PERFORMANCE OF FEEDLOT HEIFERS FED CORN SILAGE OR BROWN MIDRIB FORAGE SORGHUM SILAGE AS THE ROUGHAGE PORTION OF A FINISHING DIET

B. Hough[1,2], L. W. Greene[1,2], F. T. McCollum-III[3], B. Bean[1,3], N. A. Cole[4], and T. Montgomery[2]

[1]Texas Agricultural Experiment Station, Amarillo, [2]West Texas A&M University, Canyon, [3]Texas Cooperative Extension, Amarillo, [4]USDA-ARS, Bushland

Summary

One hundred twenty-six yearling cross bred heifers were used to determine the performance of heifers fed brown midrib forage sorghum silage (BMRS) vs. corn silage (CS) as the roughage source in a high concentrate finishing diet. Heifers were housed in 18 pens. Heifers were assigned to one of three diets; 10% (DM basis) CS (C10), 10% (DM basis) BMRS (S10), 7.5% (DM basis) BMRS (S7.5) and offered *ad libitum* feed. Heifers were marketed in four groups as determined by ultrasound at re-implant based upon external fat, rib-eye area, and marbling score. Average daily gain for heifers fed the 7.5 and 10% brown mid-rib sorghum silage diets were the same (3.05 lb/day) and greater (P=.03) than those fed 10% corn silage (2.74 lb/day). Feed efficiency (feed/gain) was greater for heifers fed sorghum silage compared to those fed corn silage as the roughage source. No differences in carcass measurements were detected.

Introduction

Feedlots throughout the Texas panhandle feed a finishing ration consisting of corn silage as the roughage component of the diet. However, recent concerns over irrigation water availability, has created the necessity for roughage sources with lower water usage requirements. One alternative to corn silage is brown midrib forage sorghum silage. Previous research from our laboratory shows that brown midrib forage sorghum has increased dry matter digestibility compared to conventional hybrids. Sorghum silage requires approximately 40 % less water than that of the corn silage. Therefore, the replacement of corn silage with brown midrib forage sorghum silage as the roughage component of the diet on feedlot performance and carcass characteristics were determined.

Experimental Procedures

This study was conducted at the Texas Agricultural Experiment Station Feedlot in Bushland, Texas, during the winter/spring of 2002. Yearling heifers were fed a finishing ration containing (dry matter basis) 10% corn silage (C10), 10% brown midrib forage sorghum silage (S10), or 7.5% brown midrib forage sorghum silage (S7.5). Treatments were selected to compare corn silage and brown midrib (BMR) forage sorghum silage at (1) the same level of inclusion on a dry matter basis and (2) the same level of neutral detergent fiber to the diet.

Eighteen pens were randomly assigned to the three experimental diets (6 pens/treatment). Heifers (n=126) were blocked into three weight groups, with each block subdivided into six, 7-head pen groups randomly assigned to the three treatment diets.

The C10 diet contained (DM) 10% corn silage (NC+ 7117), 2.3% white grease (pork fat), 7.5% supplement, and 80.2% steam-flaked corn. The supplement contained cottonseed meal, urea, vitamins, minerals, rumensin, and tylosin. The S10 diet contained (DM) 10% forage sorghum silage (Walter Moss Millenium), 2.3% white grease, 7.2% supplement, and 80.5% steam flaked corn. The S7.5 diet contained (DM) 7.5% forage sorghum silage (Walter Moss Millenium), 2.3% white grease, 7.5% supplement, and 82.7% steam-flaked corn.

Silages were produced at the Texas A&M James E. Bush Farm 1.5 miles north of Bushland, Texas, and ensiled in 10 ft silo press bags at the experimental feedlot. Laboratory analysis of silage samples collected during the trial was analyzed for chemical composition by the DHI Laboratory in Ithaca, NY and presented in table 1.

Feed was mixed daily and offered at 0700 hrs, in the following order: C10, S10, S7.5. Feed samples were collected daily and composited over the entire feeding period. Feed samples were analyzed at the DHI Laboratory and presented in table 2.

Heifers were implanted with Synovex-H at initiation of the trial and re-implanted with Revalor-H at 84 days on feed. Heifers were weighed individually at 28-day intervals. External fat, rib-eye area, and marbling were estimated by ultrasound at re-implant to determine marketing dates. Marketing dates were based upon a maximum pre-set carcass value formula. Cattle were harvested at IBP Amarillo with carcass data obtained by the Cattleman's Carcass Data Service.

Performance data was analyzed using GLM procedures of SAS using pen as experimental unit. Carcass data was analyzed using MIXED procedures of SAS using heifer as experimental unit.

Table 1. Chemical composition of corn silage vs sorghum silage.

	Corn silage	Sorghum silage
Dry matter, %	66.3	71.0
Crude protein, %	9.9	8.9
Acid detergent fiber, %	28.2	35.5
Neutral detergent fiber, %	44.3	49.0
TDN, %	69.0	59.5
NEm, Mcal/kg	0.71	0.56
Neg, Mcal/kg	0.44	0.30

Table 2. Chemical composition of experimental data.

	C10	S10	S7.5
% Dry matter	93.3	93.9	93.2
% Crude protein	14.0	14.5	15.2
% Acid detergent fiber	7.7	8.5	6.6
% Neutral detergent fiber	17.9	17.1	15.0
% TDN	81.0	81.0	82.0
NEm, (Mcal/kg)	.417	.417	.424
Neg, (Mcal/kg)	.283	.283	.286

Table 3. Performance of cattle fed different sources and levels of silage.

	C10	S10	S7.5	SE	P value
Initial weight, lb	697	694	691	5.29	0.7
Days on feed	166	165	160	4.36	0.59
Feed intake, lb/day	18.59	19.34	19.25	1.03	0.43
Average daily gain, lb/day	2.74[a]	3.05[b]	3.05[b]	0.20	0.03
Feed/Gain	6.79[a]	6.34[b]	6.32[b]	0.29	0.01

Table 4. Carcass characteristics of cattle fed.

	C10	S10	S7.5	SE	P value
Rib eye area (in^2)	14.31	14.66	14.55	0.35	0.63
External fat thickness (in)	0.54	0.53	0.58	0.02	0.22
Hot carcass weight (lb)	751.4	783.4	771.3	27.3	0.14
Yield grade	2.56	2.49	2.61	0.11	0.73
Marbling score[a]	42.9	41.3	45.6	1.5	0.11

[a]Marbling score; slight = 30, moderate = 50, modest = 60

Results and Discussion

Chemical composition of silages are presented in table 1. The corn silage was harvested at a higher moisture content than the brown midrib forage. Crude protein content for the corn silage was greater than that for the sorghum silage used in this study. As expected, the fiber content was greater for the sorghum silage than the corn silage resulting in the corn silage providing a greater amount of energy when included in the diet on an equal weight basis.

The mixed C10 and S10 diets contained similar amounts of energy as determined by the laboratory analysis (table 2). Crude protein tended to be higher in the diets containing the brown midrib sorghum silage compared to the corn silage diets.

Performance data of heifers are shown in table 3. Heifers fed either the S10 or S7.5 gained 11.3/% faster ($P < 0.03$) than those fed C10 (1.38 and 1.38 vs. 1.24 kg/d, respectively). Feed intake (8.5, 8.8, and 8.7 kg/d for C10, S10 and S7.5) was not different ($P = 0.43$). Although no statistical differences were noted in feed intake, the difference in ADG could have been related to lowered palatability of the diet due to the presence of mold on the face of the corn silage. Because fewer pens were being fed the corn silage than the sorghum silage, the face of the silage was not removed as rapidly resulting in a continual presence of mold on the corn silage face compared to the sorghum silage. Feed efficiency (feed/gain) was better ($P < 0.01$) for the S10 and S7.5 diets than the C10 diet (6.34 and 6.32 vs. 6.79 respectively). Feedlot performance was not different between the S10 and S7.5 diets. Carcass characteristics are shown in table 4. The average external fat thickness of cattle at harvest was .55 inches. No differences in carcass measurements were detected.

Implications

In this study, feeding brown midrib sorghum silage as the roughage source in a high concentrate finishing diet resulted in greater ADG and better feed conversions compared to corn silage indicating that brown midrib sorghum silage will be an acceptable roughage source in feed lot diets.