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Whole-plant corn, forage sorghum, and grain sorghum silages for growing cattle

Abstract

Agronomic and cattle performance traits were measured for eight silages produced in 1991. The silages were: irrigated Pioneer 3377 corn; dryland (early-planted) DeKalb 535 corn; irrigated and dryland DeKalb DK 42Y grain sorghum; and dryland forage sorghums Cargill 200F, Pioneer 947, Northrup King (NK) 300, and Funk's 102F. The irrigated corn and NK 300 and Funk's 102F forage sorghums had the highest whole-plant dry matter (DM) yields per acre; early-planted corn had the lowest yield. The dryland grain sorghum had the highest grain yield and the early-planted corn, the lowest. Average daily gains (ADG) were excellent for steers fed each of the eight silage rations and reflected the relatively high grain contents of the silages and the high DM intakes (2.37 to 2.81% of body wt). As expected, the irrigated corn silage produced the fastest and most efficient gain; the late-maturing, Funk's 102F forage sorghum produced the slowest and least efficient gain.

Keywords

Cattlemen's Day, 1993; Kansas Agricultural Experiment Station contribution; no. 93-318-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 678; Beef; Silage; Corn; Forage sorghum; Grain sorghum

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WHOLE-PLANT CORN, FORAGE SORGHUM, AND GRAIN SORGHUM SILAGES FOR GROWING CATTLE

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and K. K. Bolsen*

Summary

Agronomic and cattle performance traits were measured for eight silages produced in 1991. The silages were: irrigated Pioneer 3377 corn; dryland (early-planted) DeKalb 535 corn; irrigated and dryland DeKalb DK 42Y grain sorghum; and dryland forage sorghums Cargill 200F, Pioneer 947, Northrup King (NK) 300, and Funk's 102F. The irrigated corn and NK 300 and Funk's 102F forage sorghums had the highest whole-plant dry matter (DM) yields per acre; early-planted corn had the lowest yield. The dryland grain sorghum had the highest grain yield and the early-planted corn, the lowest. Average daily gains (ADG) were excellent for steers fed each of the eight silage rations and reflected the relatively high grain contents of the silages and the high DM intakes (2.37 to 2.81% of body wt). As expected, the irrigated corn silage produced the fastest and most efficient gain; the late-maturing, Funk's 102F forage sorghum produced the slowest and least efficient gain.

(Key Words: Silage, Corn, Forage Sorghum, Grain Sorghum.)

Introduction

Silage production in Kansas is primarily from irrigated and dryland corns and dryland forage and grain sorghums. Producers who grow or background cattle with high-silage rations tend to select silage crops or hybrids based on agronomic traits and nutritive values. In several earlier studies, we have documented the effects of growing season, hybrid, stage of maturity, processing, and grain addition on the yield potential and cattle performance from numerous forage and grain sorghum silages.

Irrigated and drought-stressed corn silages were compared in two studies. The objectives of this study were to compare both agronomic traits and cattle performance from eight silages produced in 1991.

Experimental Procedures

The crops were produced near the Kansas State University campus during the 1991 growing season. The eight silages included irrigated Pioneer 3377 corn; dryland (early-planted) DeKalb 535 corn; irrigated and dryland DeKalb DK 42Y grain sorghum; and dryland forage sorghums Cargill 200F, Pioneer 947, Northrup King 300, and Funk's 102F. The four fields used were of predominantly Reading silt loam soils. Prior to planting, anhydrous ammonia was applied at 100 lb per acre for both the irrigated and dryland corns and grain sorghums, and 80 lb per acre for the forage sorghums. The two corns were harvested at the 90% milk line stage of kernel maturity, and the six sorghums, at the very late-dough stage. All eight silages were made without a silage additive in 10 × 50 ft concrete stave silos.

The silos were opened on March 18 and 19, 1992 and were emptied at uniform rates during the next 3 months. Silage samples were taken three times weekly. Each silage was fed to 18 yearling, crossbred steers (three pens of six steers per silage) in a 70-day growing trial, which began on March 21, 1992. The complete-mixed rations were fed twice daily to appetite and contained 89% silage and 11% supplement on a DM basis. Rations were formulated to provide 12.1% crude protein, .52% calcium, and .28% phosphorus (DM basis); 250 mg of Rumensin; and 30,000 IU of

vitamin A per steer daily. Soybean meal was the main supplemental protein.

For 1 week before the start of the growing trial, all steers were limit-fed a forage sorghum silage ration to provide a DM intake of 2.0% of body weight. Steers were then weighed individually on 3 consecutive days. For 2 days before the final weighing, the steers were fed their respective silage rations at a restricted DM intake of 2.0% of body weight. Then individual weights were taken on 3 consecutive days.

Results and Discussion

Agronomic performance and chemical composition of the eight silage crops are shown in Table 1. The irrigated corn and dryland forage sorghums NK 300 and Funk's 102F had the highest whole-plant DM yields per acre; early-planted corn (DeKalb 535)

had the lowest yield. The extremely dry, hot weather throughout June and July contributed to the low silage and grain yields for the early-planted corn. Grain yields of the five dryland silage crops benefitted from early-August rainfall, and the grain sorghum had the highest yield. Grain yields of the four forage sorghums were average or above, but their whole-plant DM yields were below average. The CP and ADF values for the eight silages indicated that all were of relatively high nutritive value.

Average daily gains (Table 2) were excellent for steers fed the eight silage rations and reflected the relatively high silage grain contents and their high DM intakes (2.37 to 2.81% of body wt). As expected, irrigated corn silage produced the fastest and most efficient gain; the late-maturing, Funk's 102F forage sorghum produced the slowest and least efficient gain. However, the other five grain and forage sorghum silages compared favorably to irrigated corn silage for both agronomic and nutritive value traits.

Table 1. Agronomic Performance and Chemical Composition of the Eight Silages in 1991

Crop, hybrid, and growing condition	Planting date	Harvest date	Plant height, inches	Whole-plant		Grain yield, bu/acre ¹	Silage ²	
				DM, %	DM yield, tons/acre		CP, %	ADF, %
<u>Corn:</u>								
Pioneer 3377, irrigated	May 10	Aug. 13	96	33.3	6.5	120.0*	8.7	23.4
DeKalb 535, dryland early-planted	Apr. 1	July 16	91	33.1	4.1	18.2	8.7	28.1
<u>Grain sorghum: DeKalb 42Y</u>								
Irrigated	May 29	Aug. 28	49	37.7	5.6	105.3	10.0	25.1
Dryland	May 28	Sept. 17	42	39.2	5.6	122.4	9.8	20.5
<u>Forage sorghum: dryland</u>								
Cargill 200F	June 6	Aug. 16	70	38.2	5.0	91.5	9.1	28.8
Pioneer 947	June 6	Aug. 20	77	34.1	5.7	96.0	8.5	28.9
Northrup King 300	June 6	Sept. 27	56	38.3	6.4	101.6	7.9	29.0
Funk's 102F	June 6	Oct. 9	83	39.1	6.4	83.4	7.8	29.8

¹Bushels/acre adjusted to 14.5% moisture.

²CP = crude protein, ADF = acid detergent fiber, and both are reported on a DM basis.

*Estimated.

Table 2. Performance by Yearling Steers fed the Eight Silage Rations

Item	Corn		Grain sorghum,		Forage sorghum			
	Pioneer 3377 irrigated	DeKalb 535 dryland	DeKalb 42Y		Cargill 200F	Pioneer 947	NK 300	Funk's 102F
No. of steers	18	18	18	18	18	18	18	18
Initial wt, lb	640	634	642	646	633	634	626	637
Avg daily gain, lb	2.67 ^a	2.37 ^{bc}	2.43 ^{bc}	2.52 ^b	2.30 ^{bc}	2.35 ^{bc}	2.33 ^{bc}	2.22 ^c
Daily DM intake, lb	18.9 ^b	17.0 ^c	19.9 ^{ab}	20.6 ^a	18.7 ^b	18.8 ^b	19.1 ^b	20.0 ^{ab}
Feed/lb of gain, lb ¹	7.1 ^a	7.2 ^{ab}	8.2 ^{bc}	8.2 ^{bc}	8.2 ^{bc}	8.0 ^b	8.2 ^{bc}	9.0 ^c

¹100% DM basis.

^{abc}Means in the same row with different superscripts differ (P < .05).