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Mineral, Rumensin®, and chlortetracycline supplementation for steers on native bluestem pasture

Abstract

Eighty steers, primarily of British breeding, were allotted to one of four treatments and maintained on native bluestem pastures from January 11, 1984 to October 2, 1984. Steers received either chlortetracycline or Rumensin®, with and without mineral supplementation.

Keywords

Cattlemen's Day, 1985; Kansas Agricultural Experiment Station contribution; no. 85-319-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 470; Beef; Mineral; Rumensin®; Chlortetracycline; Bluestem

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Mineral, Rumensin®, and Chlortetracycline Supplementation for Steers on Native Bluestem Pasture

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Summary

Eighty steers, primarily of British breeding, were allotted to one of four treatments and maintained on native bluestem pastures from January 11, 1984 to October 2, 1984. Steers received either chlortetracycline or Rumensin®, with and without mineral supplementation.

Daily gains were higher (P<.05) for steers fed Rumensin® both in the winter and summer than those getting chlortetracycline. Mineral supplementation increased (P<.01) total gain and summer gain but had no significant effect over the winter period.

Introduction

Continuous low level feeding of chlortetracycline has improved cattle performance in some situations. The basis for the improvement is not clear but may be due to control of subclinical infections. Feeding Rumensin® also has improved cattle performance on grass. This is due in part to increased digestion and utilization of the grass because of increased rumen retention time and a shift in the volatile fatty acid production. Rumensin® also has been shown to increase feed efficiency. Chemical analysis shows mature bluestem pasture to be deficient in some minerals, notably phosphorus. This study compared the effects of feeding chlortetracycline or Rumensin® with or without mineral supplementation.

Experimental Procedures

Four groups of 20 steers (averaging 434 lb) were assigned to receive supplements containing Rumensin® or chlortetracycline, with or without a mineral mixture. The steers were maintained in four native bluestem pastures, with the groups rotated every two weeks to minimize pasture differences. During the winter, Rumensin® and mineral supplements were fed three times a week in a concentrate mix supplying 1 lb each of grain sorghum and soybean meal per head daily. The chlortetracycline was mixed in salt and fed free choice. During the summer, supplements were mixed with salt and fed free choice in mineral feeders. Intake levels of supplements and individual minerals are shown in Tables 3.1, 3.2, 3.3, and 3.4 for the summer and winter periods.

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[1]Department of Agronomy.

Results

Results are shown in Table 3.5, 3.6, and 3.7. Steers fed Rumensin® gained more ($P<.05$) than those fed chlortetracycline. Mineral supplementation increased ($P<.01$) gains in the summer and increased total gain but had no significant effect in the winter.

Table 3.1. Daily Supplement Fed Per Head During the Winter Period

Item	Groups 1	2	3	4
Salt, lb	.10	.09	.10	.08
Chlortetracycline, mg	-	-	320	286
Grain Sorghum, lb	1.0	1.0	1.0	1.0
Soybean Meal, lb	1.0	1.0	1.0	1.0
Rumensin®, mg	120	120	-	-
Potassium Chloride, lb	.05	-	.05	-
Dicalcium Phosphate, lb	.15	-	.15	-
Trace Mineral Mix, lb[1]	.01	-	.01	-

[1]See Table 3.3.

Table 3.2. Daily Supplement Fed Per Head During the Summer Period

Item	Groups 1	2	3	4
Rumensin®, mg	153	152	-	-
Chlortetracycline, mg	-	-	336	347
Dicalcium Phosphate, lb	.10	-	.13	-
Trace Mineral Mix, lb[1]	.01	-	.01	-
Salt, lb	.03	.04	.06	.08
Molasses, lb	.01	.01	.01	.01

[1]See Table 3.3.

Table 3.3. Estimated Daily Mineral Requirements Compared to Levels Supplied in Mineral Supplements of Four Groups of Cattle

Mineral	Required Levels	Winter Groups				Summer Groups			
		1	2	3	4	1	2	3	4
Calcium, g	13.9	15.8	-	15.8	-	10.5	-	13.6	-
Phosphorus, g	12.8	12.7	-	12.7	-	8.5	-	11.0	-
Manganese, mg	29.0	18.9	-	18.9	-	18.9	-	18.9	-
Zinc, mg	145.0	108.4	-	108.4	-	108.4	-	108.4	-
Iron, mg	58.0	43.0	-	43.0	-	43.0	-	43.0	-
Copper, mg	23.0	11.0	-	11.0	-	11.0	-	11.0	-
Iodine, mg	.6	.7	-	.7	-	.7	-	.7	-
Cobalt, mg	.4	.4	-	.4	-	.4	-	.4	-
Magnesium, g	4.0	2.5	-	2.5	-	2.5	-	2.5	-
Potassium, g	34.8	11.3	-	11.3	-	11.3	-	11.3	-
Sodium, g	2.9	.6	-	.6	-	.6	-	.6	-

Table 3.4 Daily Mineral Intake of Steers from Grass, Water, Grain Sorghum, and Soybean Meal.

Mineral	Winter				Summer	
	Grass[1,2]	Water[2]	Sorghum Grain[2]	Soybean Meal[2]	Grass[1,2]	Water[2]
Calcium, g	23.8	3.4	.4	3.4	36.6	3.4
Phosphorus, g	1.3	-	1.8	3.8	9.9	-
Maganese, mg	157.7	-	16.3	18.9	213.7	-
Zinc, mg	210.2	-	35.1	108.4	210.2	-
Iron, mg	1608.0	-	29.9	114.7	3483.6	-
Copper, mg	59.7	-	4.2	9.9	213.7	-
Iodine, mg	-	-	-	-	-	-
Cobalt, mg	.8	-	.1	.1	.8	-
Magnesium, g	3.4	2.3	.9	6.1	6.1	2.3
Potassium, g	29.6	.2	1.9	8.0	78.4	.2
Sodium, mg	47.4	-	156.6	47.4	47.4	-

[1] Assumed grass intake of 12.8 lb per head daily.

[2] Values based on analysis and NRC tables.

Table 3.5. Effect of Mineral, Antibiotic, and Rumensin® Supplementation on Daily Gains of Steers on Native Blustem Pasture

Item	Rumensin®		Chlortetracycline	
	Salt	Salt + Mineral	Salt	Salt + Mineral
Winter Daily Gain, lb[1]	.47[a]	.41[a]	.40[ab]	.32[b]
Summer Daily Gain, lb[2]	1.82[b]	1.96[a]	1.52[c]	1.85[ab]
Total Daily Gain, lb	1.25[a]	1.31[a]	1.05[b]	1.21[a]

[abc]Values in same row with different superscripts differ significantly (P<.05).

[1]January 11 - May 1, 1984 - 111 days.

[2]May 1 - October 2, 1984 - 154 days.

Table 3.6. Effect of Rumensin® and Chlortetracycline Supplementation on Steer Gains

Item	Rumensin®	Chlortetracycline
Winter Daily Gain, lb	.44[a]	.36[b]
Summer Daily Gain, lb	1.89[a]	1.69[b]
Total Daily Gain, lb	1.28[a]	1.13[b]

[ab]Values in same row with different superscripts differ significantly (P<.05).

Table 3.7. Effect of Mineral Supplementation on Steer Gains

Item	Mineral	No Mineral
Winter Daily Gain, lb	.36	.43
Summer Daily Gain, lb	1.90[a]	1.67[b]
Total Daily Gain, lb	1.26[a]	1.15[b]

[ab]Values in same row with different superscripts differ significantly (P<.01).