higher level of virginiamycin or monensin tended to be fatter. This would indicate that the energetic efficiency may be even higher than the values calculated for NEm and NEg. These values were calculated from an equation (Owens et al., 1984) that assumes an equal energy density in the carcass for all treatments at time of slaughter. With these calculations, only the virginiamycin 17.5 g treatment exhibited a higher NEm or NEg value than the controls (P<.05). Liver abscesses were detected in 49 of the 221 cattle. The highest level, 32.9%, occurred in the cattle receiving monensin and with the 10 g level of virginiamycin 23.2%. Steers fed higher level of virginiamycin (17.5 g/ton) had fewer abscesses than did the monensin fed cattle. Marbling scores in this trial are more indicative of the youthfulness of the cattle rather than lack of finish as indicated by an average of .48 inch subcutaneous fat thickness across all treatments. When cleared for use virginiamycin shows promise as being a useful additive to improve the efficiency of feedlot cattle.

Table 3. Effect of virginiamycin or monensin on carcass characteristics.

Item	Control	Virginiamycin 10 g	Virginiamycin 17.5 g	Monensin 25 g/ton
Carcass wt, lb	749.1	744.6	752.2	746.8
Dressing %[a]	62.6	62.3	62.7	62.4
Rib eye area, sq in	13.33	13.37	13.27	13.23
KPH, %	2.11	2.13	2.12	2.24
Fat thickness, in	.46	.46	.50	.49
Marbling score[b]	398	399	381	384
Percent choice	47.5	50.0	45.7	38.0
Percent YG 4	.00	1.8	1.8	7.1
USDA yield grade	2.59	2.55	2.69	2.70
Liver abscess:				
Incidence, %	17.9[ab]	23.2[ab]	14.5[a]	32.9[b]
Severity[c]	2.3[a]	2.1[a]	1.7[ab]	1.5[b]

[a] Calculated by dividing hot carcass weight by the gross 117 day weight.
[b] 300-399 = slight; 400-499 = small (USDA, 1987).
[c] 0=no abscesses; 1=one or two small, well organized inactive abscesses; 2=two to four well organized abscess without inflammation; 3=one or more active abscesses with inflammation, only among cattle with abscesses.

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