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Sorghum grain, urea or soybean meal as a protein source in all-concentrate cattle finishing rations

Abstract

Results of previous similar research have been reported in Kansas Agricultural Experiment Station Bulletins 483, 493, 507, and 518. Trials at several research centers and here have shown that roughage may be satisfactorily omitted from finishing rations for cattle often, reducing feed required per pound of gain. Cattle may be finished on all-grain diets with only mineral and vitamin supplements when the grain has sufficient protein.

Keywords

Cattlemen's Day, 1969; Report of progress (Kansas State University. Agricultural Experiment Station); 529; Beef; Sorghum grain; Urea; Soybean meal; Finishing rations

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Sorghum Grain, Urea or Soybean Meal as a Protein Source
in All-concentrate Cattle Finishing Rations,
(Project 253) 1968.

G.A. Greathouse, R.W. Swanson, E.F. Smith,
L.I. Smart, and B.E. Brent

Results of previous similar research have been reported in Kansas Agricultural Experiment Station Bulletins 483, 493, 507, and 518.

Trials at several research centers and here have shown that roughage may be satisfactorily omitted from finishing rations for cattle, often reducing feed required per pound of gain. Cattle may be finished on all-grain diets with only mineral and vitamin supplements when the grain has sufficient protein.

Feedlot trials using three different rations (Table 10) were conducted. A premix was added to make the rations as nutritionally adequate as possible. All the sorghum grain used was obtained at a local elevator, dry rolled and mixed with other ration ingredients as needed.

Steers used were started on a mixture of 60% dehydrated alfalfa crumbles and 40% ground grain with prairie hay fed separately. During three weeks the dehydrated alfalfa crumbles and prairie hay were gradually eliminated.

Experiment 1

March 5 to August 7, 1968 - 155 days

Twelve steers purchased near Manhattan, Kansas, were used. They were fed individually, four to each of the three rations shown in table 10.

Each steer was subjected during the feeding trial to an 8- to 11-day digestibility study of rations he consumed.

Results

The results are reported in table 11. Rations containing urea or soybean meal were about equal. The urea ration cost least per pound of gain. Steers fed sorghum grain not supplemented with protein performed below other steers. Since the performance of the steers fed urea was equal to the performance of the steers fed soybean meal, the limiting factor in feeding sorghum grain as the only source of protein would appear to be the quantity of nitrogen in the diet.

Experiment 2

August 7, to November 15, 1968 - 100 days

Thirty-five steers that had been grazed on bluestem pasture were divided into three treatment groups and fed the three rations shown in table 10. Four steers from each group were individually fed; the remainder group fed. Rations were always accessible. The premix was pelleted then crumbled to obtain a better mix with the ground grain.

Results

The results are reported in table 12. Differences among treatments were small. Steers fed soybean oil meal

required the least feed per pound of gain (6.1 to 1 for those group fed).

Carcasses graded high good to low choice and there seemed to be no differences by treatments in the carcasses.

Feed cost per cwt. of gain varied little, from \$12.60 (group fed steers) to \$13.46 (individually fed steers) with both extremes for animals fed soybean oil meal.

All rations were satisfactory. When a protein supplement is needed, either urea or soybean meal could be used, depending on relative costs.

Table 10
Composition of Rations Used,¹ 1968

Ration mix	Sorghum grain	Sorghum grain and 1% Urea	Sorghum grain and Soybean oil meal
<u>Pounds of ingredients per ton</u>			
Ground sorghum grain	1950	1930	1815
Premix	50	50	50
Urea	0	20	0
Soybean oil meal	<u>0</u>	<u>0</u>	<u>135</u>
Total, lb.	2000	2000	2000

Ingredients in 50 lbs. of premix

Ground limestone	20.0
Trace mineral premix ²	1.0
Stilbestrol premix (1 gram stilbestrol per lb.)	1.0
Vitamin A premix (10,000 IU per gram)	0.3 (140 grams)
Chlortetracycline premix (10 grams per lb.)	0.8 (380 grams)
Fine ground sorghum grain (enough to make the premix up to 50 lbs.)	<u>26.9</u>
Total, lbs.:	50.0

¹ Salt, free choice

² Percentages of indicated elements in trace mineral premix: manganese, 4.4; iron, 6.6; copper, 1.32; cobalt, 0.23; iodine, 0.30; zinc, 5; magnesium, 20; sulfur, 2.70.

Table 11

Experiment 1

Sorghum Grain With No Added Protein in All-concentrate
Cattle Finishing Rations
March 5 - August 7, 1968 - 155 days
Individually-fed Steers

	Sorghum grain	Sorghum grain, 1% Urea	Sorghum grain, Soybean meal
No. of steers per ration	4	4	4
Av. initial wt., lbs.	575	619	568
Av. final wt., lbs.	981	1085	1033
Av. daily gain, lbs.	2.62	3.01	3.01
Av. daily feed intake, lbs.	17.9	19.1	18.6
Feed required per lb. of gain, lbs.	6.82	6.34	6.16
Feed cost per cwt. of gain, \$ ¹	12.65	12.01	12.57
Percent protein in concentrate mixture (88% dry matter basis)	9.55	11.77	11.91
Cost of concentrate mixture per ton, \$	37.09	37.83	41.14
Carcass Data:			
Av. hot carcass wt., lbs.	561	647 ²	614
Av. rib eye area, sq. inches	9.99	11.71	11.28
Av. fat thickness, inches	.43	.57	.55
Av. % kidney knob (estimate)	2.1	2.0	2.25
Av. marbling score	Small	Moderate	Modest
Av. USDA grade	Good+	Choice +	Choice-

¹ Feed costs used are on inside back cover.

² One liver abscess detected during slaughter

Table 12

Experiment 2

Sorghum Grain, Urea, or Soybean Meal as Protein Source
in All-concentrate Cattle Finishing Rations
August 7 to November 15, 1968 - 100 days

	1 Individually-fed steers			2 Group-fed Steers			3 Summary (1 & 2 combined)		
	Sorghum grain, ground, 1% urea	Sorghum grain, ground, Soybean meal	Sorghum grain, ground	Sorghum grain, ground, 1% urea	Sorghum grain, ground, Soybean meal	Sorghum grain, ground	Sorghum grain, ground, 1% urea	Sorghum grain, ground, Soybean meal	Sorghum grain, ground
Number of steers per treatment	4	4	4	8	8	7	12	12	11
Av. initial wt., lbs.	699	700	660	650	654	694	666	669	681
Av. final wt., lbs.	1022	1055	1001	1019	1014	1057	1020	1027	1037
Av. daily gain, lbs.	3.26	3.59	3.44	3.73	3.64	3.67	3.57	3.62	3.59
Av. daily feed intake, lbs.	21.44	23.0	22.96	24.63	21.85	25.32	23.57	22.23	23.19
Feed required per lb. of gain, lbs.	6.84	6.55	6.83	6.74	6.13	7.07	6.77	6.27	6.92
Feed cost per cwt. of gain, ¹ \$	12.94	13.46	12.65	12.74	12.60	13.07	12.81	12.89	12.92
Percent protein in concentrate mixture (88% dry matter basis)	10.9	10.7	8.4	10.9	10.7	8.4	10.9	10.7	8.4
Cost of concentrate mixture per ton, ¹ \$	37.83	41.14	37.09	37.83	41.14	37.09	37.83	41.14	37.09
Carcass data:									
Av. lbs. hot carcass wt.	606	601	587	590	589	605	595	593	598
Av. loin eye area, in.	11.53	11.19	10.63	11.24	10.87	11.26	11.34	10.98	11.03
Av. fat thickness, in.	.53	.55	.70	.60	.53	.56	.58	.54	.58
Av. marbling score	Slight +	Small	Small -	Small -	Slight +	Small	Small -	Small -	Small -
Av. U.S.D.A. grade	Good +	Choice -	Good +	Good +	Good +	Choice -	Good +	Good +	Good +
Av. yield grade ²	3	3.25	2.75	2.75	2.63	2.85	2.83	2.84	2.81

1 Feed costs are on inside back cover

2 Yield Grade: 1 to 5, with 1 most desirable