FORAGE QUALITY OF 'MATUA' BROMEGRASS (BROMUS WILDENOWII)

L.G. Brown and J.K. King[1]
[1]Department of Agriculture, Western Kentucky University, Bowling Green, Kentucky 42101

ABSTRACT
Research on forage quality of 'Matua' prairiegrass (*Bromus wildenowii*) is limited in Kentucky. Due to hot summers, mild winters and a 200-day long growing season in Kentucky, quality as well as management practices may differ from those reported in research from other climates. The objective of this study was to evaluate the forage quality of cool-season grasses including Matua, grazing bromegrass (*Bromus stamineus*), smooth bromegrass (*Bromus inermis*), tall fescue (*Festuca arundinacea*) and orchardgrass (*Dactylis glomerata*). The experiment was conducted in the field and greenhouse. Four harvests were obtained from each. Quality analyses were determined with the Near-Infrared Reflectance Spectrophotometer (NIRS) as crude protein (CP), acid detergent fiber (ADF), neutral detergent fiber (NDF) and relative feed value (RFV). Matua consistently yielded herbage quality that was comparable to that of the other species, and produced higher quality forage during the fall of the year.

KEYWORDS
Prairiegrass, bromegrass, tall fescue, orchardgrass, forage quality

INTRODUCTION
'Matua' prairiegrass (*Bromus wildenowii*) was developed in New Zealand under intensive grazing. It was released into the USA in 1973 and is currently the only prairiegrass cultivar sold there. Matua is reportedly valued for high production during early spring and late fall, and for high palatability (Hume 1991a, 1991b). Some Kentucky tradesmen have promoted this grass to producers while research on its forage quality is limited here. Management research in the USA has been limited as well (Pennsylvania State University, 1994; Ballerstadt *et al.*, 1990).

The yield potential from Matua compares favorably to that of other cool-season grasses. Data from Kentucky indicates that tall fescue yielded 17.9 t/ha for two years, compared to 15.5 t/ha for prairiegrass (Lauriault, 1996). Prairiegrass yields were higher than yields for other Bromus species.

The objective of this study was to evaluate forage quality of Matua prairiegrass and compare it to other cool-season grasses including grazing bromegrass (*Bromus stamineus*), smooth bromegrass (*Bromus inermis*), tall fescue (*Festuca arundinacea*) and orchardgrass (*Dactylis glomerata*).

METHODS
The field experiment was established during March, 1995 in Kentucky on Pembroke silt loam (fine-silty, mixed, mesic Mollic Paleudalfs). Soil testing established that available nutrients met requirements for cool-season grasses, according to local recommendations.

Different cool species served as treatments including Matua, grazing bromegrass, smooth bromegrass, tall fescue and orchardgrass. Bromus species were seeded at 27.9 kg/ha and other species at 13.4 kg/ha, consistent with Kentucky recommendations.

Ninety-eight days after seedling emergence was the first harvest. Thereafter, three more harvests were made at 25 to 30 day intervals, corresponding to the boot stage of growth in prairiegrass and grazing bromegrass. Other species were not as mature. Samples were clipped, then plots were harvested, approximating usual pasture management. After each harvest plots were fertilized with nitrogen.

The greenhouse experiment was established in June, 1995. The same treatments and similar harvest schedule was used. Six-inch diameter pots were planted with these treatments and remained in the greenhouse throughout the year. Harvest began 71 days after seedling emergence. Due to lack of growth at final harvest, all replications were combined into a single sample of each species.

All samples were oven dried and ground for NIRS analysis. Analyses included crude protein (CP), acid detergent fiber (ADF), neutral detergent fiber (NDF) and relative feed value (RFV).

RESULTS AND DISCUSSION
When evaluating quality of forages, it is generally accepted that ADF and NDF results exceeding 31% and 40%, respectively, hinder the intake and digestibility of that forage. This is reflected in the RFV index that is figured from these analyses (Ball *et al.*, 1991). CP is not figured into the RFV, but certainly is an important consideration in assessing quality. According to American Forage and Grassland Congress, prime quality hay would have >19% CP, <31% ADF and <40% NDF.

Field Experiment. The first harvest resulted in all species except Matua having CP near 19% (Table 1). The CP for Matua was the lowest amongst species at 16.68%. While there were some significant differences among species for ADF, there were no significant differences in NDF or RFV results. The average NDF was 55.5% and average RFV 118.

The second harvest resulted in no significant differences among species for any quality analyses (Table 2), while the third showed no significant differences among species for CP or RFV. ADF of Matua at 25.33% was significantly higher than that of orchardgrass with no other differences being significant. Grazing bromegrass and smooth bromegrass had NDF values significantly higher than Matua's 54.85%.

The fourth harvest resulted in no significant differences for any quality analyses. Notably, all RFV values were dramatically higher than those from analyses of herbage collected during previous harvests.

When Matua prairiegrass was subject to field conditions, its CP was comparable to that of other species in this study. ADF for Matua were below 31% consistently. NDF for all species were well above 40% until the last harvest in the fall, when a dramatic decrease occurred, ranging from 35.85% for Matua to 42.88% for grazing bromegrass. All species analyses resulted in less than prime quality RFV during the first three harvests, while RFV results for the final harvest were above 151.

Greenhouse Experiment. The first greenhouse harvest resulted in CP of 19% or greater in all species except for grazing bromegrass which had the significantly lower but still desirable CP 18.88%. There were no significant differences in ADF or RFV results, while NDF

was significantly different between tall fescue (55.48%) and grazing bromegrass (60.60%).

The second harvest resulted in CP analyses generally lower than those of the first harvest and showing no significant differences among species. Neither were ADF significantly different. There were significant differences in the NDF results, tall fescue having the lowest (53.38%) and grazing bromegrass the highest (60.98%). RFV were significantly different as well, with tall fescue (115.30) being significantly higher than Matua, grazing bromegrass and orchardgrass.

The third harvest showed no significant differences in all quality analyses except RFV which averaged 119.62. CP levels increased in all species since the previous harvest. Smooth bromegrass had CP (26.33%) that was significantly higher than that of all other species. CP in Matua was significantly lower than that of all other species at 22.93%. ADF levels of all species were below 30%, with smooth bromegrass ADF (24.78%) significantly lower than all others. NDF were lower than in the previous harvest, Matua having an NDF significantly lower than all other species.

The fourth greenhouse harvest occurred at a time when only limited dry matter was harvestable, therefore one composite sample of all replications of each species were collected. This made it impossible to have valid statistical analyses, however the results are reported here to show the trend. CP levels ranged from a high of 23.90% for smooth bromegrass to a low of 18.90% in tall fescue. ADF results for all species were near 31%. NDF results were high, ranging from smooth bromegrass at 49.70% to orchardgrass at 56.00%. Smooth bromegrass had the highest RFV 124.2 followed by Matua 120.2.

In conclusion, Matua prairiegrass grown in Kentucky produced forage quality that was comparable to that of other cool-season forages commonly grown there.

Table 1
Forage analyses of samples from field harvest

	CP (%)	ADF (%)	NDF (%)	RFV
Harvest One				
Prairiegrass	16.68^{b}	30.13^{a}	55.68^{a}	111.13^{a}
Grazing bromegrass	20.93^{a}	26.83^{ab}	55.53^{a}	114.33^{a}
Smooth bromegrass	21.25^{a}	25.83^{b}	54.30^{a}	118.30^{a}
Tall fescue	19.05^{ab}	27.70^{ab}	53.33^{a}	118.12^{a}
Orchardgrass	20.38^{a}	27.43^{ab}	53.50^{a}	117.65^{a}
Harvest Two				
Prairiegrass	14.33^{a}	24.78^{a}	55.50^{a}	116.53^{a}
Grazing bromegrass	13.93^{a}	25.38^{a}	56.25^{a}	114.45^{a}
Smooth bromegrass	13.93^{a}	25.73^{a}	56.28^{a}	113.90^{a}
Tall fescue	13.53^{a}	26.50^{a}	57.58	110.45^{a}
Orchardgrass	12.80^{a}	25.63^{a}	57.70^{a}	111.18^{a}
Harvest Three				
Prairiegrass	19.20^{a}	25.33^{a}	54.85^{b}	117.72^{a}
Grazing bromegrass	17.40^{a}	23.15^{ab}	61.55^{a}	107.13^{a}
Smooth bromegrass	18.53^{a}	23.85^{ab}	59.70^{a}	110.10^{a}
Tall fescue	18.48^{a}	23.93^{ab}	57.85^{ab}	113.08^{a}
Orchardgrass	18.08^{a}	22.68^{b}	58.30^{ab}	114.03^{a}
Harvest Four				
Prairiegrass	21.58^{a}	21.98^{a}	35.85^{a}	189.85^{a}
Grazing bromegrass	20.78^{a}	22.70^{a}	42.88^{a}	154.95^{a}
Smooth bromegrass	21.28^{a}	22.05^{a}	42.30^{a}	162.73^{a}
Tall fescue	22.35^{a}	21.23^{a}	38.33^{a}	178.55^{a}
Orchardgrass	23.08^{a}	24.25^{a}	39.55^{a}	169.70^{a}

^{a,b}Values in the same column within the same harvest with different superscripts are different, P<0.05.

Table 2
Forage analyses of samples from greenhouse harvest

	CP (%)	ADF (%)	NDF (%)	RFV
Harvest One				
Prairiegrass	20.45^{ab}	31.95^{a}	59.63^{ab}	100.03^{a}
Grazing bromegrass	18.88^{b}	31.95^{a}	60.60^{a}	98.38^{a}
Smooth bromegrass	22.05^{a}	30.35^{a}	56.35^{ab}	108.75^{a}
Tall fescue	20.15^{ab}	29.98^{a}	55.48^{b}	110.05^{a}
Orchardgrass	21.60^{ab}	32.05^{a}	60.18^{ab}	98.90^{a}
Harvest Two				
Prairiegrass	17.73^{a}	30.38^{a}	57.43^{ab}	105.92^{bc}
Grazing bromegrass	18.40^{a}	31.28^{a}	60.98^{a}	98.73^{c}
Smooth bromegrass	18.73^{a}	29.35^{a}	56.08^{bc}	109.65^{ab}
Tall fescue	20.13^{a}	29.35^{a}	53.38^{c}	115.30^{a}
Orchardgrass	19.90^{a}	30.83^{a}	60.38^{a}	100.05^{c}
Harvest Three				
Prairiegrass	22.93^{d}	25.43^{ab}	51.08^{c}	125.92^{a}
Grazing bromegrass	24.38^{bc}	26.38^{ab}	54.83^{a}	116.08^{a}
Smooth bromegrass	26.33^{a}	24.78^{b}	52.35^{bc}	123.70^{a}
Tall fescue	24.05^{c}	27.30^{a}	54.58^{a}	115.33^{a}
Orchardgrass	25.13^{b}	26.48^{ab}	54.28^{ab}	117.08^{a}

^{a,b}Values in the same column with different superscripts are different, P<0.05.

REFERENCES

Ball, D. M., C. S. Hoveland and G. D. Lacefield. 1991. Southern Forages**.** Potash and Phosphate Institute and the Foundation for Agronomic Research, Atlanta, GA, USA. pp. 131-132.

Ballerstedt, P., W.C. Young III, D. Floyd, and T. Silberstein, 1990. Evaluation of the forage production and seed production potential of rescuegrass (*Bromus unioloides* H.B.K.) in western Oregon. Proc. Forage and Grassland Conf.

Hume, D. E. 1991a. Effect of cutting on production and tillering in Prairie grass (*Bromus wildenowii* Kunth) compared with two ryegrass (*Lolium*) species. 1. Vegetative plants. Annals of Botany. **67**: 533-541.

Hume, D. E. 1991b. Leaf and tiller production of prairie grass (*Bromus wildenowii* Kunth) and two ryegrass (*Lolium*) species. Annals of Botany. **67**: 111-121.

Lauriault, L. 1996. Personal communication. Univ. of Kentucky College of Agric., Lexington, KY, USA.

Pennsylvania State University. 1994. Prairie grass. Penn. State Univ. College of Agric. Sci.-Coop. Ext. Svc., Agronomy Facts No. 39.