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Feeding Value of Four Different Hybrid Sorghum Grains For Finishing Cattle

Project 567

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Introduction

Hybrid sorghum grain is the major source of energy in livestock finishing rations in the Midwest. In 1968, 739 million bushels of sorghum grain were produced in the United States and 620 million bushels, or 84% were fed to livestock. Kansas ranked second to Texas, producing 183 million bushels in 1968, or 30% of the quantity fed to livestock. Since hybrid sorghum grains were introduced in 1956, yield has increased 25%. Because livestock consumes 84% of the sorghum grain produced in the United States, hybrids with superior nutritive value would be advantageous.

Work in Texas[1] and Kansas[2] has suggested that a new white hybrid sorghum grain may be superior to elevator-run, red sorghum grain in nutritive value. If so, more work is needed to determine nutritive characteristics of hybrid sorghum.

This study compared a white hybrid grain sorghum (Funk's G-766W, white over yellow endosperm)[3] with three red hybrids: Acco R-109 (red over yellow endosperm)[4] DeKalb E-57 (red over white endosperm)[5], Northrup King 222A (red over yellow endosperm)[6]. Comparisons were on the basis of feedlot performance and carcass characteristics. Digestibility of the same hybrids was reported in the 1969-70 Cattlemen's Day Bulletin, 536, p.41.

[1]Nishimuta, J. F., L. B. Sheerrod, and R. D. Furr, 1969. Digestibility of regular, waxy and white sorghum grain rations by sheep. Proceeding, Western Section American Society of Animal Science, 20.259.

[2]Drake, C. L. et al., 1970. White sorghum grain (Funk's G-766W) and elevator-run red sorghum grain compared for fattening cattle. K. S. U. Bulletin 536, p. 38.

[3]Seed supplied by Funk Bros, Lubbock, Texas.

[4]Seed supplied by Anderson, Calyton & Co., Belmond, Iowa.

[5]Seed supplied by DeKalb Seed Co., Lubbock, Texas.

[6]Seed supplies by Northrup, King & Co., Lubbock, Texas.

Materials and Methods

Four hybrid grain sorghums were produced under irrigation, harvested and stored near Manhattan, Kansas.

The grain was dry rolled and incorporated into isonitrogenous, all concentrate rations (12% protein, dry-matter basis). Ration composition is given in Table 7 and proximate analyses of the four hybrid grain sorghums are presented in Table 8.

During the 1969-70 winter, a 126-day feeding trial used 60 Hereford steers averaging 761 pounds. Steers were randomly allotted by weight into twelve lots of 5 head each. Ten were group-fed (nonsheltered lots) in two groups of five each, and 5 were individually fed (sheltered lots) per hybrid. The cattle were adjusted to an all-concentrate ration. Each steer was implanted with 30 mg stilbesterol. The first 6 days of the trial 3 pounds of a synthetic roughage (Ruff-tabs) were fed. Automatic waterers were available in each pen. Carcass data were obtained at slaughter.

Results and Discussion

Feedlot and carcass data are presented in Table 9. The data are based on the averages of 15 head (14 head for Acco R-109) per treatment. Five head were fed individually in sheltered pens (south side open) and ten head were fed in 2 groups of 5 in nonsheltered pens. There were no significant differences in average daily gain, feed intake, pounds of feed per pound of gain, or carcass traits (Table 9). Variation in average daily gain due to hybrid was slight; however, steers on DeKalb E-57 consumed slightly more feed. Those receiving Funk's G-766W (white) required 2.2 pounds more feed to produce a pound of gain than the average of the 3 red hybrids. Acco R-109 was used most efficiently, requiring 7.08 pounds feed per pound gain; Northrup King 222A, DeKalb E-57, and Funk's G-766W required 7.47, 7.93, and 8.48 pounds of feed per pound of gain, respectively. These data do not agree with the findings of Drake et al., 1970, K. S. Eng (personal communication), or R. G. Hinders (personal communication). All reported white grain to be used more efficiently. However, red sorghum grain of an unknown origin listed as elevator-run, red sorghum was used in their trials. In the trials reported here only known hybrids were compared.

No significant differences were found in feedlot or carcass data from sheltered (individually fed) and nonsheltered (group fed) animals. However, sheltered steers tended to gain faster and require less feed per pound of gain (Table 10); 2.26 to 2.20 average daily gain and 7.20 to 8.48 pounds of feed per pound of

gain, respectively. The steers fed in sheltered lots required 1.29 pounds less feed to produce a pound of gain or a $2.56/cwt gain advantage for sheltered animals with feed prices used.

Lofgreen and Garrett's (1968) net energy tables were used to calculate expected gain for nonsheltered and sheltered steers (Table 11). Nonsheltered steers gained .65 pound per day less than calculated; sheltered steers, .13 pound per day less. Acco R-109 and Northrup King 222A fed in sheltered lots produced higher average daily gains (+.12 and +.19 pound, respectively) than calculated using Lofgreen and Garett's tables. In non-sheltered lots steers on those two hybrids gained closer to the calculated values than did steers on DeKalb E-57 or Funk's G-7666W. This indicates there may be differences in net energy for gain among hybrids. More energy was required for maintenance in nonsheltered lots. Lower gain than expected might be attributed to an all-concentrate ration during winter feeding trials.

Summary

Although data from the present study do not indicate statistical significant differences; they do indicate there may be differences among hybrids that could be of an economical advantage for finishing cattle. Acco R-109 and Northrup King 222A, which are two yellow endosperm hybrids were used more efficiently than other hybrids tested. The first seven days of the trial steers receiving Acco R-109 consumed less grain. After that consumption was essentially the same. Acco R-109 seemed to be less palatable initially. Sheltered steers gained faster and used feed more efficiently than nonsheltered steers. Feed cost was $2.56/cwt gain less for steers in sheltered lots.

Acknowledgments

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Table 7. Composition of Rations Used to Compare White and Red Hybrid Grain Sorghums in Steer-Feeding Trials

Item	% of ration	
Sorghum grain[a]	98.00	
Salt	1.00	
Trace mineral premix[b]	.05	
Urea	.5	
Limestone	.5	
Chlorotetracycline	3.5 mg/lb	
Vitamin A	1,653.00 IU/kg	751. IU/kg

[a]Grain varied with urea added to keep rations isonitrogenous at 12% protein (dry matter basis). Urea added as % of rations: Funk's G-766W, .57; Acco R-109, .62; DeKalb E-57, .70; Northrup King 222A, .23.

[b]Percentages of indicated elements in trace mineral premix: Manganese 4.4%; iron 6.6%; copper 1.32%; cobalt .23%; iodine .30%; zinc 5%; magnesium 20%; sulfur 2.7%.

Table 8. Proximate Analyses of Four Hybrid Grain Sorghums, Dry Matter Basis

Item	Sorghum hybrid			
	Funk's G-766W	Acco R-109	DeKalb E-57	Northrup King 222A
Dry matter %	84.20	84.84	84.49	84.11
Protein % (N x 6.25)	10.65	10.49	10.17	11.83
Ether extract %	3.26	3.18	2.92	3.20
Ash %	1.54	1.69	1.58	1.58
Crude fiber %	2.03	2.12	1.87	1.87
N-free extract %	82.77	82.52	83.43	81.52
Starch %	77.33	79.04	78.27	76.96
Gross energy Kcal/lb	2078.00	2054.00	2069.00	2084.00

Table 9. Performance and Carcass Data of Steers Fed All-Concentrate Rations Containing One of Four Hybrid Grain Sorghums (Winter 1969-70) Dry Matter Basis

Item	Sorghum hybrids			
	Funk's G-766W	Acco R-109	DeKalb E-57	Northrup King 222A
Feedlot data				
No. steers	15	14[a]	15	15
Avg. initial wt., lbs.	765	760	772	758
Avg. final wt., lbs.	1042	1051	1059	1024
Avg. daily gain, lbs.	2.25	2.34	2.21	2.15
Avg. daily feed intake, lbs.	16.96	16.82	18.06	16.32
Avg. lbs feed/ lbs gain[b]	8.48	7.08	7.93	7.47
Cost/cwt gain[c]	17.04	14.23	15.94	15.01
Carcass data				
Avg. hot carcass wt., lbs.	648	653	660	629
Avg. rig eye area, sq. in.	12.72	12.31	12.56	12.44
Avg. fat over rib eye, in.	.40	.40	.40	.37
Avg. carcass grade[d]	10.05	10.16	10.34	10.26
Avg. yield grade[e]	2.43	2.58	2.46	2.27
Avg. marbling score[f]	15.10	15.02	15.53	15.31

[a]One steer crippled and removed.
[b]Calculated by using 2 goupr-fed lots as 2 observations plus 5 individually-fed steers for 7 observations.
[c]Cost of ration $2.01/cwt.
[d]High good = 9; low choice = 10.
[e]1 = most desirable; 5 = least desirable.
[f]Small = 14; modest = 17.

Table 10. Performance Data of Nonsheltered (Group-fed) And Sheltered (Individually-fed) Steers on All-Concentrate Rations (Winter 1969-70), Dry Matter Basis

Item	Nonsheltered lots			
	Funk's G-766W	Acco R-109	DeKalb E-57	Northrup King 222A
No. steers	10	9[a]	10	10
Avg. daily gain, lbs.	2.29	2.25	2.19	1.97
Avg. daily feed intake, lbs.	20.67	17.64	18.21	16.95
Avg. lb feed/lb gain	9.01	7.84	8.37	8.71
Cost $/cwt gain[b]	18.11	15.75	16.82	17.51
		Average cost 17.14/cwt		
	Sheltered lots			
No. steers	5	5	5	5
Avg. daily gain, lbs.	2.00	2.42	2.46	2.39
Avg. daily feed intake, lb.	15.48	16.49	18.01	16.07
Avg. lb feed/lg gain	7.96	6.81	7.32	6.72
Cost $/cwt gain[b]	16.00	13.69	14.71	13.51
		Average cost 14.45/cwt		

[a]One cripple and removed.
[b]Cost of ration = $2.01/cwt.

Table 11. Predicted and Observed Average Daily Gains Of Sheltered and Nonsheltered Steers By Net Energy[ab]

Item	Sorghum hybrids							
	Funk's G-766W		Acco R-109		DeKalb E-57		Northrup King 222A	
	N-S[c]	S[c]	N-S	S	N-S	S	N-S	S
No. steers	10	5	9[d]	5	10	5	10	5
Avg. daily feed, lbs.	23.2	19.2	19.4	18.1	20.0	19.8	20.0	17.7
Expected avg. daily gain, lbs.	3.15	2.60	2.62	2.30	2.70	2.60	2.80	2.20
Observed avg. daily gain, lbs.	2.29	2.00	2.25	2.42	2.19	2.46	2.12	2.39
Differences in avg. daily gain, lbs.[e]	-.86	-.60	-.37	+.12	-.71	-.24	-.68	+.19

Average of four treatments in relation to expected daily gain
nonsheltered lots = -.65 lb.
sheltered lots = -.13 lb.

[a]Lofgreen and Garrett's (1968) Net Energy Tables for une in fattening beef cattle.
[b]Sorghum grain NEm = .87 megcal/lb
NEp = .58 megcal/lb
[c]N-S = nonsheltered lots, S = sheltered lots.
[d]One crippled steer removed.
[e]Observed avg. daily gain - expected avg. daily gain.