

# Digestibility of Five "Old World Bluestem" Hays

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## Story in Brief

Hays from five Old World Bluestems were harvested in 1974 and 1975, then fed to calves in conventional digestion trials. Plains bluestem, Caucasian bluestem, "T"-Blend, "L"-Blend and "B"-Blend were the varieties studied. Results showed few differences between varieties in dry matter digestibility (DMD), intake or N-retention, although Plains was most often highest in quality and "B"-Blend was most often lowest in quality. High relative yields of Caucasian bluestem hay probably offset the slight disadvantage of lower quality.

## Introduction

Laboratory data are good indicators of the *relative* feeding values of forages, but in order to truly know the productive potential of a forage, it must be evaluated in animal feeding trials. Caution dictates that through digestion and intake trials we evaluate the forages most-likely to be of value. Digestibility reflects the availability of nutrients to the animal as a result of the digestive process. Intake reflects the many factors which cause an animal to want to eat a particular forage. These two criteria thus indicate the feeding value of a forage.

## Materials and Methods

Five varieties of Old World Bluestems were established in 1973 in plots ranging in size from 2.02 to 5.96 acres (because of the scarcity of some seed). The site was on a Dale silt loam with 0 to 5 percent slope at the Southwestern Livestock and Forage Research Station, El Reno, Oklahoma. The area was clean-tilled, and a firm seedbed was prepared prior to planting. A "chaffey seed" drill was used to row plant the grass at 1/2 inch depth. Weeds were controlled by herbicide applications the first year and nitrogen fertilizer was applied in three applications of 50 lb each, every year. Top growth was removed in the year of establishment, but hay for the studies herein reported were collected in 1974 and 1975.

Hay was harvested three times in each of the test years (1974-1975), resulting in 30 hays for evaluation. All hay was cut, sun-dried and removed in "conventional" bales. As hay was removed from each plot, the yield per acre was determined. It was then stored under cover until the initiation of feeding trials.

Hays were chopped to a length of about one inch just before feeding. To determine digestibility and nitrogen balance, beef steers weighing 450 to 650 lb were randomly assigned to conventional digestion stalls and fed the test hays in 14-day trials (a seven-day "preliminary" period followed by a seven-day "collection" period). Hay was fed twice each day and at each feeding was adjusted to allow for approximately 10 percent refusal. In total, five steers were used to evaluate each hay.

## Results and Discussion

The hay yields for the 1974 and 1975 seasons are shown in Table 1. Several factors influenced these results. The site where these hays were grown in highly productive and might be more suited to grain crop production under current economic conditions. In

**Table 1. Hay yields (tons/acre) from Old World Bluestem plots in 1974 and 1975<sup>1</sup>.**

Blend/Cut	1974				1975			
	1	2	3	Total	1	2	3	Total
Plains	1.94	1.78	2.16	5.88	2.04	1.90	2.13	6.07
Caucasian	2.12	1.74	2.14	6.00	2.10	1.95	2.19	6.24
"T"-blend	1.60	1.79	1.96	5.35	1.70	1.59	2.07	5.36
"L"-blend	2.04	2.07	2.23	6.34	2.26	2.11	2.49	6.86
"B"-blend	2.12	2.06	2.52	6.70	2.32	2.16	2.50	6.98

<sup>1</sup>First and second cut 1974 values were determined by randomly selecting bales, weighing, then counting bales. Thereafter, all hay removed from the plots was weighed on the truck.



**Table 2. Chemical composition of hays harvested from Old World Bluestem plots in 1974 and 1975<sup>1</sup>.**

Variety	Year	Cut	IVDMD	Chemical composition			
				CP	NDF	ADF	ADL
Plains	1974	1	56.0	11.5	73.6	46.0	4.56
		2	57.5	10.1	71.6	39.0	3.71
		3	59.2	11.0	69.9	40.6	5.11
	1975	1	54.6	11.9	76.9	48.3	4.69
		2	55.9	8.0	75.2	47.1	5.60
		3	56.2	9.8	73.6	43.5	3.96
Caucasian	1974	1	54.1	10.6	72.2	45.6	4.53
		2	57.8	9.8	73.4	41.2	4.33
		3	55.6	9.5	71.6	43.1	4.63
	1975	1	52.1	10.0	75.4	48.9	5.18
		2	54.3	6.8	72.7	48.9	4.39
		3	53.3	8.8	69.2	46.4	5.98
"T"-blend	1974	1	53.2	10.8	74.9	48.7	6.48
		2	60.0	10.9	69.1	37.0	3.73
		3	59.7	11.1	71.3	42.5	4.96
	1975	1	53.1	10.4	74.4	48.8	5.21
		2	57.2	10.0	73.4	45.8	5.06
		3	56.3	10.0	70.3	42.7	3.52
"L"-blend	1974	1	53.6	10.3	75.6	48.5	6.06
		2	56.5	8.5	68.2	40.4	4.62
		3	58.1	10.1	72.5	43.6	4.69
	1975	1	54.8	10.2	77.4	50.8	5.60
		2	57.9	10.1	74.0	44.0	4.35
		3	57.6	9.3	71.8	42.3	3.52
"B"-blend	1974	1	54.2	10.9	75.0	47.8	5.80
		2	58.6	8.9	69.4	39.8	4.85
		3	55.3	10.1	73.8	43.5	4.92
	1975	1	55.2	11.7	74.4	49.1	5.15
		2	57.0	11.7	72.4	43.2	4.05
		3	56.1	9.8	72.8	43.3	3.51

<sup>1</sup>All values are presented as a percent of the dry matter.

addition, while this was "dry land" hay production, both years shown had "good" rainfall distribution during the growing season. Nevertheless, these values indicate the productive potential of Old World Bluestems and give valid comparisons of the five varieties studied.

Quality data (Horn and Taliaferro, 1979) have shown that over the growing season, Caucasian bluestem is not as high in feeding value as is the Plains variety. There are, however, circumstances when the higher yield inherent in Caucasian bluestem may more than offset the lower quality. These results illustrate the importance of carefully analyzing the nutritional requirements of the class of livestock owned before establishing new pastures.

The *in vitro* dry matter disappearance (IVDMD) and chemical composition of the hays are shown in Table 2. Based on *laboratory data*, Plains and "T"-Blend were highest in *predicted* quality, Caucasian and "L"-Blend were intermediate and "B"-blend was

Table 3. *In vivo* dry matter digestibility of Old World Bluestem hays harvested in 1974 and 1975.

Year	Cut	Variety					Average
		Plains	Caucasian	"T"-blend	"L"-blend	"B"-blend	
1974	1	59.9	60.0	57.0	56.7	56.2	57.7
	2	58.3	57.2	58.4	56.9	57.3	57.6
	3	70.2	70.4	71.5	71.8	68.8	70.5
	Average	62.8	62.5	62.3	61.8	60.8	
1975	1	60.2	54.0	55.4	53.4	51.8	55.0
	2	55.2	57.6	59.8	57.9	59.7	58.0
	3	57.6	57.7	54.1	54.5	57.9	56.4
	Average	57.7	56.4	56.4	55.3	56.5	

Table 4. Voluntary intake by calves of Old World Bluestem hays harvested in 1974 and 1975<sup>1</sup>.

Year	Cut	Variety					Average
		Plains	Caucasian	"T"-blend	"L"-blend	"B"-blend	
1974	1	5.09	5.57	4.23	4.73	4.64	4.84
	2	5.72	5.97	5.93	5.48	5.98	5.80
	3	7.18	7.58	7.10	7.04	6.85	7.16
	Average	6.00	6.37	5.75	5.75	5.83	
1975	1	5.78	6.96	6.48	5.73	6.26	6.26
	2	4.47	4.24	5.66	4.76	4.73	4.74
	3	5.42	4.75	5.73	4.91	5.59	5.28
	Average	5.22	5.32	5.96	5.13	5.53	

<sup>1</sup>Voluntary intake = DM intake/animal/day during digestibility trials.



Table 5. Nitrogen retention by calves fed Old World Bluestem hays harvested in 1974 and 1975.

Year	Cut	Variety					Average
		Plains	Caucasian	"T"-blend	"L"-blend	"B"-blend	
1974	1	32.74	37.56	26.52	30.19	24.75	30.25
	2	25.89	20.20	33.48	30.07	25.37	27.37
	3	50.22	46.18	48.32	48.71	44.97	47.68
	Average	36.28	34.65	36.11	36.32	31.70	
1975	1	32.82	24.50	34.00	21.21	23.42	27.44
	2	12.27	15.71	27.36	25.22	32.32	22.38
	3	31.00	40.07	27.04	25.49	25.48	29.82
	Average	25.36	26.76	29.47	23.97	27.07	

lowest. It is especially important to note crude protein (CP) values of all Old World Bluestem hays were adequate for growth, except for the second-cut Caucasian hay value in 1975.

The *in vivo* dry matter digestibility (DMD) values for the hays are shown in Table 3. Note that in live animal trials, the hays were not different in digestibility. Differences between cuts, however, were sizeable. Digestibility results are supported by those of voluntary intake (Table 4) and N-retention (Table 5) studies. All hays evaluated were relatively high-quality forages.

These results demonstrate the potential of the Old World Bluestems for hay production. Careful consideration should be given to the "target" animal's nutrient requirements before a variety of Old World Bluestem is selected. Of the varieties available (Plains bluestem and Caucasian bluestem), Plains is slightly higher in quality-of-hay produced, but Caucasian bluestem yields more hay per acre.

### Literature Cited

- Horn, F. P. and C. M. Taliaferro. 1979. Animal Science Research Report, MP-104. Okla. Agric. Exper. Sta. & USDA.
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