

# 2005 Cool-Season Grass Horse Grazing Tolerance Report

G.L. Olson, S.R. Smith, L.M. Lawrence, G.D. Lacefield, T.D. Phillips, and B. Coleman

## Introduction

Cool-season grasses such as bluegrass, tall fescue, and orchardgrass are dominant pasture grasses for horses in Kentucky. While variety evaluations for yield have been carried out for many years, little work has been done to establish the effect of variety on persistence when subjected to close, continuous grazing by horses.

The purpose of this report is to summarize current research on the grazing tolerance of varieties of tall fescue, orchardgrass, and other species when subjected to continuous heavy grazing pressure by horses within the grazing season. The main focus will be on stand survival.

Go to the UK Forage Extension Web site at [www.uky.edu/AG/FORAGE](http://www.uky.edu/AG/FORAGE) to obtain electronic versions of all forage variety testing reports as well as other forage publications.

## Description of the Tests

Tests were established in Lexington in the fall of 2001, 2002, 2003, and 2004. The soils at this location are well-drained silt loams and are well suited to tall fescue, orchardgrass, and other cool-season grasses. Plots were 5 by 15 feet in a randomized complete block design, with each variety replicated six times. Plots were seeded at the recommended seeding rate per acre and were planted into a prepared seedbed using a disk drill. Grazing was continuous from April to October.

Plots were grazed down to below 4 inches quickly and were maintained at 2 to 4 inches (sometimes less) for the remainder of the grazing season. Supplemental hay was fed during periods of slowest growth. Visual ratings of percent stand were made in the fall several weeks after the horses were removed to check stand survival after the grazing season and in the spring prior to grazing to check on winter survival and spring growth. Since trials were seeded in rows, persistence ratings were based on density within a row and not total ground cover. Grass plots were fertilized with 60 pounds of actual N per acre in the spring and 30 to 40 pounds of actual N in early November after horses were removed from the pasture. Other fertilizers (lime, P, and K) were applied as needed.

## Results and Discussion

Weather data for Lexington for 2002, 2003, 2004, and 2005 are presented in Table 1.

Data on percent stand are presented in Tables 2, 3, 4, and 5. Statistical analyses were performed on all entries (including experimentals) to determine if numerical differences are truly due to variety. Varieties not significantly different from the highest numerical value in a column are marked with one asterisk (\*). To determine if two varieties are truly different, compare the difference between the two varieties to the Least Significant

**Table 1. Temperature and rainfall at Lexington, Kentucky in 2002, 2003, 2004 and 2005.**

	2002				2003				2004				2005			
	Temperature		Rainfall		Temperature		Rainfall		Temperature		Rainfall		Temperature		Rainfall	
	°F	DEP	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	38	+7	2.12	-0.74	26	-5	0.96	-1.90	30	-1	3.14	+0.28	37	+6	4.35	+1.49
FEB	38	+3	1.28	-1.93	32	-3	3.59	+0.38	36	+1	1.32	-1.89	39	+4	1.68	-1.53
MAR	45	+1	7.93	+3.53	47	+3	2.09	-2.31	47	+3	3.43	-0.97	41	-3	2.79	-1.61
APR	58	+3	4.19	0.31	57	+2	3.14	-0.74	55	0	3.06	-0.82	56	+1	3.30	-0.58
MAY	61	-3	4.36	-0.11	63	-1	6.68	+2.21	68	+4	9.79	+5.32	61	-3	1.78	-2.69
JUN	74	+2	2.45	-1.21	69	-3	4.85	+1.19	72	0	3.13	-0.53	75	+3	1.33	-2.33
JUL	78	+2	1.10	-3.90	74	-2	2.68	-2.32	73	-3	7.65	+2.65	77	+1	3.30	-1.70
AUG	77	+2	0.95	-2.98	75	0	5.26	+1.33	71	-4	2.91	-1.02	78	+3	3.34	-0.59
SEP	72	+4	4.90	1.70	65	-3	4.22	+1.02	68	0	2.61	-0.59	72	+4	0.59	-2.21
OCT	55	-2	5.61	3.04	56	-1	1.61	-0.96	58	+1	5.65	+3.08	58	+1	0.92	-1.65
NOV	43	-2	3.76	0.37	50	+5	4.63	+1.24	49	+4	6.29	+2.90	47	+2	1.54	-1.85
DEC	36	0	4.11	-1.13	36	0	3.26	-0.72	36	0	3.20	-0.78				
Total			42.73	-1.79			42.97	-1.58			52.18	+7.63			25.32	-15.25

DEP is departure from the long-term average.

Difference (LSD) at the bottom of the column. If the difference is equal to or greater than the LSD, the varieties are truly different when grown under the conditions at a given location. The Coefficient of Variation (CV), which is a measure of the variability of the data, is included for each column of means. Low variability is desirable, and increased variability within a study results in higher CVs and larger LSDs.

In general, commercial varieties of tall fescue and orchardgrass tolerated overgrazing well (Tables 2, 3, and 4), but the varieties of timothy and prairie brome (prairiegrass) [*Bromus willdenoii*] in these trials did not. The sensitivity of timothy and prairie brome to heavy grazing was not surprising, as these are both erect species and sensitive to heavy defoliation. Perennial ryegrasses and Kentucky bluegrasses vary in tolerance to grazing.

Differences in tolerance among varieties could be due to true grazing tolerance but also to preference, especially where highly palatable species such as bluegrass and ryegrass are alongside tall fescue. These data should be taken as an indication of toler-

ance to periods of overgrazing. For best pasture stands, forage grasses should not be abused as in this study.

The lack of a defined “grazing-tolerant variety” for these species makes absolute interpretation difficult. For example, endophyte-infected Kentucky 31 (KY31+) is known to be grazing tolerant. However, there are no proven grazing-tolerant varieties for the other species. Still, certain varieties were clearly more tolerant than others.

Table 6 summarizes information about distributors and persistence across years for all varieties in these tests. Varieties are listed in alphabetical order, with experimental varieties listed at the bottom. An open block indicates that the variety was not in that particular test (labeled at the top of the column), while an “x” in the block indicates the variety was in the test but was significantly different from the most persistent variety. A single asterisk (\*) means that the variety was not significantly different from the most persistent variety in that study. It is best to choose a variety that has performed well over several years.

**Table 2. Seedling vigor rating and percent stand of forage grasses sown September 12, 2001 at Lexington, Kentucky in a horse grazing tolerance study.**

Variety	Species	Seedling Vigor <sup>1</sup> Nov 2, 2001	Percent Stand							
			2003		2003		2004		2005	
			Apr 4	Oct 15	Mar 28	Oct 27	Mar 31	Nov 8	Mar 30	Sep 1
<b>Commercial Varieties—Available for Farm Use</b>										
KY31 E+ <sup>2</sup>	tall fescue	3.7	90	60	81	54	48	53	72	63*
Crown Royale	orchardgrass	3.7	90	66	79	65	38	60	55	53*
Johnstone	tall fescue	3.8	89	48	73	41	26	27	58	53*
Slezanka	KY bluegrass	3.0	88	74	87	72	35	13	53	53*
Prairie	orchardgrass	3.5	90	58	73	51	39	52	53	50*
Albert	orchardgrass	3.0	90	62	78	62	52	50	53	48*
Kenblue	KY bluegrass	2.0	89	77	88	73	30	10	52	48*
Granddaddy	tetraploid perennial ryegrass	4.7	90	78	89	72	70	53	53	43
Clair	timothy	1.5	89	21	64	16	19	15	35	33
Fure	meadow fescue	3.2	90	21	56	18	10	33	47	28
Platini	KY bluegrass	2.2	90	70	86	60	6	18	27	22
Colt	timothy	2.7	90	15	59	13	18	13	25	20
Aries	diploid perennial ryegrass	5.0	90	79	90	77	67	63	16	8
Maverick Gold	diploid perennial ryegrass	5.0	28	21	57	23	25	13	6	6
Quartet	tetraploid perennial ryegrass	5.0	78	62	83	57	36	48	8	5
<b>Experimental Varieties</b>										
KY31 E- <sup>2</sup>	tall fescue	3.7	90	58	82	56	49	47	68	60*
KYFA9301	tall fescue	3.5	90	71	85	60	60	68	77	55*
OG9705g	orchardgrass	2.0	90	57	70	57	37	43	58	50*
KYFA9304	tall fescue	3.8	90	61	81	59	51	57	63	48*
PP10	tall fescue variety mixture	3.2	88	48	75	29	19	38	55	42
PP11	per. ryegrass variety mixture	5.0	48	23	68	26	25	17	9	11
Mean		3.5	84	54	76	49	36	38	45	38
CV,%		12.5	5	26	12	31	47	36	34	45
LSD,0.05		0.5	5	16	11	18	19	16	18	20
*Not significantly different from the highest value in the column, based on the 0.05 LSD.										
<sup>1</sup> Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.										
<sup>2</sup> KY 31E- is the variety KY 31 where the toxic endophyte has been removed. KY31 E+ has the toxic endophyte. All other fescue varieties in this test do not contain an endophyte.										

## Summary

These studies indicate that there are varieties of cool-season grasses that can tolerate overgrazing by horses for three to four seasons and still maintain reasonable stands. This information should be used along with yield and other information (for example, relative maturity in spring) in selecting the best grass variety for each individual use. It is not generally recommended that tall fescue, orchardgrass, or other cool-season grasses be continuously overgrazed as was done in this trial. Although several varieties expressed tolerance to the level of grazing pressure used in these trials, overgrazing greatly reduces forage production. This information should be an indication of those varieties that will better withstand overgrazing when it occurs.

Good management for maximum life from any grass would be to allow complete establishment before grazing and to avoid overgrazing during times of extreme stress, such as drought.

## Authors

- G.L. Olson, Research Specialist, Forages, UK Department of Plant and Soil Sciences
- S.R. Smith, Extension Associate Professor, Forages, UK Department of Plant and Soil Sciences
- L.M. Lawrence, Professor, Horse Nutrition, UK Department of Animal and Food Sciences
- G.D. Lacefield, Extension Professor, Forages, UK Department of Plant and Soil Sciences
- T.D. Phillips, Associate Professor, Tall Fescue Breeding, UK Department of Plant and Soil Sciences
- B. Coleman, Extension Associate Professor, Horse Specialist, UK Department of Animal and Food Sciences

Variety	Species	Seedling Vigor <sup>1</sup> Oct 31, 2002	Percent Stand					
			2003		2004		2005	
			Mar 23	Oct 30	Mar 26	Nov 8	Mar 30	Oct 31
<b>Commercial Varieties—Available for Farm Use</b>								
Select	tall fescue	4.2	90	78	94	85	83	87*
Benchmark Plus	orchardgrass	4.0	89	74	88	73	75	83*
Duo	festulolium	5.0	90	79	91	80	85	83*
Jesup MaxQ <sup>2</sup>	tall fescue	3.7	90	71	93	80	78	82*
Certified Potomac	orchardgrass	3.8	89	67	87	73	72	78*
Crown Royale Plus	orchardgrass	3.8	89	73	88	73	73	77*
Haymate	orchardgrass	3.3	85	68	79	65	70	73
Uncertified Potomac	orchardgrass	4.0	88	65	85	67	70	73
Certified Kenblue	KY bluegrass	1.5	88	36	53	22	63	70
Benchmark	orchardgrass	3.5	86	60	78	60	65	68
Tekapo	orchardgrass	2.8	82	55	78	63	54	68
<b>Experimental Varieties</b>								
KYFA 9304	tall fescue	4.7	90	79	95	88	87	90*
KY 31 E- <sup>2</sup>	tall fescue	4.3	90	79	94	78	85	88*
KYPP 9901	KY bluegrass	1.2	84	8	17	13	58	77*
HB 120	KY bluegrass	1.3	89	26	19	16	47	68
S-22	KY bluegrass	1.5	88	45	46	30	53	65
VB 5649	KY bluegrass	1.7	88	34	13	13	42	63
HB 121	KY bluegrass	1.5	90	19	16	9	32	43
Mean		3.1	88	56	67	55	66	74
CV,%		15.9	3	17	10	18	17	19
LSD,0.05		0.6	3	11	8	11	13	16
*Not significantly different from the highest value in the column, based on the 0.05 LSD.								
<sup>1</sup> Vigor score based on a rating of 1 to 5 with 5 being the most vigorous seedling growth.								
<sup>2</sup> KY 31 E- is the variety KY 31 where the toxic endophyte has been removed. Jesup MaxQ- is a variety that contains a non-toxic endophyte that provides stand persistence with no animal toxicity. All other fescue varieties in this test do not contain an endophyte.								

Variety	Species	Seedling Vigor <sup>1</sup> Oct 31, 2003	Percent Stand			
			2004		2005	
			Mar 26	Nov 8	Mar 30	Oct 31
<b>Commercial Varieties—Available for Farm Use</b>						
Common bluegrass	KY bluegrass	3.0	99	75	87	97*
Select	tall fescue	3.7	99	88	88	97*
Haymate	orchardgrass	4.2	98	83	82	95*
Ginger	KY bluegrass	2.5	81	10	65	90*
Barfleo	timothy	3.0	96	72	87	42
Peak	smooth brome	3.0	91	37	30	14
<b>Experimental Varieties</b>						
KY 31 E- <sup>2</sup>	tall fescue	5.0	99	88	90	100*
KYFA 9304	tall fescue	4.8	98	90	88	100*
KYFA 0006	tall fescue	5.0	99	90	85	99*
KYFA 9611	tall fescue	3.5	96	88	88	99*
KYTF 2	tall fescue	4.7	99	90	90	98*
KYFA 9602	tall fescue	4.0	96	83	83	95*
KYFA 9819	festulolium	5.0	99	87	80	84
TM 9901	timothy	4.0	96	78	80	39
Mean		4.0	96	76	81	83
CV,%		8.7	10	11	11	12
LSD,0.05		0.4	11	10	10	11
*Not significantly different from the highest value in the column, based on the 0.05 LSD.						
<sup>1</sup> Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.						
<sup>2</sup> KY 31 E- is the variety KY 31 where the toxic endophyte has been removed. All other fescue varieties in this test do not contain an endophyte.						

Variety	Species	Seedling Vigor <sup>1</sup> Nov 8, 2004	Percent Stand	
			Mar 30, 2005	Oct 31, 2005
<b>Commercial Varieties—Available for Farm Use</b>				
Seine	tall fescue	4.2	93	100*
Select	tall fescue	4.2	100	99*
Stockman	tall fescue	3.8	98	98*
Haymate	orchardgrass	3.5	98	98*
GrandDaddy	tetraploid perennial ryegrass	5.0	82	95*
Ginger	KY bluegrass	2.2	88	89
Aries	diploid perennial ryegrass	4.7	13	65
Express	timothy	1.8	50	53
<b>Experimental Varieties</b>				
KYFA9304	tall fescue	4.2	100	100*
KYFA9811	tall fescue	4.5	97	100*
94-100	orchardgrass	3.2	98	99*
KY31 E- <sup>2</sup>	tall fescue	4.7	98	99*
OG0204G	orchardgrass	3.7	98	99*
OG0205G	orchardgrass	3.5	95	99*
KYDG9303	orchardgrass	4.3	95	98*
KYPP9901	KY bluegrass	2.0	93	98*
Mean		3.7	87	93
CV,%		15.4	8	8
LSD,0.05		0.7	8	8
*Not significantly different from the highest value in the column, based on the 0.05 LSD.				
<sup>1</sup> Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.				
<sup>2</sup> KY 31 E- is the variety KY 31 where the toxic endophyte has been removed. All other fescue varieties in this test do not contain an endophyte.				

**Table 6. Summary of persistence of forage grasses under heavy grazing pressure by horses across years at Lexington, Kentucky.**

Variety	Species	Proprietor/ KY Distributor	2001 <sup>1</sup>					2002					2003			2004				
			Oct 02	Oct 03	Mar 04	Nov 04	Mar 05	Sep 05	Oct 03	Mar 04	Nov 04	Mar 05	Oct 05	Mar 04	Nov 04	Mar 05	Oct 05	Mar 05	Oct 05	
<b>Commercial Varieties—Available for Farm Use</b>																				
Albert	orchardgrass	University of Wisconsin	x	*	*	x	x	*												
Aries	diploid perennial ryegrass	Ampac Seed Company	*	*	*	*	x	x										x	x	
Barfleo	timothy	Barenbrug USA												*	x	*	x			
Benchmark	orchardgrass	FFR/Southern States							x	x	x	x	x							
Benchmark Plus	orchardgrass	FFR/Southern States							*	*	x	*	*							
Clair	timothy	Public	x	x	x	x	x	x												
Crown Royale	orchardgrass	Grassland Oregon	*	*	x	*	*	*												
Crown Royale Plus	orchardgrass	Grassland Oregon							*	*	x	*	*							
Colt	timothy	FFR/Southern States	x	x	x	x	x	x												
Duo	festulolium	Ampac Seed Company							*	*	*	*	*							
Express	timothy	Seed Research of Oregon																x	x	
Fure	meadow fescue	DLF-Jenks	x	x	x	x	x	x												
Ginger	KY bluegrass	Dye Seed Ranch, Inc ProSeeds Marketing													x	x	x	*	x	x
Grand Daddy	tetraploid perennial ryegrass	Smith Seed Services	*	*	*	*	x	x											x	*
Haymate	orchardgrass	FFR/Southern States							*	x	x	*	x	*	*	*	*	*	*	*
Jesup Max Q	tall fescue	Pennington Seed							*	*	*	*	*							
Johnstone	tall fescue	ProSeeds Marketing	x	x	x	x	*	*												
Kenblue	KY bluegrass	Public	*	*	x	x	x	*	x	x	x	x	x							
Common	KY bluegrass	Public												*	x	*	*			
KY 31+	tall fescue	Public	*	*	x	*	*	*												
Maverick Gold	diploid perennial ryegrass	Ampac Seed Company	x	x	x	x	x	x												
Peak	smooth brome	Allied Seed, L.L.C.												*	x	x	x			
Platini	KY bluegrass	Turner Seed Inc. of KY	*	*	x	x	x	x												
Potomac certified	orchardgrass	Public							x	*	x	*	*							
Potomac uncertified	orchardgrass	Public							x	x	x	*	x							
Prairie	orchardgrass	Turner Seed Inc. of KY	x	x	x	x	x	*												
Quartet	tetraploid perennial ryegrass	Ampac Seed Company	x	x	x	x	x	x												
Seine	tall fescue	Seed Research of Oregon																	*	*
Select	tall fescue	FFR/Southern States							*	*	*	*	*	*	*	*	*	*	*	*
Slezanka	KY bluegrass	DLF-Jenks	*	*	x	x	x	*												
Stockman	tall fescue	Seed Research of Oregon																	*	*
Tekapo	orchardgrass	Ampac Seed Company							x	x	x	x	x							
Tuukka	timothy	Ampac Seed Company																		
<b>Experimental Varieties</b>																				
94-100	orchardgrass	Agri. Food of Canada																	*	*
HB 120	KY bluegrass	DLF-Jenks							x	x	x	x	x							
HB 121	KY bluegrass	DLF-Jenks							x	x	x	x	x							
KY 31-	tall fescue	KY Agric. Exp. Station	x	*	x	x	*	*	*	*	*	*	*	*	*	*	*	*	*	*
KYDG 9303	orchardgrass	KY Agric. Exp. Station																	*	*
KYFA 0006	tall fescue	KY Agric. Exp. Station												*	*	*	*			
KYFA 9301	tall fescue	KY Agric. Exp. Station	*	*	*	*	*	*												
KYFA 9304	tall fescue	KY Agric. Exp. Station	x	x	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
KYFA 9602	tall fescue	KY Agric. Exp. Station												*	*	*	*			
KYFA 9611	tall fescue	KY Agric. Exp. Station												*	*	*	*			
KYFA 9811	tall fescue	KY Agric. Exp. Station																	*	*
KYFA 9819	festulolium	KY Agric. Exp. Station												*	*	*	*			
KYTF 2	tall fescue	KY Agric. Exp. Station												*	*	*	*			
KYPP 9901	KY bluegrass	KY Agric. Exp. Station							x	x	x	x	*						*	*
OG0204G	orchardgrass	FFR/Southern States																	*	*
OG0205G	orchardgrass	FFR/Southern States																	*	*
OG 9705G	orchardgrass	FFR/Southern States	x	x	x	x	*	*												
PP 10	tall fescue mixture	Ampac Seed Company	x	x	x	x	*	x												
PP 11	per. ryegrass mixture	Ampac Seed Company	x	x	x	x	x	x												
TM 9901	timothy	FFR/Southern States												*	x	*	x			
S-22	KY bluegrass	Barenbrug USA							x	x	x	x	x							
VB 5649	KY bluegrass	Barenbrug USA							x	x	x	x	x							

\*Not significantly different from the most persistent variety in the test. An open block indicates the variety was not in the test, while an "x" in the block indicates the variety was in the test but the stand survival was significantly less than the most persistent variety.

<sup>1</sup> Establishment year

<sup>2</sup> Date of rating of percent stand.



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