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Effect of Sprouting and Weather Damage on Feeding Value of Grain Sorghum (Summary of Beef, Swine, and Poultry Trials)

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Summary

Grain sorghum officially graded as 39% damaged (sprouted) with 10% broken kernels or foreign material was fed to beef steers, growing swine, and broilers to compare its feeding value to that of normal grain sorghum. Damaged grain constituted 0, 50, or 100% of the grain portion of the rations. Cattle performance during a 57-day finishing period was not reduced by feeding sprouted grain sorghum. However, the swine and broiler trials suggest that sprouted grain sorghum has a slightly lower energy value.

Introduction

An unusually wet fall harvest season created severe weather damage to part of the 1986 Kansas grain sorghum crop. There is only limited research data comparing the feeding values of damaged (especially sprouted) grain and normal grain. These trials were conducted to provide current information on feeding sprouted grain sorghum to beef, swine, and poultry.

Experimental Procedures

Weather-damaged grain sorghum (Funks 522DR) was purchased from one Southeast Kansas source for use in all three trials. Visual observation suggested sprout damage as high as 80%; however, official grading by the Kansas State Grain Inspection Department indicated: 55.5 lb test weight, 11.8% moisture, 39% damaged kernels, and 10% broken kernels and foreign material. Remarks included "badly weathered" and "distinctly discolored." The normal, non-damaged grain sorghum was Cargill 70, produced at one location in Northeast Kansas, and was used for that portion of all grain sorghum mixtures not coming from the damaged grain.

Cattle trial: Eighteen Angus crossbred steers averaging 758 pounds were allotted by weight to three dietary treatments. Six steers were individually fed each diet for 57 days to closely monitor palatability and intake. The diets (DM basis) were 79.2% sorghum grain, 15% corn silage, and 5.8% supplement. Damaged grain constituted 0, 50, or 100% of the grain sorghum portion.

Swine trial: Sixty Yorkshire or crossbred growing pigs averaging 91.7 pounds were allotted by weight and breed to three dietary treatments. There were four replicates (pens) for each treatment, five pigs per pen. The trial ran 4 weeks. Diets are shown in Table 4.1. Sprouted grain sorghum constituted 0, 50, or 100% of the grain portion.

Table 4.1. Composition of Diets for Growing Pigs[a]

Ingredients, %	Normal Grain	1/2 Damaged 1/2 Normal	Damaged Grain
Milo, ground	79.4	39.7	--
Sprouted milo, ground	--	39.7	79.4
Soybean meal, 44%	18.2	18.2	18.2
Dicalcium phoshate	1.0	1.0	1.0
Limestone	.8	.8	.8
Salt	.4	.4	.4
Trace Minerals	.5	.5	.5
Vitamins	.15	.15	.15

[a]Diets calculated to contain 15% C.P., .65% Lys, .65% Ca, .55% P.

Broiler trial: One hundred twenty-six Cornish broiler chicks with an initial average weight of 93 g were allotted by weight to three dietary treatments. There were six replicates (pens) of each treatment, with seven chicks per pen. The trial ran 6 weeks. Diets are shown in Table 4.2. Again, sprouted grain constituted 0, 50, or 100% of the grain portion.

Table 4.2. Compositon of Treatments for Broilers[a]

Ingredients, %	Normal Grain	1/2 Damaged 1/2 Normal	Damaged Grain
Milo, ground	54.2	27.2	--
Sprouted milo, ground	--	27.2	54.2
Soybean meal, 44%	38.4	38.4	38.4
Soybean oil	3.0	3.0	3.0
DL-methionine	.3	.3	.3
Dicalcium phosphate	2.0	2.0	2.0
Limestone	1.0	1.0	1.0
Salt	.5	.5	.5
Trace minerals	.1	.1	.1
Vitamins	.5	.5	.5

[a]Diets calculated to contain 21.7% C.P., .56% Met, .96% Ca, and .78% P.

Results and Discussion

Cattle trial: Steers fed 50 or 100% sprout-damaged grain sorghum were not adversely affected. Results are summarized in Table 4.3. Although gain and efficiency were slightly better on the diets that contained damaged grain, the differences were not statistically significant (N.S.). There were no indications of depressed intake or reduced palatability with the weathered grain. This trial suggests that sprouted and weather damaged grain sorghum can be used in beef cattle finishing diets without depressing growth and efficiency.

Table 4.3. Effect of Sprouting and Weather Damage on Feeding Value of Grain Sorghum - Cattle Trial

Item	Normal Grain	1/2 Damaged 1/2 Normal	Damaged Grain
No. Individually Fed	6	6	6
Initial Wt., lb.	757	762	755
Final Wt., lb.	929.8	944.7	941.0
Total Gain, lb.	172.8	182.7	185.6
Daily Gain	3.03	3.21	3.26
Daily D.M. intake, lb.	21.33	21.10	22.30
Feed/Gain	7.04	6.57	6.84

Swine trial: Average final weight of growing pigs on test was 145.4 lb. There were no differences (P>.10) for daily gain, intake, or efficiency (F/G) among the three treatments (Table 4.4) for the 4 week trial. However, feed intake was increased about 10% in diets containing sprouted grain. Thus, F/G became somewhat poorer (N.S.) for the sprouted grain diets. These data suggest that sprouted grain sorghum had a lower energy value than regular grain sorghum, but the pigs compensated by eating enough more to maintain constant gain.

Table 4.4. Effect of Sprouting and Weather Damage on Feeding Value of Grain Sorghum - Swine Trial [a]

Item	Normal Grain	1/2 Damaged 1/2 Normal	Damaged Grain
Average Daily Gain, lb.			
day 0-14	1.83	1.78	1.74
day 0-28	1.92	1.96	1.87
Average Daily Feed Intake, lb.			
day 0-14	5.70	6.09	5.84
day 0-28	6.24	6.98	6.92
Feed/Gain			
day 0-14	3.17	3.43	3.36
day 0-28	3.29	3.58	3.70

[a]No treatment means among each item were significantly different, P>.10.

Broiler trial: Average final weight of chicks was 2059 g. Chick growth rate was similar (P>.10) among the three diets after 6 weeks on test (Table 4.5). Feed intake increased (P<.10) on the 50% sprouted grain sorghum diet but decreased at the 100% level. Efficiency responded in a parallel manner, becoming slightly poorer with 50% sprouted grain, but remaining unchanged at the 100% level. These responses also suggest that the sprouted grain is slightly lower in energy. When sprouted grain was 50% of the grain, chicks maintained their rate of gain by increasing their feed intake. But when 100% sprouted grain was fed, chick performance decreased slightly (N.S.), possibly because of reduced feed palatability.

Table 4.5. Effect of Sprouting and Weather Damage on Feeding Value of Grain Sorghum - Broiler Trial

Item	Normal Grain	1/2 Damaged 1/2 Normal	Damaged Grain
Average Daily Gain, g			
day 0-14	34.2	32.9	32.9
day 0-28	44.2	43.0	42.3
day 0-42	47.5	47.1	45.8
Average Daily Feed Intake, g			
day 0-14	49.8	49.8	46.8
day 0-28	83.6	83.0	77.9
day 0-42	105.2[ab]	108.1[a]	101.8[b]
Feed/Gain			
day 0-14	1.45	1.52	1.42
day 0-28	1.89	1.94	1.84
day 0-42	2.22	2.30	2.22

[ab]Treatment means within row with different superscripts differ significantly, P<.10.

When examined together, the swine and broiler trials suggest that sprouted grain sorghum had a slightly lower energy value than normal grain sorghum. Growing pigs were able to maintain nearly constant gain when it made up 50 and 100% of the grain by increasing feed intake. In that case, the poorer feed efficiency we observed would be expected. Chicks responded similarly to pigs when sprouted material was 50% of the grain source; however, slightly reduced performance might be expected when sprouted grain sorghum comprises 100% of the grain source, possibly because of poor palatability.