

A COMPARISON OF MIDGRASS PRAIRIE AND OLD WORLD BLUESTEM DURING WINTER AND EARLY SPRING

T.T. Marston¹, S.A. Gunter¹, F.T. McCollum², and R.L. Gillen³

Story in Brief

Six ruminally cannulated steers were used to collect diet samples on December 18, 1991, February 29, 1992, and April 11, 1992 of midgrass prairie and old world (Plains) bluestem pastures. Midgrass prairie was higher in crude protein than old world bluestem at all dates and was sufficient to meet gestating and lactating beef cow requirements. Estimates of in vitro organic matter digestibility indicated old world bluestem could provide sufficient energy to maintain late gestating beef cows, however, energy would need to be supplemented to cows grazing midgrass prairie pastures during the winter months. Acid detergent and neutral detergent fiber analysis from each pasture type was similar for samples taken in December and February, but both decreased from the February to the April sampling periods. These results indicate midgrass prairie and old world bluestem could require different supplemental programs during the winter months.

(Key Words: Forage, Crude Protein, Digestibility, Cattle.)

Introduction

Knowing the quality of dormant forages is helpful in determining the proper winter supplementation program. Historically, producers in western Oklahoma have used native midgrass prairie to winter cows and stocker cattle. With the introduction of the Conservation Reserve Program, many producers could have old world bluestem pastures available for winter grazing in the near future. Many of the recommendations for winter supplement programs have been based on the forage quality of tallgrass species, which are typically quite low in protein (less than 5% CP). This study was initiated to compare midgrass prairie and old world bluestem during the dormant winter season and early spring.

¹Graduate Student ²Associate Professor ³Associate Professor, Range Science

Materials and Methods

Six ruminally cannulated steers were used to determine the diet composition from native midgrass and old world bluestem pastures located in the Marvin Klemme Range Research Station, near Bessie, Oklahoma. On three dates (December 18, 1991, February 29, 1992 and April 11, 1992) diet samples were collected. Prior to each collection date the steers were allowed to graze the respective pastures for one week. Steers were unsupplemented during the adaptation periods, with the exception of free access to a trace mineral mix. On the collection dates, rumens were evacuated and thoroughly washed with water. Immediately following the rumen wash, steers were allowed to graze at will for approximately 30 minutes. Diet samples were retrieved from the rumens and their respective ruminal contents were replaced.

The pastures sampled consisted of either Plains bluestem or a mixture of native midgrass species. The Plains bluestem pasture had been fertilized in the previous growing season with 40 lb N/acre. The midgrass prairie pasture was not fertilized and considered to be in excellent condition. Both pastures had been grazed the previous summer.

Diet samples were analyzed for nitrogen (to estimate CP), acid detergent fiber (ADF) and neutral detergent fiber (NDF) using standard laboratory procedures. Organic matter digestibility (IVOMD) was estimated using an in vitro procedure.

Comparisons were made between least square means using the general linear models option of SAS. Parameters were tested using pasture type, date, and the two-way interaction as independent variables. Simple correlations between the different parameters were also computed.

Results and Discussion

On all three dates, midgrass prairie samples were greater in CP than old world bluestem samples (Table 1). The protein content of the midgrass prairie exceeded the requirements reported by NRC (1984) for late gestating and early lactating beef cows (assuming DM intake at 2% of body weight) and was considerably greater than CP values normally reported for dormant, tallgrass prairie species. Milder than normal winter weather occurred between the test dates. The mild weather allowed winter annual grasses to comprise a greater percentage of the midgrass diet samples than normally anticipated. With more severe winter weather, the CP of the midgrass prairie samples would be expected to decline. The old world bluestem samples taken on December 18 and February 29 had less protein than the NRC (1984) requirements for late gestating or early lactating beef cows.

In vitro organic matter digestibility is an estimate of the amount of

Table 1. Nutritional quality (OM basis) of forage consumed by steers.

Date Forage ^a	December 18		February 29		April 11	
	MP	OW	MP	OW	MP	OW
Crude protein, %	10.0 ^b	6.8 ^c	11.2 ^b	6.8 ^c	17.4 ^b	13.9 ^c
Digestibility, %	46.1 ^b	50.5 ^c	42.6 ^b	50.9 ^c	66.4 ^b	55.9 ^c
DOM/CP	4.6	7.4	3.8	7.5	3.8	4.0

a Forage abbreviations are MP = midgrass prairie, OW = old world bluestem.

b,c Means within each date with different superscripts differ ($P < .01$).

available energy (TDN) in a diet sample. Old world bluestem had significantly more IVOMD than the midgrass prairie, and exceeded the NRC requirement for late gestating beef cows (assuming DM intake at 2% of body weight). Midgrass prairie would not have met the late gestating cow's energy requirement on December 18 or February 29. Because of a much greater IVOMD value obtained from the April 11 samples, energy requirements for a lactating cow would have been exceeded on midgrass prairie.

The ratio of digestible organic matter (DOM) to CP can be used to indicate what type of supplement would best correct the energy to protein balance in the diet. Ratios indicated an energy supplement containing 20 to 30% CP would have been beneficial to the cattle grazing dormant, native midgrass prairie during the winter months. However, the DOM/CP ratio for old world bluestem indicated a supplement with a greater percent protein (like those recommended for dormant tallgrass prairie) would have been beneficial in maintaining cow body weight, condition and reproduction.

Least square means for ADF and NDF content are reported in Table 2. At all testing dates, midgrass prairie samples were lower in both ADF and NDF percentages than the old world bluestem samples. A low NDF value usually

Table 2. Least square means for ADF and NDF (OM basis) content of diet samples.

Date Forage ^a	December 18		February 29		April 11	
	MP	OW	MP	OW	MP	OW
ADF, %	42.6 ^b	48.6 ^c	43.3 ^b	48.4 ^c	31.1 ^b	43.3 ^c
NDF, %	74.6 ^b	78.4 ^c	66.6 ^b	74.7 ^c	44.6 ^b	62.5 ^c

a Forage abbreviations are MP = midgrass prairie, OW = old world bluestem.

b,c Means within each date with different superscripts differ ($P < .01$).

indicates greater DM intake of a forage, while a low ADF value usually indicates greater forage digestibility. However, the IVOMD values do not agree with their corresponding ADF values.

Pooling the data from both forage types, simple correlation coefficients (Table 3) were estimated. A strong, positive relationship existed between ADF and NDF values. This is in agreement with other studies. Strong negative correlation coefficients occurred between ADF and NDF values to both IVOMD and CP content of the samples. The positive correlation between CP and IVOMD indicated that the higher CP content enhanced IVOMD.

The date of sampling affected the nutrient content of the forages. However, little or no differences in ADF, IVOMD or CP ($P > .17$) were noted between the December and February samples. The NDF values became significantly less ($P < .01$) as the trial progressed through the winter and into early spring. This would indicate the diets were increasing in energy content. The April diet samples were greater ($P < .01$) in CP and IVOMD and had less ($P < .01$) ADF and NDF contents than either December or February samples.

Based on these preliminary results, cows grazing dormant native midgrass prairie pastures would benefit from an energy type supplement program. In most cases a 20-30% CP supplement, composed mainly from grain byproducts (such as wheat midds), would increase energy intake without adversely effecting forage intake or digestibility. On the other hand, cows grazing dormant old world bluestem would benefit the most from a high protein supplement (typically made from soybean or cottonseed meal) similar to those supplements fed to cattle grazing dormant tallgrass pastures.

Table 3. Simple correlations^a between ADF, NDF, in vitro OM digestibility, and CP.

	ADF	NDF	IVOMD
NDF	.90		
IVOMD	-.64	-.73	
CP	-.88	-.93	.68

^a All correlations significant ($P < .01$).