Rumensin Levels for Finishing Steers Fed High Moisture Corn

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Story in Brief

Three Rumensin levels (0, 15 and 30 g per ton) at three protein levels (9, 11 and 13 percent of ration dry matter) were fed in 187 finishing steers for 166 to 194 days at Panhandle State University, Goodwell, Oklahoma. The high moisture corn-corn silage rations were supplemented with soybean meal in all cases. The two higher protein levels improved rate of gain and feed efficiency for the trial, but benefits were apparent mainly at weights over 700 lb. Rumensin improved feed efficiency by 3.0 percent. Improvement in feed efficiency was almost as large at the 15 level of Rumensin as it was with 30 g in this trial. Rumensin proved most useful with higher protein concentrations.

Introduction

Rumensin is commonly fed to finishing cattle in feedlots of the Great Plains. It is approved for feeding to cattle in confinement at levels from 5 to 30 g per ton of feed. At lower levels, Rumensin may increase rate of gain, but higher levels are needed to maximize feed efficiency. This trade-off, between rate of gain and feed efficiency, may make lower Rumensin levels more economical when non-feed costs are high and feed cost is low. This feedlot study was conducted to determine the effects of feeding Rumensin at 0, 15 or 30 g per ton with ration proteins at 9, 11 and 13 percent of the ration dry matter.

Materials and Methods

One hundred ninety-two steers with a mean shrunk weight of 483 lb were allotted to 24 pens. There were three replications on each protein level at 0 and 30 Rumensin and two replications on each protein level at the 15 g level. Five steers did not complete the trial for health reasons not associated with ration treatments. The high moisture corn-corn silage ration (Table 1) was freely available and intake records were maintained. Steers were implanted initially with 24 mg diethylstilbestrol and after 84 days on feed with Synovex S. Each 28 days steers were weighed without shrink. Cattle were fed either 164 or 196 days as they were slaughtered as they reached apparent grade; carcass characteristics were measured. Final weight was calculated from hot carcass weight using a mean dressing percentage of 62 percent to adjust for differences in fill. Specific gravities, based upon carcass weight underwater, were used to esti-

Table 1. Feed compositon of test rations

Ingredient	Protein Percentage 9	11	13
	Percent of Dry Matter		
High moisture corn grain	75.2	75.2	75.2
Corn silage	14.0	14.0	14.0
Alfalfa meal	0.50	0.50	0.50
Dry ground corn	8.28	4.85	0.0
Soybean meal	0.0	3.62	8.70
Limestone	1.10	1.12	1.07
KCl	0.47	0.34	0.16
Salt	0.30	0.30	0.30
Vitamin A	+	+	+
Trace mineral	+	+	+
Rumensin	±	±	±

mate percentage protein and fat and energy content of 10 steers at the start of the trial and of 107 finished steers at slaughter. Daily protein, fat and energy gains were calculated.

Results and Discussion

A whole shelled corn-cottonseed hull ration was fed last year to a similar set of steers (Gill *et al.*, 1977). In that trial, Rumensin proved most effective at a low protein level. Results with the high moisture ration fed this year showed no apparent interaction, so results of protein and Rumensin levels will be presented separately.

Protein concentration effects

Protein concentration effects on performance data are shown in Table 2. Data is divided into periods of early (0 to 56 days) and later (56 days to slaughter) performance. High protein levels proved most beneficial early in the feeding period, and markedly improved rate of gain and feed efficiency during this period. Rate of gain favored the 13 percent protein ration during the first 56 days (to 660 lb) and the 11 percent ration in subsequent periods. Feed efficiency also favored the 13 percent ration throughout the trial. These early effects of higher protein levels on rate and efficiency of gain were diluted later in the trial, but an overall benefit was maintained. Carcass characteristics of these steers are presented in Table 3. The differences noted in fat thickness over the rib and rib eye area are probably the result of the differences in carcass weight. Indeed, rib eye area, expressed on a basis of inches per 100 lb of carcass, was unchanged by protein level. However, increased carcass fat with higher protein levels and slightly decreased marbling with higher protein levels, as suggested by other studies, are trends which may be gleaned from these results. Level of protein feeding did not influence protein or fat percentage of the carcass.

Table 2. Performance of finishing steers fed three protein levels

Item	Protein Concentration 9	11	13
Steers, number	62	64	61
Initial weight, lb	482	483	483
Weight gain, lb/day			
0-56 days	2.48[a]	3.17[ab]	3.46[b]
56-slaughter	3.20	3.31	3.29
Total	2.97[a]	3.27[b]	3.35[b]
Feedintake, lb/day			
0-56 days	13.6	14.3	14.0
56-slaughter	18.7	18.9	18.6
Total	17.1	17.4	17.2
Feed per gain			
0-56 days	5.53[a]	4.50[b]	4.07[c]
56-slaughter	5.85	5.71	5.65
Total	5.76[a]	5.34[b]	5.12[c]

[a,b,c]Means in a row which have different superscripts differ statistically.

Table 3. Carcass characteristics of finishing steers fed three protein levels

Item	Protein Concentration[a] 9	11	13
Carcass weight, lb	630	656	665
Liver abcess, %	29[a]	16[a]	20[b]
KHP fat, %	3.1	3.1	3.1
Fat thickness, in	0.62[c]	0.71[b]	0.69[bc]
Marbling score[d]	14.1	14.5	13.9
Ribeye area			
square in	11.9[c]	12.4[bc]	12.6[b]
square in/100 lb carcass	1.90	1.90	1.90
Quality grade[e]	13.7	14.0	13.6
Color[f]	5.8	5.8	5.9
Age[g]	1.8	1.9	1.9

[a]Percentage of ration dry matter.
[b,c]Means in a row which have different superscripts differ statistically.
[d]Small minus = 13, small = 14, small plus = 15.
[e]Good plus = 13, choice minus = 14.
[f]Cherry red = 6, slightly dark red = 5.
[g]A minus = 1, A = 2.

Rumensin concentration effects

Rumensin concentration effects on steer performance data are presented in Table 4. As review of literature (Thornton, 1976) would suggest, rate of weight gain may be slightly increased at low but depressed by higher Rumensin concentrations. Feed intake depression and feed efficiency improvements with Rumensin were apparent. But as has been common in our trials, improvement in feed efficiency was lower (3.0 percent) than is commonly reported. This lower response may be associated with (1) high animal performance making percentage improvement more difficult, (2) the very high concentrate rations, typical of Great Plains Feedlots being fed, (3) use of fermented feeds which may respond less to Rumensin and (4) correcting animal performance to a carcass weight basis, thereby avoiding differences in fill.

Feed efficiency in this study was similar with either 15 or 30 g Rumensin feeding. Some literature (Elanco, 1975) would suggest that feed efficiency may be greater at 30 g per ton than at lower levels. The difference with this trial may be due to the above four factors. Feed intake was more depressed by Rumensin after 56 days on feed. Possibly reducing its level for steers with higher intakes may prove helpful. Efficiency of carcass energy deposition was greater for steers fed 15 g per ton than other levels. Rumensin did not alter carcass characteristics (Table 5) except that fat and energy content of steers fed Rumensin at 15 g/ton was slightly greater than of those fed 0 or 30 g per ton. Liver abscess incidence was not increased by higher Rumensin and higher protein levels in this study as was noted with dry shelled corn rations in 1977 (Gill *et al.*, 1977).

Caution should be exercised in application of results of this trial to other feeding conditions. Although the 30 g per ton Rumensin concentration may not be the most economical level under all conditions of feed and overhead

Table 4. Performance of finishing steers at three rumensin levels

Item	Rumensin Concentration		
	0	15	30
Steers, number	69	47	71
In weight, lb	483	481	484
Weight gain, lb/day			
0-56 days	2.98	3.12	3.04
56+	3.33	3.23	3.24
Total	3.22	3.20	3.17
Feed intake, lb/day			
0-56 days	14.2	14.2	13.7
56+	19.4	18.3	18.4
Total	17.7	17.1	16.8
Feed per gain			
0-56 days	4.83	4.67	4.59
56+	5.83	5.69	5.68
Total	5.51[a]	5.36[b]	5.33[b]
Carcass daily gain			
Protein, lb	0.24	0.25	0.234
Fat, lb	1.07	1.18	1.06
Energy, mcal	5.16	5.69	5.15
Pounds	2.20	2.17	2.17
Caloric efficiency			
kcal stored per lb of feed	290[a]	333[b]	305[ab]

[a,b]Means in a row which have different superscripts differ statistically.

Table 5. Carcass characteristics of steers fed three rumensin concentrations

Item	Rumensin Concentration		
	0	15	30
Carcass weight, lb	648	663	644
Liver abcess, %	14	8	12
KHP fat, %	3.1	3.1	3.1
Fat thickness, in	0.65	0.72	0.65
Marbling score[c]	14.4	14.5	13.8
Ribeye area, in^2	12.3	12.2	12.3
Quality grade[d]	13.9	13.9	13.5
Color[e]	5.9	6.0	5.8
Age[f]	1.9	1.9	1.8
Cooler shrink, %	1.16	1.05	1.04
Carcass composition			
Protein, %	14.6	14.1	14.6
Fat, %	33.6	35.6	33.5
kcal/g	3.95	4.12	3.94

[a,b]Means in a row which have different superscripts differ statistically.
[c]Small minus = 13, small, = 14, small plus = 15.
[d]Good plus = 13, choice minus = 14.
[e]Cherry red = 6, slightly dark red = 5.
[f]A minus = 1, A = 2.

costs as review of the literature suggests (Thornton, 1977) other ration and economic factors (Gill, 1974) need consideration. When greater amounts of roughage are fed, higher Rumensin levels appear useful. Further, this experiment was calculated on a *carcass weight* basis. If cattle are sold on a live-weight rather than a grade-and-yield basis, and Rumensin increases gut fill and reduces dressing percentage slightly, this would alter interpretation of the test results. The data also suggests that cooler shrink on the Rumensin cattle may be less than the control cattle (Table 5). The overall economic benefit of Rumensin feeding to finishing cattle, consistently reported by experiment stations across the nation, is supported by results of this trial. However, results question whether the 30 g per ton level is most economical under all feedlot conditions.

Protein-Rumensin interactions

The interaction observed with a dry corn-cottonseed hullration last year, in which Rumensin spared protein, was not observed in this trial. Efficiency and gain comparisons by protein and Rumensin level are presented in Table 6. With these high moisture corn rations, Rumensin depressed gain slightly at a low protein level. Opposite from effects with dry corn last year, Rumensin proved most useful in improving feed efficiency with higher protein levels. The reason for a Rumensin-protein corn moisture interaction may be associated with differences in either 1) starch avilability or 2) protein quality of the corn. A digestion trial with these rations currently is underway to help answer this question.

Table 6. Rumensin-protein interaction

Rumensin level	Protein level		
	9	11	13
g/ton	Daily gain		
0	3.06	3.28	3.32
15	2.87[c]	3.26[cd]	3.47[d]
30	2.96	3.26	3.30
	Feed/gain		
0	5.78[c]	5.49[ad]	5.26[de]
15	5.75[c]	5.32[abd]	5.03[e]
30	5.74[c]	5.19[bd]	5.04[d]

[ab]Means in a *column* which have a different superscript differ statistically.
[cde]Means in a *row* which have a different superscript differ statistically.

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