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Protein, Salt, and Premix Aspects of All-concentrate Cattle Finishing Rations

G.M. Roth, E.F. Smith, and R.R. Schalles

This test was designed to study the following aspects of all-concentrate rations: (1) salt, (2) supplemental protein (3) self-feeding a protein and premix combination (4) a pelleted premix compared to a mash form, and (5) a repeat trial of soybean meal versus urea as a supplemental protein source.

Crossbred calves from Hereford dams and Angus sires, raised at the Grass Utilization Unit were used. Birth dates were known for all calves. They were brought up to an all-concentrate ration by self-feeding a mixture of 70 percent dehydrated alfalfa crumbles and 30 percent dry rolled sorghum grain. The sorghum grain was increased 10 percent every other day until (after about two weeks) the calves were on a diet of dry rolled, sorghum grain.

Four straightbred Angus, one bull, one steer weighing 980 pounds, and one heifer weighing 548 pounds, were removed from the original 79 head, leaving 72 test animals.

The cattle were lotted (by randomized stratification) into two trials of six treatments each. Each treatment contained six animals averaging 697 pounds and 525 days of age at the time the test was begun. The cattle were weighed every 28 days, always at the same time and in the same order.

A heifer in treatment 1 died of viral pneumonia shortly after the test was begun. The feed she had consumed was subtracted and her data removed from the test.

The ration compositions and performance data are shown in Tables 13, 14 and 15. Data from trials 1 and 2 were summarized together as there were no significant differences between trials in any of the data.

Discussion

Based on the data collected, the only difference between treatments of statistical significance involved the pelleted premix treatment. The rate of gain for it was significantly lower than any other treatment. Decreased rate of gain resulted from decreased feed consumption rather than from inefficient feed utilization.

Salt is necessary in the animal diet primarily as a source of sodium. When the diet is deficient in sodium, the level of sodium excretion drops because the kidneys can do an excellent job of conserving it. When the animal has a normal body level of sodium, it may take several months to show a deficiency. Animals receiving no salt performed normally on this 84-day trial.

The protein requirement of cattle of this size and age is usually estimated to be about 10 percent of the total ration; enough to insure good performance allowing for variation in feed ingredients. Sorghum grain used in this experiment was 9.7 percent protein on a 90-percent dry matter basis. Cattle receiving no supplemental protein performed normally.

In regard to the treatment with the various ration components separately self-fed, it was originally intended to separately self-feed sorghum grain and a mixture containing the salt, premix, and protein supplement. The ratio of soybean meal to urea in the protein supplement portion of this mixture was designed to be the factor used to control intake. It was found that when the mixture was formulated to contain 0.5 percent salt of the total ration. The salt exerted a limiting influence on consumption of the mixture. It soon became necessary to take the salt out of the mixture and to feed it free choice in a separate feeder. The cattle consumed .23 percent of their total diet as salt when it was fed free choice. After removing the salt, it was relatively easy to stabilize intake by using only a mixture of soybean meal and premix. The premix seemed to be unpalatable enough to limit consumption. A mixture of 72 percent soybean meal and 28 percent premix was soon found to give the desired intake of both ingredients so this mixture was used throughout the remainder of the test, with little day-to-day variation in intake. Cattle on that ration and those on the control ration performed almost identically.

The feed cost was high for both groups, reflecting the price differential between soybean meal and urea as a source of supplemental protein.

The comparison of soybean meal and urea as supplemental protein sources showed no significant differences. This was in agreement with previous work.

Table 13. Protein, Salt, and Premix Aspects of
All-concentrate Cattle Finishing Rations
Ration Composition

Ingredient, lbs.	1	2	3	4	5	6
Dry, rolled sorghum grain	1920	1930	1920	1940	1812	Free choice
45% nitrogen urea	20	20	20			
Salt	10		10	10	10	"
Mash form premix	50	50		50	50	
Pelleted form premix			50			
44% C.P. soybean meal					128	
Mixture of 71.7% soybean meal & 28.3% premix mash*						"
TOTAL, lbs.	2000	2000	2000	2000	2000	

* This is the mixture at which the intake of premix was nearly equal to that of animals in the control group, treatment 5.

Premix, lbs.

20.0 Ground limestone
1.0 Trace mineral premix
0.5 Stilbestrol premix, 2 gm/lb
0.3 Vitamin A premix, 10,000 I.U./gm
0.8 Aureomycin premix, 10 gm/lb
27.4 Finely-rolled sorghum grain
50.0

Table 14 Protein, Salt, and Premix Aspects of
All-concentrate Cattle Finishing Rations

Performance Data
2-9-69 to 10-1-69, 84 Days

Treatment Description	1 Urea control	2 No salt	3 Pelleted premix	4 No-protein supplement	5 Soybean control	6 Free choice
No. of steers	7	7	7	7	7	7
No. of heifers	4	5	5	5	5	5
Av. initial wt., lbs.	717	690	689	686	704	698
Av. final wt., lbs.	955	956	916 ¹	958	970	970
Wt. gain, lbs.	238	266	227	272	266	272
Av. daily gain, lbs.	2.8	3.2	2.7	3.2	3.2	3.2
Av. feed/head/day, lbs.	24.2	22.2	20.8	22.8	22.9	23.2
Feed/cwt gain, lbs.	855	702	771	706	739	715
Av. carcass grade ²	19.6	19.9	20.2	20.1	20.0	19.8
Av. yield grade ³	2.9	2.9	2.8	3.1	3.1	3.0
Av. rib-eye area, sq. in.	12.58	12.29	11.51	12.29	12.25	11.95
Av. fat thickness, in.	1.07	0.74	0.83	0.99	0.92	0.96
NE /100 lbs. feed, megcal	84.7	85.2	84.7	85.6	83.8	85.8
NE /100 lbs. feed, megcal	56.5	56.8	56.5	57.1	55.9	57.2
Feed to meet maintenance, lbs.	7.92	7.88	7.92	7.84	8.02	7.82
Feed for production	16.31	14.36	12.93	15.01	14.91	15.33
Total NE , megcal	9.21	8.15	7.30	8.57	8.33	8.77
Expected ADG, lbs/day	3.64	3.31	3.01	3.46	3.37	3.53
Actual ADG	78	96	90	94	94	92
Expected ADG %						

¹Significantly less than all others at the .05 level.

²21 = Choice +, 20 = Choice, 19 = Choice -.

³Yield grades are 1-5 with 1 being the most desirable.

Table 15 Protein, Salt, and Premix Aspects of
All-concentrate Cattle Finishing Rations

Economic Data

	1	2	3	4	5	6
Treatment Description	Urea control	No salt	Pelleted premix	No-protein supplement	Soybean control	Free choice
Feed cost/ton ¹ , \$	45.26	45.36	45.44	44.65	47.78	48.71
Feed cost/cwt gain, \$	19.35	15.92	17.52	15.75	17.65	17.41
Yardage cost/cwt gain ² , \$	1.76	1.58	1.85	1.54	1.58	1.54
Total cost/cwt gain, \$	21.11	17.50	19.37	17.29	19.23	18.95
Animal cost/head ³ , \$	224.31	214.99	214.84	213.86	219.68	217.48
Feed cost/head, \$	46.15	42.37	39.79	42.85	46.02	47.38
Yardage cost/head ² , \$	4.20	4.20	4.20	4.20	4.20	4.20
Total cost/head, \$	274.66	261.56	258.83	260.91	269.90	269.06
Return/head ⁴ , \$	276.88	260.96	250.54	258.88	268.89	264.24
Profit or loss/head, \$	2.22	-.60	-8.29	-2.03	-1.01	-4.82

¹Price includes \$5/ton for processing; pelleting was an additional \$5/ton.

²Yardage was 5¢/head/day.

³Based on Kansas City quotations July 9, 1969.

⁴Based on actual return; cattle sold on grade and yield basis.