

Nutritional Evaluation of Stover and Grain from Hybrid Grain Sorghums

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Relatively little information is available on the nutritive value of stover and grain from different grain sorghum hybrids grown in Arizona. Recent studies (1974 and 1975 Cattle Feeders Day Reports) have shown that sorghum stover produced in Arizona apparently has a lower energy value for cattle than that produced in other areas. It could not be determined whether this lower value was due to Arizona growing conditions or perhaps due to the types of grain sorghum grown here.

The purpose of this study was to compare the chemical composition and estimated dry matter digestibility of stover from some grain sorghum hybrids commonly grown in Arizona. Since the grain from these hybrids was available, it also was evaluated.

Procedure

Stover and grain obtained from seven grain sorghum hybrids grown in a variety test provided the materials for this study. Hybrids represented were: Acco R 109A, Acco R 1029, Asgrow Dorado M, Asgrow Dorado TX, DeKalb C42A and DeKalb E59. All hybrids were grown under irrigation at the same location in southeastern Arizona. A center pivot sprinkler was used to apply approximately 30 cm of well water per hectare. Anhydrous ammonia was applied to provide 225 kg of actual nitrogen per hectare. Grain was harvested at maturity and the remaining stover harvested by hand from three replicate plots of each hybrid. Replicates I and II were located near the perimeter of the field while replicate III was adjacent to the center pivot. All samples were air-dried, ground in a hammermill and retained by replicate by each hybrid.

Prior to analysis, all samples were reground to pass a 1-mm screen. Final dry matter, crude protein, ether extract, ash, acid detergent fiber (ADF), calcium and phosphorus were determined by standard methods. Dry matter digestibility was estimated by disappearance of dry matter from nylon bags suspended in the rumen of a fistulated steer for 24 hr (grains) or 48 hr (stover).

Results

Mean chemical composition and percent nylon bag dry matter disappearance (NBDMD) of the stovers are shown in table 1. Data for the grains are in table 2. No important differences were observed among the hybrids in composition or estimated digestibility of either the stover or the grain samples. Chemical composition and NBDMD for the stover and grain by replicate are shown in tables 3 and 4. In the stover samples, significant differences due to location in the field (replicate) were observed for all parameters examined except crude protein and phosphorus. For the grain samples, differences due to location were observed only for crude protein and ether extract. In all cases where differences were observed, replicate III which was located adjacent to the center pivot was different from replicates I and II. Growth characteristics and yields of grain and stover were also lower for replicate III than for the other two replicates.

Observations

1. There was little variation in chemical composition or nylon bag dry matter disappearance of either stover or grain from the seven hybrids evaluated.
2. Nutrient compositions determined were similar to those listed in current tables of feed composition.
3. Chemical composition and estimated digestibility (particularly for stover) varied for different locations in the field.
4. The data suggest there is little genetic variation among the hybrids evaluated in chemical composition or availability of nutrients in either stover or grain. However, these data also indicate that environmental conditions or cultural practices can significantly influence nutritive quality, particularly of stover.

TABLE 1. MEAN CHEMICAL COMPOSITION AND DRY MATTER DISAPPEARANCE OF STOVER FROM DIFFERENT GRAIN SORGHUM HYBRIDS^a

Hybrid	Chemical Composition, %							NBDMD, %
	CP	ADF	NFE	EE	Ash	Ca	P	
Acco R 109A	7.5	42.7	35.8	1.7	12.3	.69	.07	58.7
Acco R 1029	6.9	42.5	36.3	2.1	12.2	.68	.09	59.7
Asgrow Dorado	6.7	43.1	34.5	2.3	13.4	.62	.09	60.3
Asgrow Dorado M	6.7	41.0	38.3	2.1	11.9	.73	.08	59.6
Asgrow Dorado TX	6.2	40.5	40.5	2.0	10.8	.67	.08	61.2
DeKalb C42A	6.4	42.3	36.2	2.3	12.9	.64	.08	58.8
DeKalb E59	6.8	41.6	38.5	1.9	11.2	.67	.08	61.1
Mean, all hybrids	6.7	42.0	37.2	2.1	12.1	.67	.08	59.9
Standard deviation	.4	.9	.2	.2	.9	.03	.01	1.0

^aEach value is the mean of three replicates. All values on a dry matter basis.

TABLE 2. MEAN CHEMICAL COMPOSITION AND DRY MATTER DISAPPEARANCE OR GRAIN FROM DIFFERENT SORGHUM HYBRIDS^a

Hybrid	Chemical Composition, %							NBDMD, %
	CP	ADF	NFE	EE	Ash	Ca	P	
Acco R 109A	11.6	9.3	74.2	2.5	2.4	.04	.20	42.4
Acco R 1029	12.1	9.1	73.7	2.8	2.3	.03	.23	42.3
Asgrow Dorado	11.2	8.2	76.0	2.5	2.0	.03	.20	42.9
Asgrow Dorado M	12.1	7.6	76.0	2.4	1.9	.02	.19	42.2
Asgrow Dorado Tx	11.9	8.2	75.8	2.1	2.0	.03	.19	42.1
DeKalb C42A	11.9	9.2	74.0	2.7	2.2	.03	.20	45.5
DeKalb E59	11.9	8.5	75.8	2.1	1.7	.02	.19	40.0
Mean, all hybrids	11.8	8.6	75.1	2.5	2.1	.03	.20	42.5
Standard deviation	.9	1.2	2.5	.0	.3	.01	.09	2.5

^aEach value is the mean of three replicates. All values on a dry matter basis.

TABLE 3. MEAN CHEMICAL COMPOSITION AND DRY MATTER DISAPPEARANCE OF GRAIN SORGHUM STOVER BY REPLICATE^a

Item	Replicate		
	I	II	III
Crude protein, %	6.8	6.6	6.7
Acid detergent fiber, %	42.4	43.0	40.4 ^b
Nitrogen free extract, %	36.4	35.2	39.9 ^b
Ether extract, %	1.8	1.7	2.6 ^b
Ash, %	12.5	13.4	10.4 ^b
Calcium, %	.59	.56	.86 ^b
Phosphorus, %	.09	.08	.08
NBDMD, %	59.3	57.6	63.1 ^b

^aValue for each replicate (location in field) is the mean of seven hybrids. All values on a dry matter basis.

^bSignificantly different ($P < .05$) from other values on the same line.

TABLE 4. MEAN CHEMICAL COMPOSITION AND NYLON BAG DRY MATTER DISAPPEARANCE OF GRAIN SORGHUM HYBRIDS BY REPLICATE^a

Item	Replicate		
	I	II	III
Crude protein, %	11.3	11.0	13.1 ^b
Acid detergent fiber, %	8.3	8.5	9.0
Nitrogen free extract, %	75.1	75.7	74.4
Ether extract, %	3.3	2.7	1.4 ^b
Ash, %	2.0	2.1	2.0
Calcium, %	.02	.03	.03
Phosphorus, %	.19	.20	.21
NBDMD, %	42.8	43.1	41.6

^aValue for each replicate (location in field) is the mean of seven hybrids. All values on a dry matter basis.

^bValues in the same line with different superscripts are significantly different ($P < .05$).