

2008 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. Tables 15, 16, and 17 show the summaries of all tall fescue, orchardgrass and perennial ryegrass varieties tested in Kentucky during the past ten years. The UK Forage Extension Web site at <www.uky.edu/Ag/Forage> contains electronic versions of all forage variety testing reports from Kentucky and surrounding states and from a large number of other forage publications.

Description of the Tests

Grass variety tests for grazing tolerance were established in Lexington in the fall of 2004, 2005, 2006 and 2007. The soil at Lexington (Maury) is a well-drained silt loam and is 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. Plots were seeded at the recommended seeding rate per acre and were sown 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 or heifers and kept at 2 to 4 inches 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 several weeks after the cattle 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 the fall. Other fertilizers (lime, P, and K) were applied as needed according to the University of Kentucky soil test recommendations.

Table 8 shows orchardgrass varieties under rotational grazing. For this trial, the cattle were allowed to graze the grass quickly to about 4 inches and then the cattle were removed. The grass was then allowed to regrow for four to five weeks and then grazed to about 4 inches and the cattle removed. This procedure was repeated throughout the season.

Results and Discussion

Weather data for Lexington is presented in Table 1. Data on percent stand are presented in Tables 2 through 11. Statistical analyses were performed on all entries (including experimentals) to determine if the apparent differences

Table 1. Temperature and rainfall at Lexington, Kentucky in 2005, 2006, 2007 and 2008.

	2005				2006				2007				2008 ²			
	Temperature		Rainfall		Temperature		Rainfall		Temperature		Rainfall		Temperature		Rainfall	
	°F	DEP ¹	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	37	+6	4.35	+1.49	42	+11	4.77	+1.91	37	+6	2.93	+0.07	33	+2	4.60	+1.74
FEB	39	+4	1.68	-1.53	36	+1	2.13	-1.08	27	-8	1.83	-1.38	36	+1	5.37	+2.16
MAR	41	-3	2.79	-1.61	44	0	3.05	-1.35	52	+8	1.97	-2.43	45	+1	6.28	+1.88
APR	56	+1	3.30	-0.58	59	+4	3.52	-0.36	53	-2	3.87	-0.01	55	0	5.72	+1.84
MAY	61	-3	1.78	-2.69	62	-2	2.99	-1.48	68	+4	1.45	-3.02	62	-2	4.88	+0.41
JUN	75	+3	1.33	-2.33	70	-2	1.82	-1.84	74	+2	1.77	-1.89	74	+2	3.30	-0.36
JUL	77	+1	3.30	-1.70	76	0	5.13	+0.13	74	-2	6.90	+1.90	76	0	2.54	-2.46
AUG	78	+3	3.34	-0.59	76	+1	3.23	-0.70	80	+5	2.56	-1.37	75	0	1.08	-2.85
SEP	72	+4	0.59	-2.21	64	-4	9.27	+6.07	72	+4	1.15	-2.05	72	+4	1.21	-1.99
OCT	58	+1	0.92	-1.65	54	-3	4.88	+2.31	63	+6	5.28	+2.71	57	0	1.35	-1.22
NOV	47	+2	1.54	-1.85	47	+2	1.78	-1.61	46	+1	2.86	-0.53	43	-2	2.28	-1.11
DEC	32	-4	2.19	-1.79	42	+6	2.45	-1.53	40	+4	5.29	+1.31				
Total			27.51	-17.04			45.02	+0.47			37.86	-6.69			38.61	-1.96

¹ DEP is departure from the long-term average.

² 2008 data is for eleven months through November.

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 desirable, 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 regard to grazing tolerance (Tables 2 and 3).

Table 12 (fescue and festulium), Table 14 (orchardgrass and prairie brome), and Table 15 (perennial ryegrass and festulium) 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); 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.

Tables 15, 16, and 17 are summaries of stand persistence data from 1996 to 2008 of commercial tall fescue, orchardgrass, and perennial ryegrass varieties that have been entered in the Kentucky trials. In Table 15 the data is listed as a percent-

Table 2. Seedling vigor and stand persistence of tall fescue varieties sown September 14, 2004 in a cattle grazing tolerance study at Lexington, Kentucky (continuous grazing).

Variety	Seedling Vigor ¹ Nov 8, 2004	Percent Stand							
		2005		2006		2007		2008	
		Apr 8	Oct 31	Apr 4	Oct 23	Mar 29	Oct 25	Apr 7	Oct 15
Commercial Varieties-Available for Farm Use									
Stockman	3.5	97	99	100	98	99	88	98	95*
KY31+ ²	2.3	87	97	99	98	99	96	96	93*
Cowgirl	3.2	90	99	99	97	97	94	95	92*
Experimental Varieties									
KYFA 9304	3.7	88	99	99	99	100	98	97	95*
KYFA 9811	3.8	95	100	99	98	99	95	95	94*
KY31- ²	4.0	95	99	100	98	98	97	96	93*
TF 0203G	4.0	97	98	100	98	98	97	98	90
Mean	3.5	92.6	98.8	99.5	97.8	98.5	94.9	96.2	93.1
CV,%	21.0	9.5	2.0	1.6	2.8	2.1	9.6	3.5	4.1
LSD,0.05	0.9	10.4	2.3	1.8	3.2	2.4	10.8	4.0	4.5

¹ Vigor score 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.
 *Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Table 3. Seedling vigor, grazing preference and stand persistence of tall fescue and festulium (FL) varieties sown September 8, 2005 in a cattle grazing tolerance study at Lexington, Kentucky (continuous grazing).

Variety	Seedling Vigor ¹ Nov 7, 2005	Grazing Preference ²		Percent Stand					
		2007	2008	2006		2007		2008	
		May 19	May 16	Apr 17	Oct 20	Mar 30	Oct 16	Apr 9	Oct 15
Commercial Varieties-Available for Farm Use									
KY31+ ³	3.5	3.0	3.2	96	96	98	97	96	94*
Select	1.8	2.3	2.8	83	90	93	92	93	93*
Jesup MaxQ	2.3	2.3	2.3	87	91	95	91	93	92*
Barolex	2.8	4.3	5.8	86	90	93	88	89	89*
Bariane	1.3	5.2	6.0	57	68	73	74	79	83
Spring Green (FL)	3.7	8.7	9.0	96	91	94	93	88	66
Duo (FL)	3.8	8.2	9.0	97	84	90	88	46	25
Experimental Varieties									
KYFA 9301/AR542	3.5	2.5	3.5	94	95	96	96	96	96*
KYFA 9301/AR584	3.8	2.5	2.7	94	96	97	95	95	95*
KYFA 9821/AR542	3.2	2.7	3.0	94	95	97	96	96	94*
AGRFA 144	2.8	2.2	2.5	89	92	95	93	93	93*
AGRFA 148	2.8	2.5	2.2	94	95	97	95	96	93*
KY31- ³	3.0	2.3	2.7	94	95	96	95	95	93*
TF 0203G	2.3	1.8	2.2	92	93	95	95	93	93*
BARFABE 9301a	2.7	4.5	5.8	85	88	91	89	90	93*
KYFA 9821 EF	2.8	2.0	3.0	92	93	96	94	94	93*
KYFA 9301 EF	2.7	1.8	4.3	88	93	94	94	92	92*
IS-FTF 25	2.5	2.0	2.3	84	92	94	92	91	92*
KYFA 9821/AR584	3.2	2.3	2.7	93	94	96	94	92	92*
TF 9801	2.0	2.7	2.3	81	84	88	88	89	88*
IS-FTF 12	1.8	2.2	2.8	83	87	88	86	89	88
TF 0101	2.5	2.0	3.5	92	92	93	92	89	88
KYFA 9304 EF	2.7	2.5	4.5	87	89	91	89	88	84
UMTF	0.8	5.3	6.3	13	17	26	24	32	32
Mean	2.7	3.2	3.9	85.4	87.4	90.1	88.7	87.2	85.0
CV,%	26.0	25.0	22.7	8.2	8.2	6.7	6.0	7.2	7.5
LSD,0.05	0.8	0.9	1.0	8.0	8.2	6.9	6.1	7.2	7.3

¹ Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.
² Preference score based on a scale of 1 to 9 with 9 indicating all forage was grazed.
³ "+" indicates variety is endophyte infected; "-" indicates variety is endophyte free.
 *Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

age of KY31+. In other words, in the tall fescue trials KY31+ is 100 percent. Varieties with percentages over 100 persisted better than KY31+, and varieties with percentages less than 100 persisted less than KY31+. In Tables 16 and 17 the data is listed as a percentage of the mean of the commercial varieties entered in each specific trial. In other words, the mean for each trial is 100 percent. Varieties with percentages over 100 persisted better than average, and varieties with percentages less than 100 persisted less than average. Direct, statistical comparisons of varieties cannot be made using the summary Tables 15, 16, and 17, but these comparisons do help to identify varieties for further consideration. Varieties that have performed better than average over many years have very stable performance; others may have performed very well in wet years or on particular soil types. These details may influence variety choice, and the information can be found in the yearly reports. See footnote in Tables 15, 16, and 17 to determine which yearly report to refer to.

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 or orchardgrass be continuously overgrazed as was done in these trials. Although several varieties expressed tolerance to the level of grazing pressure used in these trials, overgrazing

Table 4. Seedling vigor, grazing preference and stand persistence of tall fescue varieties sown September 8, 2006 in a cattle grazing tolerance study at Lexington, Kentucky (continuous grazing).

Variety	Seedling Vigor ¹ Oct 25, 2006	Grazing Preference ²		Percent Stand				
		2007	2008	2006	2007		2008	
		May 19	May 16	Oct 25	Mar 30	Oct 15	Apr 9	Oct 17
Commercial Varieties-Available for Farm Use								
Barolex	3.3	6.5	6.8	100	100	100	100	100*
Jesup MaxQ	2.7	3.2	2.0	99	100	100	100	100*
KY31+ ³	3.8	5.3	4.3	100	100	100	100	100*
Select	3.3	2.7	2.7	100	100	100	100	100*
Tuscany II	2.8	4.8	3.3	99	100	100	100	100*
Bariane	2.5	8.5	8.3	96	100	99	100	99*
Advance MaxQ	3.2	7.8	4.3	99	98	98	98	99
Verdant	3.2	6.0	3.5	99	99	98	97	98
Experimental Varieties								
AGRFA 121	3.5	3.8	1.3	100	100	100	100	100*
AGRFA 140	3.8	2.5	1.0	100	100	100	100	100*
AGRFA 148	3.7	2.2	1.8	100	100	100	100	100*
KY31- ³	4.2	4.0	2.5	100	100	100	100	100*
KYFA 9301/AR542	4.2	4.3	2.8	100	100	100	100	100*
KYFA 9301/AR584	4.2	4.0	2.2	100	100	100	100	100*
KYFA 9301EF	3.7	4.0	3.3	99	100	100	100	100*
KYFA 9304	3.8	5.2	4.0	100	100	100	100	100*
KYFA 9821/AR584	4.0	2.8	2.7	100	100	100	100	100*
TF 0202	3.2	6.2	5.3	99	100	100	100	100*
AGRFA 144	3.7	1.3	1.3	100	100	85	100	100*
AGRFA 156	3.2	4.7	2.0	100	100	99	100	100*
KFa402V542	3.0	6.2	2.7	99	100	100	100	100*
AGRFA 120	3.7	3.5	1.3	100	100	100	100	99*
FA 2863	3.3	5.2	3.7	99	100	100	99	99*
FA 2864	3.2	6.2	4.3	99	99	99	99	99*
AGRFA 155	3.3	4.7	2.0	99	98	99	99	99*
FA 2862	2.7	4.0	2.8	99	100	100	100	99*
K4508Q	2.5	6.8	1.5	98	100	99	100	99*
K4508Q542	3.3	5.7	1.0	99	100	100	100	99*
K5666VII	2.7	7.0	4.8	99	100	99	99	99*
FA 2865	3.7	6.0	3.7	99	100	98	98	99*
K6560QII542	3.0	8.0	2.0	100	99	98	99	98
Mean	3.4	4.9	3.1	99.3	99.7	99.1	99.6	99.5
CV,%	20.4	28.6	29.9	1.3	0.9	6.7	1.3	1.3
LSD,0.05	0.8	1.6	1.1	1.5	1.0	7.6	1.5	1.5

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

² Preference score based on a scale of 1 to 9 with 9 indicating all forage was grazed.

³ "+" indicates variety is endophyte infected; "-" indicates variety is endophyte free.

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

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.

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Table 5. Seedling vigor, grazing preference and stand persistence of tall fescue varieties sown September 5, 2007 in a cattle grazing tolerance study at Lexington, Kentucky (continuous grazing).

Variety	Seedling Vigor ¹ Nov 7, 2007	Grazing Preference ² May 16, 2008	Percent Stand		
			2007		2008
			Nov 7	Apr 9	Oct 17
Commercial Varieties-Available for Farm Use					
BarElite	3.3	6.0	97	97	98*
KY31+ ³	3.2	6.0	96	96	97*
Select	2.1	3.7	92	93	94*
Jesup MaxQ	1.5	5.7	94	92	92*
Barolex	2.3	6.8	91	89	91*
Bariane	1.7	6.5	84	89	87
Nanryo	3.2	1.8	98	98	79
Experimental Varieties					
KRC 6581	4.2	5.0	99	100	100*
KYFA 9821/AR584	3.7	3.7	99	99	99*
BARFABE9301A	3.5	5.8	98	98	99*
KY31- ³	4.2	3.5	99	99	99*
KYFA 9301/AR584	3.2	4.8	98	98	99*
KYFA 9821	3.3	2.8	96	96	98*
BARFAMT9301	3.0	5.8	95	96	97*
AGRFA140	2.8	2.3	95	97	97*
FA 2866	4.3	2.5	99	98	97*
AGRGT 160	2.7	4.3	97	97	96*
AGRFA 144	1.7	7.2	98	97	96*
KYFA 9611	3.3	7.8	95	95	96*
KYFA 9301	3.2	4.3	97	94	96*
KRC 6582	3.0	7.2	97	96	95*
AGRGT 159	2.7	4.0	96	96	95*
AGRFA 111	3.2	7.0	97	96	90*
AGRFA 156	1.8	7.8	91	78	75
KRC 6580	1.0	8.3	59	47	65
Mean	2.9	5.2	94.3	93.1	93.1
CV,%	20.4	21.9	7.6	5.8	10.0
LSD,0.05	0.7	1.3	8.4	6.3	10.9
¹ Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth. ² Preference score based on a scale of 1 to 9 with 9 indicating all forage was grazed. ³ + indicates variety is endophyte infected; - indicates variety is endophyte free. *Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.					

Table 6. Seedling vigor and stand persistence of orchardgrass and prairie brome (PB) [Bromus willdenovii] varieties sown September 14, 2005 in a cattle grazing tolerance study at Lexington, Kentucky (continuous grazing).

Variety	Seedling Vigor ¹ Nov 8, 2004	Percent Stand							
		2005		2006		2007		2008	
		Mar 30	Oct 31	Apr 4	Oct 23	Mar 29	Oct 25	Apr 7	Oct 15
Commercial Varieties-Available for Farm Use									
Potomac (certified)	2.2	65	88	92	88	80	62	60	71
Command	2.0	58	82	83	75	69	42	40	48
AGRBW 101 (PB)	3.0	62	32	23	18	14	5	9	8
Grasslands Matua (PB)	2.7	28	16	10	11	8	4	9	6
Experimental Varieties									
KYDG 9303	3.5	90	96	98	93	94	83	81	86*
94-100	2.8	82	94	94	88	72	56	41	53
AGRBW 102 (PB)	5.0	28	12	6	7	7	4	8	7
AGRBP 101 (PB)	4.2	58	27	28	16	13	5	10	5
AGRBW 103 (PB)	3.7	33	12	9	9	4	3	5	4
Mean	3.2	56.1	50.8	49.2	44.8	40.0	29.2	29.1	32.0
CV,%	13.7	29.2	22.0	15.6	13.9	20.7	43.7	43.1	33.3
LSD,0.05	0.5	19.1	13.1	8.9	7.3	4.7	14.9	14.7	12.4
¹ Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth. *Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.									

Table 7. Seedling vigor, grazing preference and stand persistence of orchardgrass varieties sown September 8, 2005 in a cattle grazing tolerance study at Lexington, Kentucky (continuous grazing).

Variety	Seedling Vigor ¹ Nov 7, 2005	Grazing Preference ²		Percent Stand					
		2007	2008	2006		2007		2008	
		May 25	May 16	Apr 17	Oct 20	Mar 30	Oct 16	Apr 9	Oct 15
Commercial Varieties-Available for Farm Use									
Persist	2.8	3.5	4.2	95	95	99	96	98	97*
Benchmark Plus	3.7	3.5	4.5	96	96	98	93	95	93*
Athos	2.5	6.8	7.8	93	97	95	95	91	91
Tekapo	3.0	7.3	7.8	94	97	80	88	86	83
Experimental Varieties									
IS-OG 28	3.5	4.7	6.0	96	95	98	97	97	95*
AGR DG 101	3.3	8.8	8.2	75	81	33	29	18	17
Mean	3.1	5.8	6.4	91.4	93.3	83.9	82.9	80.8	79.4
CV,%	18.4	17.0	8.0	4.7	5.6	9.5	9.8	5.0	5.0
LSD,0.05	0.7	1.2	0.6	5.2	6.2	9.4	9.7	4.8	4.7

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

²Preference score based on a scale of 1 to 9 with 9 indicating all forage was grazed.

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

Table 8. Seedling vigor, grazing preference and stand persistence of orchardgrass varieties sown September 22, 2005 in a cattle grazing tolerance study at Lexington, Kentucky (rotational grazing).

Variety	Seedling Vigor ¹ Nov 7, 2005	Grazing Preference ² May 25, 2007	Percent Stand					
			2006		2007		2008	
			Apr 17	Oct 20	Mar 30	Oct 16	Apr 9	Oct 15
Commercial Varieties-Available for Farm Use								
Benchmark Plus	3.3	2.8	95	97	96	88	93	93*
Persist	3.0	2.5	96	98	98	91	95	93*
Athos	3.0	5.7	94	98	94	94	93	92*
Tekapo	3.0	5.3	92	95	86	87	87	87
Experimental Varieties								
IS-OG28	2.7	3.0	94	97	98	93	93	94*
AGR DG101	3.3	8.5	67	85	28	38	25	23
Mean	3.1	4.6	89.6	94.7	83.2	81.8	80.7	80.1
CV,%	21.2	23.1	8.6	4.0	11.6	12.9	9.3	7.8
LSD,0.05	0.8	1.3	9.2	4.5	11.4	12.5	9.0	7.5

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

²Preference score based on a scale of 1 to 9 with 9 indicating all forage was grazed.

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

Table 9. Stand persistence of orchardgrass varieties sown April 8, 2008 in a cattle grazing tolerance study at Lexington, Kentucky (continuous grazing).

Variety	Percent Stand	
	2008	
	Jul 17	Oct 17
Commercial Varieties-Available for Farm Use		
Persist	99	98*
Harvestar	98	97*
Benchmark Plus	98	96*
Ambrosia	97	96*
Tekapo	98	96*
Seco	96	95*
Experimental Varieties		
OG0203G	97	97*
Mean	97.6	96.2
CV,%	3.2	2.8
LSD,0.05	3.8	3.4

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

Table 10. Seedling vigor, grazing preference and stand persistence of perennial ryegrass varieties sown September 8, 2005 in a cattle grazing tolerance study at Lexington, Kentucky (continuous grazing).

Variety	Seedling Vigor ¹ Nov 7, 2005	Grazing Preference ²		Percent Stand					
		2007	2008	2006		2007		2008	
		May 25	May 16	Apr 17	Oct 20	Mar 30	Oct 16	Apr 9	Nov 20
Commercial Varieties-Available for Farm Use									
BG34	3.2	6.0	8.0	96	97	97	93	89	81*
Quartet	4.7	9.0	8.8	93	94	63	58	28	29
Tonga	3.5	8.0	8.8	97	96	97	91	40	28
Experimental Varieties									
SWER3508FRI	2.8	8.0	8.8	94	97	98	94	81	72*
SWER3575	3.3	8.0	7.8	95	96	97	94	78	66*
SWER3579	3.7	8.0	8.5	97	96	97	93	76	58
Mean	3.5	7.8	8.5	95.4	95.9	91.7	87.3	65.1	55.6
CV,%	14.3	0.0	7.5	2.1	2.5	6.4	4.4	22.0	28.4
LSD,0.05	0.6	0.0	0.8	2.4	2.8	7.0	4.5	17.0	18.8

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

²Preference score based on a scale of 1 to 9 with 9 indicating all forage was grazed.

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

Table 11. Seedling vigor, grazing preference and stand persistence of perennial ryegrass and festulolium (FL) varieties sown September 5, 2007 in a cattle grazing tolerance study at Lexington, Kentucky (continuous grazing).

Variety	Seedling Vigor ¹ Nov 7, 2007	Grazing Preference ² May 16, 2008	Percent Stand		
			2007	2008	
			Nov 7	Apr 9	Oct 17
Commercial Varieties-Available for Farm Use					
BG34	2.3	9.0	98	98	96*
Power	2.3	8.3	98	98	95*
Granddaddy	2.3	8.8	98	96	92
Quartet	4.5	8.8	98	88	81
Experimental Varieties					
GO-ABZ	3.7	8.5	99	100	100*
KRC 6554	2.7	8.8	100	100	100*
KRC 6577	3.7	9.0	100	100	99*
KRC 6579	3.4	9.0	99	99	99*
KRC 6578	3.5	9.0	99	99	99*
KLp507	4.4	9.0	100	100	99*
KRC 6575	2.8	9.0	99	100	99*
KYFA 0236 (FL)	4.5	7.3	99	100	98*
GO-ABS	3.2	8.5	100	100	98*
KLp401	3.5	9.0	99	99	97*
KRC 6576	2.3	9.0	99	98	96*
GO-ABM	2.3	8.5	96	94	94
KYFA 9819 (FL)	1.8	8.8	96	83	83
Mean	3.1	8.7	98.5	97.2	95.6
CV,%	19.7	5.7	1.6	4.4	4.7
LSD,0.05	0.7	0.6	1.8	4.9	5.1

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

²Preference score based on a scale of 1 to 9 with 9 indicating all forage was grazed.

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

Table 12. Summary of persistence of tall fescue and festulolium (FL) varieties under heavy grazing pressure across years and locations.¹

Variety	Proprietor/ KY Distributor	2004 ²												2005					2006					2007					
		Mar 05 ³	Oct 05	Apr 06	Oct 06	Mar 07	Oct 07	Apr 08	Oct 08	Apr 06	Oct 06	Mar 07	Oct 07	Apr 08	Oct 08	Mar 07	Oct 07	Apr 08	Oct 08	Mar 07	Oct 07	Apr 08	Oct 08	Mar 07	Oct 07	Apr 08	Oct 08		
Commercial Varieties-Available for Farm Use																													
Advance MaxQ	Pennington Seed																												
BarElite	Barenbrug USA																												
Barlane	Barenbrug USA																												
Barolex	Barenbrug USA																												
Cowgirl	Rose Agri-Seed	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Duo (FL)	Ampac Seed Company																												
Jesup Max Q	Pennington Seed																												
KY 31 ⁴	KY Agric. Exp. Station	*	X	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
Nanryo	Japanese Grassland Forage Seed/ USDA-ARS,EIRino, OK																												
Select	FFR/Southern States																												
Spring Green (FL)	Rose Agri-Seed																												
Stockman	Seed Research of Oregon	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
Tuscany II	Seed Research of Oregon																												
Verdant	Amer. Grass Seed Prod.																												
Experimental Varieties																													
AGRFA 111	AgResearch (USA)																												
AGRFA 120	AgResearch (USA)																												
AGRFA 121	AgResearch (USA)																												
AGRFA 140	AgResearch (USA)																												
AGRFA 144	Noble Foundation/AgResearch (USA)																												
AGRFA 148	Noble Foundation/AgResearch (USA)																												
AGRFA 155	AgResearch (USA)																												
AGRFA 156	AgResearch (USA)																												
AGRT 159	AgResearch (USA)																												
AGRT 160	AgResearch (USA)																												
FA 2862	AgResearch (USA)																												
FA 2863	AgResearch (USA)																												
FA 2864	AgResearch (USA)																												
FA 2865	AgResearch (USA)																												
FA 2866	AgResearch (USA)																												
BARFABE 9301A	Barenbrug USA																												
BARFAMT 9301	Barenbrug USA																												
IS-FTF12	DLF International Seeds																												
IS-FTF25	DLF International Seeds																												
K4508Q	AgResearch (USA)																												
K4508Q542	AgResearch (USA)																												
K566VII	AgResearch (USA)																												
K6560QII542	AgResearch (USA)																												
KFa402V542	AgResearch (USA)																												
KY 31-4	KY Agric. Exp. Station	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
KYFA 9301	KY Agric. Exp. Station																												
KYFA 9301/AR542	KY Agric. Exp. Station																												

continued

Variety		Table 12. Summary of persistence of tall fescue and festulolium (FL) varieties under heavy grazing pressure across years and locations. ¹																					
		2004 ²					2005					2006					2007						
		Mar 05 ³	Oct 05	Apr 06	Oct 06	Mar 07	Oct 07	Apr 08	Oct 08	Apr 06	Oct 06	Mar 07	Oct 07	Apr 08	Oct 08	Mar 07	Oct 07	Apr 08	Oct 08	Mar 07	Oct 07	Apr 08	Oct 08
	Proprietor/ KY Distributor																						
KYFA 9301/AR584	KY Agric. Exp. Station	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
KYFA 9304	KY Agric. Exp. Station																						
KYFA 9611	KY Agric. Exp. Station																						
KYFA 9811	KY Agric. Exp. Station	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
KYFA 9821	KY Agric. Exp. Station																						
KYFA 9821/AR542	KY Agric. Exp. Station																						
KYFA 9821/AR584	KY Agric. Exp. Station																						
KRC 6580	AgResearch (USA)																						
KRC 6581	AgResearch (USA)																						
KRC 6582	AgResearch (USA)																						
TF0101	FFR/Southern States																						
TF0202	Allied Seed																						
TF0203G	FFR/Southern States	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
TF9801	FFR/Southern States																						
UMTF	Univ. of Manitoba																						

¹ For detailed stand ratings over years, see individual trial tables.

² Establishment year

³ Date of rating of percent stand

⁴ "+" indicates variety is endophyte infected, "-" indicates variety is endophyte free.

⁵ 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.

*Not significantly different from the most persistent variety in the test.

Table 13. Summary of persistence of orchardgrass and Prairie brome (PB) [*Bromus willdenovii*] varieties under heavy grazing pressure across years at Lexington, Kentucky.

Variety	Proprietor/KY Distributor	2004 ¹								2005						2008	
		Mar	Oct	Apr	Oct	Mar	Oct	Apr	Oct	Apr	Oct	Mar	Oct	Apr	Oct	Jul	Oct
		05 ²	05	06	06	07	07	08	08	06	06	07	07	08	08	08	08
Commercial Varieties-Available for Farm Use																	
AGRWB101 (PB)	AG Research USA	x ³	x	x	x	x	x	x	x								
Ambrosia	Amer. Grass Seed Producers															*	*
Athos	DLF-Jenks									*	*	*	*	x	x		
Benchmark Plus	FFR/Southern States									*	*	*	*	*	*	*	*
Command	Seed Research of Oregon	x	x	*	x	x	x	x	x								
Grasslands Matua (PB)	AG Research USA	x	x	x	x	x	x	x	x								
Harvestar	Columbia Seeds															*	*
Persist	Smith Seed Services									*	*	*	*	*	*	*	*
Potomac (certified)	Public	x	*	*	*	x	x	x	x								
Seco	FFR/Southern States															*	*
Tekapo	Ampac Seed Co.									*	*	x	*	x	x	*	*
Experimental Varieties																	
94-100	Ag Food of Canada	*	*	*	*	x	x	x	x								
AGRBP 101 (PB)	AG Research USA	x	x	x	x	x	x	x	x								
AGRBP 102 (PB)	AG Research USA	x	x	x	x	x	x	x	x								
AGRBP 103 (PB)	AG Research USA	x	x	x	x	x	x	x	x								
AGRDP101	AG Research USA									x	x	x	x	x	x		
IS-OG28	DLF International									*	*	*	*	*	*		
KYDG 9303	KY Agric. Exp. Station	*	*	*	*	*	*	*	*								
OG0203G	FFR/Southern States															*	*

¹ Establishment year.
² Date of visual rating of percent stand.
³ 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.
 *Not significantly different from the most persistent variety.

Table 14. Summary of persistence of perennial ryegrass and festulolium (FL) varieties under heavy grazing pressure across years at Lexington, Kentucky.

Variety	Proprietor/KY Distributor	2005 ¹						2007	
		Apr	Oct	Mar	Oct	Apr	Nov	Apr	Oct
		06 ²	06	07	07	08	08	08	08
Commercial Varieties-Available for Farm Use									
BG34	Barenbrug USA	*	*	*	*	*	*	*	*
Granddaddy	Smith Seed							*	x ³
Power	Ampac Seed Co.							*	*
Quartet	Ampac Seed Co.	x	x	x	x	x	x	x	x
Tonga	Kings AgriSeeds	*	*	*	*	x	x		
Experimental Varieties									
GO-ABM	Grassland Oregon							x	x
GO-ABS	Grassland Oregon							*	*
GO-ABZ	Grassland Oregon							*	*
KRC 6554	AgResearch (USA)							*	*
KRC 6575	AgResearch (USA)							*	*
KRC-6576	AgResearch (USA)							*	*
KRC 6577	AgResearch (USA)							*	*
KRC 6578	AgResearch (USA)							*	*
KRC 6579	AgResearch (USA)							*	*
KLp401	AgResearch (USA)							*	*
KLp507	AgResearch (USA)							*	*
KYFA 0236 (FL)	KY Agric.Exp. Station							*	*
KYFA 9819 (FL)	KY Agric.Exp. Station							x	x
SW ER3508FRI	SW Seed Ltd.	x	*	*	*	*	*		
SW ER3575	SW Seed Ltd.	*	*	*	*	*	*		
SW ER3579	SW Seed Ltd.	*	*	*	*	*	x		

¹ Establishment year.
² Date of visual rating of percent stand.
³ 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.
 *Not significantly different from the most persistent variety.

Table 15. Summary of 1996-2008 Kentucky Tall Fescue Grazing Tolerance Trials (stand persistence shown as a percent of the stand rating of KY 31+).

Variety	Proprietor	Lexington										Princeton	Mean ³ (#trials)	
		1996 ^{1,2} 3yr ⁴	1997 4yr	1998 3yr	1999 4yr	2000 4yr	2001 4yr	2002 4yr	2003 4yr	2004 4-yr	2005 3-yr	2002 4yr		
Bariane	Barenbrug USA									89		88		89(2)
Barcel	Barenbrug USA	92												-
Barolex	Barenbrug USA											95		-
BAR9TMPO	Barenbrug USA				75									-
Bronson	Ampac Seed			39										-
Cattle Club	Green Seed		37	98	70	93	91							78(2)
Carmine	DLF-Jenks						90							-
Cowgirl	Rose Agri-Seed									99				-
Dovey	Barenbrug USA	92												-
Festival	Pickseed West						100	101					89	97(3)
Festorina	Advanta Seeds	98	86		57									80(3)
Fuego	Advanta Seeds			27										-
Hoedown	DLF-Jenks					88								-
Jesup EF	Pennington Seed		63	91					99					84(3)
Jesup MaxQ	Pennington Seed			114	79			103	97		98	105		99(6)
Johnstone	Proseeds		65	107			92							88(3)
KY31+	KY Agri. Exp Sta.	100	100	100	100	100	100	100	100	100	100	100	100	100(11)
KY31-	KY Agri. Exp Sta.	94	90	102	84		98	103	98	100	99	105		97(10)
Kenhy	Public			116										-
Kokanee	Ampac Seed					43								-
Martin II	International Seeds		59											-
Maximize	Rose Agri-Seed						99							-
Orygun								99						-
Resolute	Ampac Seed						23							-
Select	FFR/Sou. St.			109	69	107	101	100	100		99	98		98(8)
Southern Cross			25											-
Stargrazer	FFR/Sou. St.	90			52	86	89							79(4)
Stockman	Seed Res. of OR									102				-
TF33	Barenbrug USA			34										-
Vulcan	International Seeds			109										-

¹Year trial was established.

²Use this summary table as a guide in making variety decisions, but refer to specific yearly reports to determine statistical differences in stand persistence between varieties. To find actual persistence ratings, look in the yearly report for the final year of each specific trial. For example, the Lexington trial planted in 1997 was grazed 4 years so the final report would be "2001 Cool-Season Grass Grazing Tolerance Report" archived in the KY Forage website at <www.uky.edu/Ag/Forage>.

³Mean only presented when respective variety was included in two or more trials.

⁴Number of years of data.

Table 16. Summary of 1996-2008 Kentucky Orchardgrass Grazing Tolerance Trials (stand persistence shown as a percent of the mean of the commercial varieties in the trial).

Variety	Proprietor	Lexington										Princeton	Mean ³ (#trials)
		1996 ^{1,2} 3yr ⁴	1997 4yr	1998 3yr	1999 4yr	2000 4yr	2001 4yr	2002 4yr	2003 4yr	2004 4-yr	2005 3-yr	2002 4yr	
Abertop	Pennington Seed							38					-
Albert	Univ. of Wisconsin						115						-
Amba	DLF-Jenks						71						-
Ambrosia	Pennington Seed		90										-
Athos	DLF-Jenks						93				100		97(2)
Benchmark	FFR/Sou. States	100	105	115	94	118	123	114				133	113(8)
Benchmark Plus	FFR/Sou. States							120			102	133	118(3)
Boone	Public			131		102							117(2)
Cheyenne	Western Prod. Inc.			94									-
Command	Seed Research of OR									81			-
Crown	Donley Seed		86	96									91(2)
Crown Royale	Donley Seed						100						-
Crown Royale Plus	Donley Seed							124				83	104(2)
Hallmark	James VanLeeuwen	107		104	103		115		113			83	104(6)
Haymate	FFR/Sou. States	93	71	102	96	53	115	100	118			83	92(9)
Intensiv	Barenbrug USA								51				-
Mammoth	DLF-Jenks						115						-
Megabite	Turf Seed						77						-
Niva	DLF-Jenks							76				83	80(2)
Persist	Smith Seed										107		-
Pizza	Advanta Seeds			63									-
Potomac	Public	98						116		119		117	113(4)
Prairie	Turner Seed					127	121					83	110(3)
Profile	Scott Seed	98						116					107(2)
Progress	Scott Seed	111											-
Tekapo	Ampac Seed	93	166	92	104		55	74	118		91	100	99(9)
Takena	Smith Seed		81				99						90(2)
WP300	Western Prod. Inc.			94									-

¹ Year trial was established.

² Use this summary table as a guide in making variety decisions, but refer to specific yearly reports to determine statistical differences in stand persistence between varieties. To find actual persistence ratings, look in the yearly report for the final year of each specific trial. For example, the Lexington trial planted in 1997 was grazed 4 years so the final report would be "2001 Cool-Season Grass Grazing Tolerance Report" archived in the KY Forage website at <www.uky.edu/Ag/Forage>.

³ Mean only presented when respective variety was included in two or more trials.

⁴ Number of years of data.

Table 17. Summary of 2000-2008 Kentucky Perennial Ryegrass Grazing Tolerance Trials (stand persistence shown as a percent of the mean of the commercial varieties in the trial).

Variety	Proprietor	2000 ^{1,2}	2001	2003	2005	Mean ³ (#trials)
		4yr ⁴	3yr	4yr	3-yr	
AGRLP103	AgResearch USA	133		86		110(2)
Aries	Ampac Seed		139			-
BG 34	Barenbrug USA				176 ⁵	-
Citadel	Donley Seed	112				-
Granddaddy	Smith Seed Services		121			-
Lasso	DLF-Jenks		130			-
Linn	Public	117	129	63		103(3)
Maverick	Ampac Seed		36			-
Polly II	FFR/Southern States	37	68			53(2)
Quartet	Ampac Seed		77		63	70(2)
Remington	Barenbrug USA			151 ⁵		-
Tonga	Kings AgriSeeds				61	-

¹ Year trial was established.

² Use this summary table as a guide in making variety decisions, but refer to specific yearly reports to determine statistical differences in stand persistence between varieties. To find actual persistence ratings, look in the yearly report for the final year of each specific trial. For example, the Lexington trial planted in 2000 was grazed 4 years so the final report would be "2004 Cool-Season Grass Grazing Tolerance Report" archived in the KY Forage website at <www.uky.edu/Ag/Forage>.

³ Mean only presented when respective variety was included in two or more trials.

⁴ Number of years of data

⁵ Grazing tolerance values for these entries may have been elevated due to the low survival of the other commercial varieties in the trials for these years.



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