

2005 Cool-Season Grass Grazing Tolerance Report

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Introduction

Cool-season grasses such as tall fescue and orchardgrass are the primary pasture grasses in Kentucky. Other species such as perennial ryegrass, festulolium, and prairie brome can be used in pasture systems. Little is known about the effect of variety on the grazing tolerance of these cool-season grass species.

The purpose of this report is to summarize current research on the grazing tolerance of varieties of tall fescue, orchardgrass, perennial ryegrass, and other species when they are subjected to continuous, heavy grazing pressure by cattle within the grazing season. The main focus will be on plant stand survival. Go to the UK Forage Extension Web site at 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

Grass variety tests for grazing tolerance were established in Lexington in the fall of 2001, 2002, 2003, and 2004 and in Princeton in the fall of 2002 and 2003. The soils at Lexington (Maury) and Princeton (Zanesville) are well-drained silt loams and are well suited to tall fescue, orchardgrass, and ryegrass production. Plots were 5 by 15 feet in a randomized complete block design, with each variety replicated six times. In each test, 20 pounds of seed per acre (8 pounds/acre for timothy) were planted into a prepared seedbed using a disk drill. Grazing began in April and

was continuous until late September. Plots were grazed down to below 4 inches quickly by feeder steers and kept at that height or below for the remainder of the grazing season. Supplemental hay or soybean hulls were fed during periods of slowest growth. Animals were removed from plots after all fall growth had been removed and when little regrowth was expected. Visual ratings of percent stand were made in the fall and spring after each grazing season. Grass plots were fertilized with 60 pounds of actual N per acre in the spring and 30 to 40 pounds of actual N in the fall. Other fertilizers (lime, P, and K) were applied as needed.

Results and Discussion

Weather data for Lexington and Princeton are presented in Tables 1 and 2. Data on percent stand are presented in Tables 3 through 15. Statistical analyses were performed on all entries (including experimentals) to determine if the apparent 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 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 desir-

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.

able, and increased variability within a study results in higher CVs and larger LSDs.

Kentucky 31 tall fescue with the endophyte (KY31+) is considered to be the most grazing-tolerant variety and was the grazing-tolerant check entry in all tall fescue trials. The central questions in grazing tolerance among tall fescues are: 1) Can endophyte-free varieties persist as well as KY31+, and 2) Will the new novel, or “friendly,” endophyte materials persist as well as other tolerant varieties? After three and four seasons, several fescue varieties were comparable to KY31+ in regards to grazing tolerance (Tables 3 and 4). The extreme drought of 2002 and 2005 may have contributed to greater stand loss in lines without grazing tolerance.

Table 16 (fescue, perennial ryegrass, festulolium and prairie brome), Table 17 (orchardgrass, Kentucky bluegrass, and prairie brome), and Table 18 (perennial ryegrass, festulolium, and prairie brome) summarize information about distributors and persistence across locations and 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 plant survival was significantly less than 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.

Summary

These studies indicate that there are varieties of cool-season grasses that can tolerate overgrazing for multiple seasons and still maintain reasonable stands. Some varieties of endophyte-free as well as novel, or “friendly,” endophyte tall fescue have been able to maintain equivalent stands to endophyte-infected KY31. There is no “KY31+” equivalent in orchardgrass; that is, no variety has historically been proven to be tolerant of overgrazing. However, some varieties have exhibited good tolerance to grazing abuse even after three and four seasons.

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 recommended that tall fescue

Table 2. Temperature and rainfall at Princeton, Kentucky in 2003, 2004 and 2005.

	2003				2004				2005			
	Temperature		Rainfall		Temperature		Rainfall		Temperature		Rainfall	
	°F	DEP	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	31	-3	2.19	-1.61	36	+2	4.12	+0.32	41	+7	5.30	+1.50
FEB	35	-3	7.45	+3.02	39	+1	2.44	-1.99	43	+5	2.30	-2.13
MAR	50	+3	2.46	-2.48	53	+6	4.28	-0.66	47	0	4.11	-0.83
APR	60	+1	6.99	+2.19	59	0	5.32	+0.52	60	+1	4.61	-0.19
MAY	67	0	4.81	-0.15	72	+5	7.34	+2.38	65	-2	1.54	-3.42
JUN	71	-4	5.05	+1.20	74	-1	3.40	-0.45	76	+1	3.09	-0.76
JUL	79	+1	4.75	+0.46	75	-3	4.87	+0.58	79	+1	2.39	-1.90
AUG	79	+2	2.05	-1.96	73	-4	3.02	-0.99	80	+3	11.54	+7.53
SEP	69	-2	6.17	+2.84	71	0	0.20	-3.13	74	+2	2.17	-1.16
OCT	60	+1	3.73	+0.68	64	+5	4.03	+0.98	60	+1	0.19	-2.86
NOV	53	+6	5.85	+1.22	53	+6	6.94	+2.31	50	+3	2.48	-2.15
DEC	40	+1	2.39	-2.65	37	-1	4.29	-0.75				
Total			53.89	+2.76			50.25	-0.88			39.72	-6.37

DEP is departure from the long-term average.

or orchardgrass be continuously overgrazed, as was done in these trials. While several varieties expressed tolerance to the level of grazing pressure used in these trials, overgrazing greatly reduces yield and therefore profitability of these varieties. This information should be an indication of those varieties that will better withstand the occasional overgrazing that sometimes becomes necessary in livestock operations.

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

Table 3. Percent stand and seedling vigor of tall fescue and festulolium (FL) varieties sown September 12, 2001 in a cattle grazing tolerance study at Lexington, Kentucky.

Variety	Seedling Vigor ¹ Nov 2, 2001	Percent Stand							
		2002		2003		2004		2005	
		Apr 4	Oct 15	Mar 24	Oct 27	Mar 31	Nov 8	Mar 30	Sep 1
Commercial Varieties—Available for Farm Use									
Select	3.2	90	83	90	69	63	73	90	88*
Felina(FL)	3.7	90	86	89	71	73	73	88	87*
Festival	4.0	90	84	90	68	73	77	90	87*
KY 31+ ²	4.7	90	88	90	74	81	75	88	87*
Spring Green(FL)	5.0	90	80	90	81	88	75	90	87*
Cattle Club	4.0	90	82	90	70	83	73	87	80*
Johnstone	4.5	90	79	89	68	61	68	87	80*
Carmine	3.2	90	79	88	60	68	78	82	78
Maximize	4.3	90	84	90	70	82	83	77	77
Stargrazer	2.8	90	78	89	61	53	68	85	77
Resolute	4.0	14	16	47	17	33	45	22	20
Experimental Varieties									
KYFA 9301	3.8	90	84	90	74	79	70	90	88*
KY 31- ²	4.5	90	85	90	71	81	73	90	85*
HM 4	4.0	90	78	88	69	73	78	88	83*
KYFA 9304	4.0	90	88	90	73	73	77	88	82*
K5666V	3.3	90	65	88	63	60	62	82	73
PP10 (variety mixture)	3.5	90	59	85	60	63	58	75	65
Mean	3.9	86	76	87	66	70	71	82	78
CV,%	10.9	1	10	4	9	16	12	7	11
LSD,0.05	0.5	1	8	4	7	12	9	6	10

*Not significantly different from the highest value in the column, based on the 0.05 LSD.

¹ Vigor rating based on a score of 1 to 5 with 5 being the most vigorous seedling growth.

² “+” indicates variety is endophyte infected; “-” indicates variety is endophyte free.

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Table 4. Percent stand and seedling vigor of tall fescue, Kentucky bluegrass (BG), and perennial ryegrass (PRG) varieties sown September 19, 2002 in a cattle grazing tolerance study at Lexington, Kentucky.

Variety	Seedling Vigor ¹ Oct 31, 2002	Percent Stand					
		2003		2004		2005	
		Mar 24	Oct 30	Mar 26	Nov 8	Mar 30	Oct 31
Commercial Varieties—Available for Farm Use							
Festival	4.0	88	78	93	87	88	99*
KY31+ ²	4.8	90	81	95	78	88	99*
Select	4.0	90	83	95	85	90	99*
Orygun	4.5	90	80	95	85	90	98*
Jesup MaxQ	3.5	90	81	95	82	88	98*
Kenblue(BG)	1.7	89	69	86	53	73	92
Common(BG)	1.8	90	74	93	50	68	92
Experimental Varieties							
KY31- ²	4.8	90	83	95	85	85	100*
HM 11	4.3	89	84	95	82	90	98*
KYFA 9304	5.0	89	84	95	87	90	98*
KYFA9301	4.5	90	83	95	83	87	98*
EC 411(PRG)	5.0	90	84	95	90	0	16
Mean	3.9	90	80	94	80	79	91
CV,%	10.1	2	5	2	9	6	4
LSD,0.05	0.5	2	5	3	9	6	4

*Not significantly different from the highest value in the column, based on the 0.05 LSD.
¹ Vigor rating based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.
² "+" indicates variety is endophyte infected; "-" indicates variety is endophyte free.

Table 5. Percent stand and seedling vigor rating of tall fescue and festulolium (FL) varieties sown September 19, 2003 in a cattle grazing tolerance study at Lexington, Kentucky.

Variety	Grazing Preference ¹ May 31, 2005	Seedling Vigor ² Oct 31, 2003	Percent Stand			
			2004		2005	
			Mar 26	Nov 8	Mar 30	Oct 31
Commercial Varieties—Available for Farm Use						
KY31+ ³	37	4.8	98	90	90	100*
Jesup MaxQ	25	4.2	99	90	87	99*
Select	20	3.8	97	90	90	99*
Jesup EF	19	4.0	98	87	87	98*
Barianne	73	4.2	95	90	88	97*
Experimental Varieties						
AGRFA 2861	22	4.4	100	90	88	100*
KY31- ³	25	5.0	99	90	90	100*
KYFA9611	73	4.0	94	90	90	100*
KYTF 2	42	5.0	98	88	90	100*
KYFA0006	58	4.6	99	90	90	99*
KYFA9304	37	4.6	97	88	90	99*
AGRFA 117	26	4.6	98	90	80	98*
AGRFA 120	19	4.4	98	90	83	98*
KYFA9602	53	4.2	98	88	88	98*
AGRFA 2860	14	4.8	99	90	90	98*
AGRFA 121	32	4.8	98	90	75	97*
KYFA9819(FL)	97	4.8	97	90	83	85
AGRFA 111	73	4.6	97	88	77	75
Mean	41	4.5	98	90	87	97
CV,%	31	15.1	3	3	6	8
LSD,0.05	15	0.9	3	3	6	9

*Not significantly different from the highest value in the column, based on the 0.05 LSD.
¹ Percent of the forage in the plot that was grazed between April 20 and May 31, 2005.
² Vigor rating based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.
³ "+" indicates variety is endophyte infected; "-" indicates variety is endophyte free.

Table 6. Percent stand and seedling vigor rating of tall fescue varieties sown September 14, 2004 in a cattle grazing tolerance study at Lexington, Kentucky.

Variety	Seedling Vigor ¹ Nov 8, 2004	Percent Stand	
		Apr 8, 2005	Oct 31, 2005
		Commercial Varieties—Available for Farm Use	
Stockman	3.5	97	99*
KY31+ ²	2.3	87	97
Experimental Varieties			
KYFA9811	3.8	95	100*
KY31- ²	4.0	95	99*
KYFA9304	3.7	88	99*
PST-5NF	3.2	90	99*
TF0203G	4.0	97	98*
Mean	3.5	93	99
CV,%	21.0	10	2
LSD,0.05	0.9	10	2

*Not significantly different from the highest value in the column, based on the 0.05 LSD.
¹ Vigor rating based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.
² "+" indicates variety is endophyte infected; "-" indicates variety in endophyte free.

Table 7. Percent stand of tall fescue, perennial ryegrass (PRG) and Kentucky bluegrass (BG) varieties sown September 25, 2002 in a cattle grazing tolerance study at Princeton, Kentucky.

Variety	Percent Stand					
	2003		2004		2005	
	Apr 3	Dec 2	Apr 1	Dec 21	Apr 15	Nov 3
Commercial Varieties—Available for Farm Use						
Select	90	78	77	78	68	83*
Jesup MaxQ	90	79	83	77	73	82*
KY31+ ¹	90	78	78	75	72	81*
Festival	90	76	75	80	72	78*
Calibra (PRG)	90	85	79	67	72	37
Certified Kenblue (BG)	90	23	25	25	33	33
Experimental Varieties						
FA 2845	90	80	84	80	78	87*
KYFA9301	90	79	78	80	77	83*
KYFA9304	90	79	78	80	78	83*
AGRFA 104	90	78	80	77	77	82*
AGRFA 106	90	77	78	75	78	82*
AGRFA 114	90	78	78	85	73	82*
KY31- ¹	90	81	79	78	72	81*
FA 2458	90	75	77	77	73	78*
FA 2651	90	77	76	75	72	78*
FA 2720	90	78	80	80	73	77*
FABE 9301A	90	78	78	75	72	77*
HM11	90	75	70	80	77	72
PBR	86	78	66	70	60	67
AGRFA 111	90	70	73	67	68	62
EC411 (PRG)	90	83	84	77	70	53
KYPP 9901 (BG)	86	12	26	28	33	40
HB96 (BG)	6	13	5	10	18	22
HB95 (BG)	5	10	13	15	18	17
Mean	83	68	67	67	65	68
CV,%	2	11	12	12	15	15
LSD,0.05	2	9	9	9	11	11

*Not significantly different from the highest value in the column, based on the 0.05 LSD.
¹ "+" indicates variety is endophyte infected; "-" indicates variety is endophyte free.

Table 8. Percent stand of tall fescue varieties sown August 26, 2003 in a cattle grazing tolerance study at Princeton, Kentucky.

Variety	Percent Stand			
	Apr 1, 2004	Dec 21, 2004	Apr 15, 2005	Nov 3, 2005
Commercial Varieties—Available for Farm Use				
Jesup EF	95	88	91	95*
Jesup MaxQ	93	90	89	94*
Experimental Varieties				
AGRFA 117	88	88	90	95*
AGRFA 121	94	90	93	95*
AGRFA 2845	92	90	91	95*
AGRFA 2848	96	90	90	95*
AGRFA 2849	95	90	92	95*
AGRFA 2850	96	90	90	95*
AGRFA 2861	94	90	91	95*
AGRFA 120	93	90	90	94*
AGRFA 2846	93	90	89	94*
AGRFA 2847	93	90	89	94*
AGRFA 2860	97	88	90	94*
Mean	94	90	90	95
CV,%	4	2	2	1
LSD,0.05	4	2	2	1

*Not significantly different from the highest value in the column, based on the 0.05 LSD.

Table 9. Percent stand and seedling vigor of orchardgrass varieties sown September 12, 2001 in a cattle grazing tolerance study at Lexington, Kentucky.

Variety	Seedling Vigor ¹ Nov 2, 2001	Percent Stand							
		2002		2003		2004		2005	
		Apr 4	Oct 15	Mar 24	Oct 27	Mar 31	Nov 8	Mar 30	Sep 1
Commercial Varieties—Available for Farm Use									
Benchmark	4.5	90	86	90	69	80	78	87	83*
Prairie	4.7	90	85	90	73	78	80	85	82*
Albert	3.8	90	86	90	67	73	73	85	78*
Hallmark	5.0	90	86	90	70	78	82	80	78*
Haymate	4.5	90	85	90	72	73	73	83	78*
Mammoth	4.2	90	83	90	68	73	75	82	78*
Crown Royale	4.8	90	86	89	68	73	70	80	68
Takena	4.0	90	83	89	68	66	67	83	67
Athos	4.7	90	83	90	72	72	82	77	63
Megabite	3.8	90	83	89	58	51	55	65	52
Amba	4.0	90	76	87	53	45	50	60	48
Tekapo	4.5	90	88	90	73	53	73	42	37
Experimental Varieties									
OG 9705G	2.7	90	86	90	70	64	85	88	83*
Mean	4.2	90	84	90	68	68	73	77	69
CV,%	12.6	0	6	1	9	13	13	13	16
LSD,0.05	0.6	0	6	1	7	10	11	11	13

*Not significantly different from the highest value in the column, based on the 0.05 LSD.

¹ Vigor rating based on a score of 1 to 5 with 5 being the most vigorous seedling growth.

Variety	Seedling Vigor ¹ Oct 31, 2002	Percent Stand					
		2003		2004		2005	
		Mar 25	Oct 30	Mar 26	Nov 8	Mar 30	Oct 31
Commercial Varieties—Available for Farm Use							
Common (BG)	1.0	88	57	93	50	77	89*
Benchmark Plus	4.7	90	78	95	67	82	78*
Benchmark	4.0	87	68	91	60	77	75*
Prairie	4.8	85	65	94	52	78	70
Uncertified Potomac	4.8	89	74	95	53	78	68
Crown Royale Plus	5.0	89	75	95	58	80	67
Certified Potomac	4.8	90	76	94	65	83	61
Haymate	3.8	83	75	93	53	70	52
Niva	3.5	82	67	93	58	72	42
Tekapo	2.8	75	67	88	52	45	37
Abertop	2.3	63	36	79	23	27	12
Experimental Varieties							
GA-OG1	5.0	88	71	93	60	82	73*
DG9930B	4.0	84	79	93	80	27	26
DG9911	4.2	85	80	95	73	40	25
Mean	3.9	84	69	92	58	66	55
CV,%	9.4	4	9	4	19	17	25
LSD,0.05	0.4	4	8	2	13	13	16

*Not significantly different from the highest value in the column, based on the 0.05 LSD.
¹ Vigor rating based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

Variety	Seedling Vigor ¹ Oct 31, 2003	Percent Stand			
		2004		2005	
		Mar 26	Nov 8	Mar 30	Oct 31
Commercial Varieties-Available for Farm Use					
Haymate	4.2	96	90	88	99*
Tekapo	4.5	97	90	78	98*
Intensiv	4.3	95	90	88	95
Hallmark	1.3	63	77	77	91
Experimental Varieties					
CIS-OG29	4.7	98	90	85	100*
CIS-OG28	5.0	98	88	88	99*
KYDG 9303	4.8	98	90	88	98*
KYDG 9701	2.8	90	87	83	98*
KYDG 9801	5.0	83	88	90	97
Mean	4.1	91	88	85	97
CV,%	10.6	14	5	5	2
LSD,0.05	0.5	15	5	5	3

*Not significantly different from the highest value in the column, based on the 0.05 LSD.
¹ Vigor rating based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

Variety	Seedling Vigor ¹ Nov 8, 2004	Percent Stand	
		Mar 30, 2005	Oct 31, 2005
		Commercial Varieties—Available for Farm Use	
Certified Potomac	2.2	65	88*
Command	2.0	58	82
Grasslands Mutua (PB)	2.7	28	16
Experimental Varieties			
KYDG 9303	3.5	90	96*
94-100	2.8	82	94*
AGRBW 101(PB)	3.0	62	32
AGRBP 101(PB)	4.2	58	27
AGRBW 102(PB)	5.0	28	12
AGRBW 103(PB)	3.7	33	12
Mean	3.2	56	51
CV,%	13.7	29	22
LSD,0.05	0.5	19	13

*Not significantly different from the highest value in the column, based on the 0.05 LSD.
¹ Vigor rating based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

Variety	Percent Stand					
	2003		2004		2005	
	Apr 3	Dec 2	Apr 1	Dec 21	Apr 15	Dec 13
Commercial Varieties—Available for Farm Use						
Benchmark Plus	90	76	36	27	18	9
Benchmark	90	73	39	27	19	8
Tekapo	89	83	34	25	13	8
Certified Potomac	90	74	41	27	17	8
Crown Royale Plus	90	76	37	20	13	8
Niva	90	79	38	22	17	8
Hallmark	84	68	34	25	13	7
Haymate	90	73	30	27	17	7
Prairie	90	71	41	25	17	7
Experimental Varieties						
KYPP 9901 (BG)	89	53	33	33	40	42*
GA-OG1	90	66	36	22	17	10
Mean	89	71	36	25	18	11
CV,%	1	7	30	32	52	33
LSD,0.05	1	6	13	9	11	4

*Not significantly different from the highest value in the column, based on the 0.05 LSD.

Variety	Ploidy	Seedling Vigor ¹ Nov 2, 2001	Percent Stand							
			2002		2003		2004		2005	
			Apr 4	Oct 15	Mar 28	Oct 27	Mar 31	Nov 8	Mar 30	Sep 1
Commercial Varieties—Available for Farm Use										
Granddaddy	tetraploid	3.5	90	81	88	82	88	68	80	68*
Lasso	diploid	3.2	90	71	90	82	84	73	63	52
Linn	diploid	3.3	90	80	88	80	85	72	37	32
Quartet	tetraploid	3.8	77	66	85	73	46	43	25	17
Aries	diploid	4.2	88	76	85	78	83	78	17	15
Polly 2	tetraploid	5.0	83	51	83	64	59	38	30	13
Maverick	diploid	5.0	34	16	58	28	31	20	22	12
Experimental Varieties										
PP11 (mixture)		5.0	54	26	66	45	31	28	17	15
Mean		4.1	76	58	80	66	63	53	36	28
CV,%		8.3	15	15	12	13	10	17	48	40
LSD,0.05		0.4	13	10	12	10	7	11	20	13

*Not significantly different from the highest value in the column, based on the 0.05 LSD.
¹ Vigor rating based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

Table 15. Percent stand and seedling vigor of perennial ryegrass, Italian ryegrass and prairie brome (*Bromus willdenovii*) varieties sown September 17, 2003 in a cattle grazing tolerance study at Lexington, Kentucky.

Variety	Species	Seedling Vigor ¹ Oct 31, 03	Percent Stand			
			2004		2005	
			Mar 26	Nov 8	Mar 30	Oct 31
Commercial Varieties—Available for Farm Use						
Linn	perennial ryegrass	4.3	99	90	34	60
AGRLP 103	perennial ryegrass	4.5	33	63	23	52
AGRBW 101	prairie brome	4.8	58	67	37	31
Grasslands Matua	prairie brome	4.5	33	50	20	18
Experimental Varieties						
LPTROM 99	perennial ryegrass	3.5	100	90	87	93*
AGRLP 108	perennial ryegrass	4.5	63	85	22	63
AGRLP 116	perennial ryegrass	4.3	52	90	28	63
AGRLP 113	perennial ryegrass	4.5	36	82	16	38
AGRBP 101	prairie brome	2.5	48	45	32	34
AGRBW 102	prairie brome	5.0	13	18	6	3
AGRML 109	Italian ryegrass	5.0	61	85	8	2
AGRML 108	Italian ryegrass	5.0	37	75	11	2
Mean		4.4	53	70	27	38
CV,%		9.8	47	23	54	44
LSD,0.05		0.5	29	19	17	19

*Not significantly different from the highest value in the column, based on the 0.05 LSD.

¹ Vigor rating based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

Table 16. Summary of persistence of tall fescue, perennial ryegrass (PRG), festulolium (FL) and Kentucky bluegrass (BG) varieties under heavy grazing pressure across years and locations.¹

Variety	Proprietor/KY Distributor	Lexington												Princeton															
		2001 ²					2002					2003				2004				2002				2003					
		Oct ³ 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	Dec 03	Apr 04	Dec 04	Apr 05	Nov 05	Apr 04	Dec 04	Apr 05	Nov 05		
Commercial Varieties—Available for Farm Use																													
Barianne	Barenbrug USA															*	*	*	*										
Carmine	DLF-Jenks	x	x	x	*	x	x																						
Calibra (PRG)	Donley Seed																	*	*	x	*	x							
Cattle Club		*	x	*	x	*	*																						
Felina (FL)	DLF -Jenks	*	x	x	x	*	*																						
Festival	Pickseed West, Inc.	*	x	x	*	*	*	x	*	*	*	*						x	x	*	*	*							
Jesup EF	AgResearch (USA)											*	x	*	*								*	*	*	*	*	*	
Jesup Max Q	Pennington Seed						*	*	*	*	*	*	*	*	*			*	*	*	*	*	*	*	*	*	x	*	
Johnstone	Williamette Seed Co./Public	x	x	x	x	*	*																						
Kenblue (BG)							x	x	x	x	x																		
Common (BG)	Public						x	*	x	x	x																		
KY 31+ ⁴	KY Agric. Exp. Station	*	*	*	*	*	*	*	x	*	*	*	*	*	*	*	x	*	*	x	*	*							
Maximize	Turf-Seed, Inc.	*	x	*	*	x	x																						
Orygun							*	*	*	*	*																		
Resolute	Ampac Seed Company	x	x	x	x	x	x																						
Select	FFR/Southern States	*	x	x	x	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*							
Spring Green (FL)	Turf-Seed, Inc.	*	*	*	*	*	*																						
Stargrazer	FFR/Southern States	x	x	x	x	*	x																						
Stockman	Seed Research of Oregon																*	*											
Experimental Varieties																													
AGRFA 104	AgResearch (USA)																	*	*	*	*	*							
AGRFA 106	AgResearch (USA)																	*	*	x	*	*							
AGRFA 111	AgResearch (USA)										*	*	x	x				x	*	x	*	x							
AGRFA 114	AgResearch (USA)																	*	*	*	*	*							
AGRFA 117	AgResearch (USA)										*	*	x	*									x	*	x	*	*		
AGRFA 120	AgResearch (USA)										*	*	x	*									*	*	x	*	*		
AGRFA 121	AgResearch (USA)										*	*	x	*									*	*	*	*	*		
AGRFA 2845	AgResearch (USA)																						x	*	*	*	*		
AGRFA 2846	AgResearch (USA)																						*	*	x	*	*		
AGRFA 2847	AgResearch (USA)																						*	*	x	*	*		
AGRFA 2848	AgResearch (USA)																						*	*	x	*	*		
AGRFA 2849	AgResearch (USA)																						*	*	*	*	*		
AGRFA 2850	AgResearch (USA)																						*	*	x	*	*		
AGRFA 2860	AgResearch (USA)											*	*	*	*								*	*	x	*	*		
AGRFA 2861	AgResearch (USA)											*	*	*	*								*	*	*	*	*		
EC 411 (PRG)	Emerald Commodities, Inc.						*	*	*	x	x							*	*	*	*	x							
FA 2458	AgResearch (USA)																	*	*	*	*	*							
FA 2651	AgResearch (USA)																	*	*	*	*	*							
FA 2720	AgResearch (USA)																	*	*	*	*	*							
FA 2845	AgResearch (USA)																	*	*	*	*	*							
FABE 9301A	Barenbrug USA																	*	*	x	*	*							
HB 95 (BG)	DLF-Jenks																	x	x	x	x	x							
HB 96 (BG)	DLF-Jenks																	x	x	x	x	x							
HM 4	FFR/Southern States	x	x	x	*	*	*																						
HM 11	FFR/Southern States						*	*	*	*	*												x	x	*	*	x		
K 5666V	Ampac Seed Company	x	x	x	x	x	x																						
KY 31- ⁴	KY Agric. Exp. Station	*	x	*	x	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
KYPP 9901 (BG)	KY Agric. Exp. Station																	x	x	x	x	x							
KYFA 0006	KY Agric. Exp. Station											*	*	*	*														
KYFA 9301	KY Agric. Exp. Station	*	*	*	x	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
KYFA 9304	KY Agric. Exp. Station	*	x	x	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
KYFA 9602	KY Agric. Exp. Station										*	*	*	*															
KYFA 9611	KY Agric. Exp. Station										x	*	*	*															
KYFA 9811	KY Agric. Exp. Station																*	*											
KYFA 9819 (FL)	KY Agric. Exp. Station										*	*	x	x															
KYTF 2	KY Agric. Exp. Station										*	*	*	*															
PBR	Barenbrug USA																	*	x	x	x	x							
PP 10	Ampac Seed Company	x	x	x	x	x	x																						
PST-5NF	Turf-Seed, Inc.																*	*											
TF0203G	FFR/Southern States															*	*												

¹Not 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 plant survival was significantly less than the most persistent variety.

² For detailed stand ratings over years, see individual trial tables.

³ Establishment year

⁴ Date of rating of percent stand

⁵ "+" indicates variety is endophyte infected, "-" indicates variety is endophyte free.

Table 17. Summary of persistence of orchardgrass, Kentucky bluegrass (BG) and Prairie brome (PB) [*Bromus willdenovii*] varieties under heavy grazing pressure across years and locations.

Variety	Proprietor/KY Distributor	Lexington																Princeton					
		2001 ¹					2002					2003			2004		2002						
		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	Dec 03	Apr 04	Dec 04	Apr 05	Dec 05
Commercial Varieties—Available for Farm Use																							
Abertop	Pennington Seed, Inc.										X	X	X	X	X								
AGRBW101 (PB)	AG Research USA																X	X					
Albert	University of Wisconsin	*	X	*	X	*	*																
Amba	DLF-Jenks	X	X	X	X	X	X																
Athos	DLF-Jenks	*	*	*	*	*	X																
Benchmark	FFR/Southern States	*	*	*	*	*	*	X	X	X	*	*							*	*	*	X	X
Benchmark Plus	FFR/Southern States							*	*	X	*	*							X	*	*	X	X
Command	Seed Research of Oregon																X	X					
Common (BG)	Public							X	*	X	*	*											
Crown Royale	Grassland Oregon	*	*	*	X	*	X																
Crown Royale Plus	Donley Seed Co.							*	*	X	*	X							X	X	X	X	X
Grasslands Matua (PB)	AG Research USA																X	X					
Hallmark 1996 ³	James VanLeeuwen	*	*	*	*	*	*																
Hallmark 2002 ³	James VanLeeuwen												X	X	X	X			X	X	*	X	X
Haymate	FFR/Southern States	*	*	*	X	*	*	*	*	X	*	X	*	*	*	*			X	*	*	X	X
Intensiv	Barenbrug USA												*	*	*	X							
Mammoth	DLF-Jenks	*	*	*	*	*	*																
Megabyte	Turf-Seed Inc.	*	X	X	X	X	X																
Niva	DLF-Jenks							X	*	X	*	X							*	X	X	X	X
Potomac certified	Public							*	*	X	*	X					X	*	X	*	*	X	X
Potomac uncertified	Public							*	*	X	*	X											
Prairie	Turner Seed Company	*	*	*	*	*	*	X	*	X	*	X							X	*	*	X	X
Takena	Smith Seed Services	*	*	X	X	*	X																
Tekapo	Modern Forage Systems	*	*	X	X	X	X	X	X	X	X	X	*	*	X	*			*	*	*	X	X
	Oldfields Seed																						
Experimental Varieties																							
94-100	Ag Food of Canada																	*	*				
AGRBP 101 (PB)	AG Research USA																	X	X				
AGRBW 102 (PB)	AG Research USA																	X	X				
AGRBW 103 (PB)	AG Research USA																	X	X				
CIS-OG28	Cebeco Int'l Seeds												*	*	*	*							
CIS-OG29	Cebeco Int'l Seeds												*	*	*	*							
DG 9911	Pennington Seed, Inc.							*	*	*	X	X											
DG 9930b	Pennington Seed, Inc.							*	*	*	X	X											
GA-OG1	Pennington Seed, Inc.							X	*	X	*	*							X	*	X	X	X
KYDG 9303	KY Agric. Exp. Station												*	*	*	*	*	*					
KYDG 9701	KY Agric. Exp. Station												*	*	X	*							
KYDG 9801	KY Agric. Exp. Station												*	*	*	X							
KYPP 9901 (BG)	KY Agric. Exp. Station																		X	X	*	*	*
OG 9705G	FFR/Southern States	*	*	X	*	*	*																

*Not significantly different from the most persistent variety. Open blocks indicate the variety was not in the test, while an "x" in the block indicate the variety was in the test but stand survival was significantly less than the most persistent variety.

¹ Establishment year.

² Date of visual rating of percent stand.

³ Seed for this test came from fields planted on dates indicated.

Table 18. Summary of persistence of perennial ryegrass, festulolium (FL), and prairie brome (PB) [*Bromus willdenovii*] varieties under heavy grazing pressure across years at Lexington.

Variety	Proprietor/KY Distributor	2001 ¹						2003			
		Mar ² 02	Oct 03	Mar 04	Nov 04	Mar 05	Sep 05	Mar 04	Nov 04	Mar 05	Oct 05
Commercial Varieties—Available for Farm Use											
AGRBW 101 (PB)	AgResearch USA							X	X	X	X
AGRLP 103	AgResearch USA							X	X	X	X
Aries	Ampac Seed Co.	*	*	*	*	X	X				
Duo (FL)	Ampac Seed Co.										
Citadel	Donley Seed										
Grand Daddy	Smith Seed Services	*	*	*	*	*	*				
Grasslands Matua (PB)	AgResearch USA							X	X	X	X
Linn	Public	*	*	*	*	X	X	*	*	X	X
Lasso	DLF-Jenks	*	*	*	*	*	X				
Maverick Gold	Ampac Seed Co.	X	X	X	X	X	X				
Polly 2	FFR/Southern States	X	X	X	X	X	X				
Quartet	Ampac Seed Co.	X	*	*	*	X	X				
Spring Green (FL)	Turf-Seed, Inc.										
Experimental Varieties											
AGRBP 101 (PB)	AgResearch USA							X	X	X	X
AGRBW 102 (PB)	AgResearch USA							X	X	X	X
AGRLH 101	AgResearch USA										
AGRLM 108	AgResearch USA							X	*	X	X
AGRLM 109	AgResearch USA							X	*	X	X
AGRLP 108	AgResearch USA							X	*	X	X
AGRLP 113	AgResearch USA							X	*	X	X
AGRLP116	AgResearch USA							X	*	X	X
LPTROM 99	Barenbrug USA							*	*	*	*
PP 11(variety mixture)	Ampac Seed Co.	X	X	X	X	X	X				
*Not significantly different from the most persistent variety. 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 plant survival was significantly less than the most persistent variety.											
¹ Establishment year.											
² Date of visual rating of percent stand.											



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