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2014 Cool-Season Grass Grazing Tolerance Report

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Introduction

Cool-season grasses such as tall fescue, orchardgrass, and Kentucky bluegrass are the primary pasture grasses in Kentucky. Other species such as perennial ryegrass, festulolium, and the brome grasses 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 17, 18, and 19 show the summaries of all tall fescue, orchardgrass, and perennial ryegrass varieties tested in Kentucky during the past 15 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.

Important Selection Considerations

Local adaptation and seasonal yield. The variety should be adapted to Kentucky as indicated by good winter survival and good performance across years and locations in replicated yield and grazing trials, such as those presented in this publication. Choose high-yielding, persistent varieties and varieties that are productive during the desired season of use. Refer to the appropriate yield trial reports for yield data on specific varieties of interest.

Seed quality. Buy premium-quality seed that is high in germination and purity and free from weed seed. Buy certified seed or proprietary seed of an improved variety. An improved variety is one that has performed well in independent trials. Other information on the label will include the test date (which must be within the previous nine months), level of germination, and percentage of other crop and weed seed. Order seed well in advance of planting time to assure that it will be available when needed.

Description of the Tests

Grass variety tests for grazing tolerance were established in Lexington in the fall of 2010, 2011, 2012, and 2013. The soil at Lexington (Maury) is a well-drained silt loam and is well-suited to tall fescue, orchardgrass, and perennial ryegrass production. Plots were 5 feet 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 steers or heifers and kept at 2 to 4 inches for the remainder of the grazing season. The trials were rated for grazing preference 10 to 20 days after cattle were allowed to start grazing. (A rating of 1 indicates no forage removed and a rating of 9 indicates all forage was grazed.) Individual trials occasionally were clipped to remove seedheads or weed growth not controlled by herbicides. 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 30 pounds of

Table 1. Temperature and rainfall at Lexington, Kentucky in 2011, 2012, 2013 and 2014.

	2011				2012				2013				2014[2]			
	Temp		Rainfall		Temp		Rainfall		Temp		Rainfall		Temp		Rainfall	
	°F	DEP[1]	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	29	-2	2.10	-0.76	38	+7	4.80	+1.94	38	+7	4.50	+1.64	25	-6	2.28	-.58
FEB	39	+4	6.34	+3.13	40	+5	5.39	+2.18	36	+1	1.78	-1.43	30	-5	5.47	+2.26
MAR	47	+3	4.76	+0.36	56	+12	5.64	+1.24	39	-5	5.47	+1.07	39	-5	3.08	-1.32
APR	58	+3	12.36	+8.48	56	+1	3.26	-0.62	55	0	4.46	+0.58	58	+3	5.27	-1.89
MAY	64	0	6.72	+2.25	69	+5	4.02	-0.45	65	+1	5.23	+.076	66	+2	5.72	+1.25
JUN	74	+2	2.61	-1.05	73	+1	2.42	-1.24	72	0	7.32	+3.66	75	+3	2.93	-0.73
JUL	80	+4	6.29	1.29	81	+5	2.50	-2.50	72	-4	9.33	+4.33	74	-2	3.18	-1.82
AUG	75	0	2.89	-1.04	75	0	1.68	-2.25	72	-3	3.68	-0.25	76	+1	6.53	+2.60
SEP	66	-2	5.52	+2.32	67	-1	6.40	+3.20	67	-1	2.21	-0.99	69	+1	3.63	+.43
OCT	55	-2	4.10	+1.53	55	-2	2.00	-0.57	55	-2	7.02	+4.45	57	0	5.55	+2.98
NOV	50	+5	9.53	+6.14	43	-2	1.81	-0.65	41	-4	3.06	-0.33				
DEC	41	+5	5.58	+1.60	42	+6	9.57	+4.94	36	0	4.19	+0.21				
Total			68.80	+24.25			49.49	+4.94			58.25	+13.70			44.14	+6.96

[1] DEP is departure from the long-term average.
[2] 2014 data is for ten months through October.

Table 2. Seedling vigor, grazing preference and stand persistence of tall fescue varieties sown September 1, 2010 in a cattle grazing tolerance study at Lexington, Kentucky.

	Seedling Vigor[1]	Grazing Preference[2]				Percent Stand								
		2011	2012	2013	2014	2010	2011		2012		2013		2014	
Variety	Oct 14, 2010	Apr 25	May 2	May 8	May 15	Oct 14	Mar 15	Oct 4	Mar 23	Oct 10	Mar 21	Oct 15	Apr 3	Nov 3
Commercial Varieties—Available for Farm Use														
KY31+[3]	3.3	5.8	1.2	1.2	1.5	99	99	99	98	99	99	99	99	99*
Select	3.4	3.5	1.5	1.0	1.3	99	99	99	99	97	97	99	99	99*
Jesup EF	3.1	2.3	1.0	1.0	1.0	99	100	99	99	99	99	99	98	98*
Jesup MaxQ	1.6	3.7	1.5	1.0	1.0	96	98	98	98	98	98	98	98	98*
Bronson	3.9	2.8	1.3	1.5	1.2	99	100	99	99	98	97	98	97	97*
BarOptima PLUS E34	2.2	6.5	1.8	2.5	2.2	95	97	98	97	97	96	97	97	97*
Goliath	3.5	2.8	1.3	1.2	1.2	99	100	98	99	97	97	97	97	97*
Cajun II	3.6	3.2	1.0	1.0	1.5	99	99	99	99	97	97	97	97	97
Experimental Varieties														
KY31-[3]	3.8	4.7	1.2	1.2	1.5	99	99	99	99	99	99	98	98	98*
KYFA0901	2.6	4.8	1.2	1.3	1.0	96	96	96	95	96	96	96	96	98*
AgR 1521	2.6	4.2	1.0	1.3	1.3	98	99	99	99	99	98	98	97	97*
KYFA0601	3.7	4.0	1.7	1.2	1.5	99	99	99	99	98	97	97	97	97*
KYFA0701	3.5	4.3	1.3	1.5	1.5	98	99	99	98	98	97	97	96	97*
GA 29	2.5	2.8	1.7	1.2	1.2	97	98	98	97	97	97	97	97	97
TF 0202	2.9	6.5	1.5	2.0	2.5	98	99	99	98	99	99	98	97	97
AgR 1502	3.1	4.7	2.0	1.0	1.5	99	99	99	98	97	96	96	96	96
Mean	3.1	4.2	1.4	1.3	1.4	98	99	98	98	98	97	97	97	97
CV,5	25.5	25.3	55.2	37.4	40.8	2	2	2	2	2	2	2	2	2
LSD,0.05	0.9	1.2	0.9	0.6	0.7	3	2	2	2	2	2	2	2	2

[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. Grazing time before rating; 2011-7 days, 2012-29 days, 2013-16 days, 2014-23 days.
[3] KY 31- is the variety KY31 from which the toxic endophyte has been removed. KY31+ contains the toxic endophyte. Jesup MaxQ, AgR 1502 and AgR 1521 contain a non-toxic endophyte. BarOptima PLUS E34 contains a beneficial endophyte. The other fescue varieties in this test do not contain an endophyte.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

actual N per acre in March, 30 pounds of actual N in May and 40 pounds of actual N in November. Other fertilizers (lime, P, and K) were applied as needed according to the University of Kentucky soil test recommendations.

Results and Discussion

Weather data for Lexington are presented in Table 1. Data on percent stand are presented in Tables 2 through 13. 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,

Table 3. Seedling vigor, grazing preference and stand persistence of tall fescue varieties sown September 13, 2011 in a cattle grazing tolerance study at Lexington, Kentucky.

	Seedling Vigor[1]	Grazing Preference[2]			Percent Stand						
		2012	2013	2014	2011	2012		2013		2014	
Variety	Oct 11, 2011	May 2	May 20	May 15	Oct 11	Mar 23	Oct 10	Mar 21	Oct 14	Apr 3	Nov 3
Commercial Varieties—Available for Farm Use											
BarOptima PLUS E34	4.4	3.3	3.5	2.8	100	100	100	100	100	100	100*
HyMark	4.8	1.5	1.3	1.0	100	100	100	100	100	100	100*
Jesup EF	4.9	2.2	1.3	1.0	100	100	100	100	100	100	100*
Jesup MaxQ	4.5	2.6	1.0	1.0	100	100	100	100	100	100	100*
KY31+[3]	4.7	4.3	1.7	1.3	100	100	100	100	100	100	100*
Select	4.4	2.0	1.2	1.0	100	100	100	100	100	100	100*
Experimental Varieties											
AGRFA 148	4.7	2.8	1.0	1.0	100	100	100	100	100	100	100*
KY31-[3]	4.7	4.7	1.3	1.3	100	100	100	100	100	100	100*
KYFA0804	4.9	1.0	1.2	1.0	100	100	100	100	100	100	100*
KYFA0902	4.8	3.0	2.8	1.2	100	100	100	100	100	100	100*
KYFA0905	4.8	4.3	3.0	1.3	100	100	100	100	100	100	100*
NFTF 1411	4.8	2.7	1.0	1.0	100	100	100	100	100	100	100*
Mean	4.7	2.9	1.7	1.3	100	100	100	100	100	100	100
CV,%	5.8	28.3	52.5	28.2	0	0	0	0	0	0	0
LSD,0.05	0.3	0.9	1.0	0.4	0	0	0	0	0	0	0

[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. Grazing time before rating; 2012-7 days, 2013-28 days, 2014-23 days.
[3] KY 31- is the variety KY31 from which the toxic endophyte has been removed. KY31+ contains the toxic endophyte. Jesup MaxQ contains a non-toxic endophyte. BarOptima PLUS E34 contains a beneficial endophyte. The other fescue varieties in this test do not contain an endophyte.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

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: Can endophyte-free varieties persist as well as KY31+? and 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 14 (fescue), Table 15 (orchardgrass), and Table 16 (perennial ryegrass and festulolium) summarize 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); an "x" in the block indicates that 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 based on the 0.05 LSD. It is best to choose a variety that has performed well over several years.

Tables 17, 18, and 19 are summaries of stand persistence data from 1996 to 2014 of commercial tall fescue, orchardgrass, and perennial ryegrass varieties that have been entered in the Kentucky trials. In Table 17 the data is listed as a percentage 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 18 and 19 the data are 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 17, 18, and 19, but these comparisons do help 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 footnotes in Tables 17, 18, and 19 to determine to which yearly report to refer.

Table 4. Seedling vigor, grazing preference and stand persistence of tall fescue varieties sown August 30, 2012 in a cattle grazing tolerance study at Lexington, Kentucky.

Variety	Seedling Vigor[1] Oct 8, 2012	Grazing Preference[2] 2013 May 8	Grazing Preference[2] 2014 May 15	Percent Stand 2012 Oct 8	Percent Stand 2013 Mar 21	Percent Stand 2013 Oct 14	Percent Stand 2014 Apr 3	Percent Stand 2014 Nov 3
Commercial Varieties—Available for Farm Use								
Cowgirl	4.0	2.8	1.3	99	100	100	100	100*
KY31+[3]	3.1	2.3	1.7	97	100	100	100	100*
Select	3.3	1.2	1.2	98	99	99	99	100*
Jesup EF	2.7	1.0	1.0	98	100	100	99	99*
BarOptima PLUS E34	3.9	3.5	2.3	100	99	100	99	99
Flourish	3.6	4.5	1.2	98	98	99	99	99
Jesup MaxQ	3.2	1.2	1.0	99	99	100	99	99
Experimental Varieties								
KY31-[3]	3.7	2.0	1.2	100	100	100	100	100*
KYFA0905	3.3	3.3	1.5	99	99	99	100	100*
KYFA0901	3.3	2.8	1.2	98	99	100	100	100*
KYFA0906	3.0	2.5	1.3	98	99	99	99	100*
PPG-FTF 104	2.9	2.3	1.7	98	99	99	99	99
Mean	3.3	2.5	1.4	99	99	99	99	100
CV,%	33.8	42.5	37.2	2	1	1	1	1
LSD,0.05	1.3	1.2	0.6	2	2	2	1	1

[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. Grazing time before rating; 2013-16 days, 2014-23 days.
[3] KY 31- is the variety KY31 from which the toxic endophyte has been removed. KY31+ contains the toxic endophyte. Jesup MaxQ contains a non-toxic endophyte. BarOptima PLUS E34 contains a beneficial endophyte. The other fescue varieties in this test do not contain an endophyte.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Table 5. Seedling vigor, grazing preference and stand persistence of tall fescue varieties sown September 6, 2013 in a cattle grazing tolerance study at Lexington, Kentucky.

Variety	Seedling Vigor[1] Oct 14, 2013	Grazing Preference[2] May 1, 2014	Percent Stand 2013 Oct 14	Percent Stand 2014 Apr 2	Percent Stand 2014 Oct 6
Commercial Varieties—Available for Farm Use					
KY31+[3]	3.8	5.7	85	89	92*
BarOptima PLUS E34	3.3	5.3	78	81	89*
Jesup MaxQ	3.1	4.0	73	82	89*
Select	3.3	4.8	83	85	89*
Bull	2.8	3.5	71	75	87*
Cajun II	2.8	6.3	43	47	57
Experimental Varieties					
AGRFA-200/AR584	4.3	5.5	92	91	93*
KYFA9732/AR584	3.9	6.0	89	87	92*
KYFA9301/AR584	3.9	4.7	89	89	92*
KYFA0701	3.9	5.3	87	88	90*
GT213/AR584	4.3	5.0	90	88	89*
HTWC4	3.0	5.5	69	78	87*
KY31-[3]	2.7	5.8	72	73	86*
KYFA9821/AR584	3.1	5.7	54	74	86*
AGRFA-179/AR584	3.3	6.3	75	74	83*
AGRFA-201/AR605	2.8	5.0	52	61	77
BARFAF13131	2.0	6.3	23	35	42
Mean	3.4	5.3	72	76	83
CV,%	24.2	21.1	87	14	12
LSD,0.05	1.0	1.3	18	12	11

[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. Grazing time before rating; 9 days.
[3] KY 31- is the variety KY31 from which the toxic endophyte has been removed. Jesup MaxQ contains a non-toxic endophyte. BarOptima PLUS E34 contains a beneficial endophyte. AR584 and AR605 are non-toxic endophytes inserted into the experimental tall fescue varieties. KY31+ contains the toxic endophyte. The other fescue varieties in this test do not contain an endophyte.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Table 6. Seedling vigor, grazing preference and stand persistence of orchardgrass varieties sown September 1, 2010 in a cattle grazing tolerance study at Lexington, Kentucky.

	Seedling Vigor[1]	Grazing Preference[2]				Percent Stand								
		2011	2012	2013	2014	2010	2011		2012		2013		2014	
Variety	Oct 12, 2010	Apr 25	May 2	May 8	May 1	Oct 14	Mar 15	Oct 4	Mar 23	Oct 10	Mar 21	Oct 1	Apr 3	Nov 3
Commercial Varieties—Available for Farm Use														
Benchmark Plus	3.7	6.2	1.0	1.3	3.3	100	98	97	98	98	98	97	97	96*
Tekapo	3.0	6.2	1.3	3.7	5.5	100	100	97	98	99	99	97	96	95*
Persist	1.2	7.5	1.2	1.0	3.2	91	93	92	93	95	95	95	93	91*
Profit	3.7	6.0	1.7	2.2	4.0	100	100	98	98	98	98	95	93	90
Harvestar	2.8	7.7	2.0	3.7	7.7	99	100	96	97	98	98	90	85	81
Experimental Varieties														
OG 9902	4.5	5.5	1.3	1.0	3.7	100	100	98	98	99	99	96	91	93*
OG 0503	3.0	6.7	1.3	1.2	5.3	99	99	99	99	99	99	97	95	93*
Mean	3.1	6.5	1.4	2.0	4.7	98	99	97	97	98	98	95	93	91
CV,%	20.5	20.5	44.6	27.1	22.6	2	3	2	2	2	2	3	6	5
LSD,0.05	0.8	1.0	0.7	0.6	1.2	3	4	3	2	2	2	3	6	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. Grazing time before rating; 2011-7 days, 2012-29 days, 2013-16 days, 2014-9 days.
*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 13, 2011 in a cattle grazing tolerance study at Lexington, Kentucky.

	Seedling Vigor[1]	Grazing Preference[2]			Percent Stand						
		2012	2013	2014	2011	2012		2013		2014	
Variety	Oct 11, 2011	May 2	May 8	May 1	Oct 11	Mar 23	Oct 10	Mar 21	Oct 14	Apr 3	Nov 3
Commercial Varieties—Available for Farm Use											
Benchmark Plus	5.0	1.2	1.2	3.8	100	100	100	100	99	99	99*
Tekapo	4.9	1.8	4.8	6.2	100	100	100	100	99	97	98*
Persist	4.9	1.8	1.2	4.2	100	100	100	100	98	99	98*
Prairie	4.8	1.5	1.8	4.5	100	100	100	100	99	97	97*
Profit	5.0	1.3	3.3	5.0	100	100	100	100	98	94	93*
Harvestar	4.8	1.5	6.2	6.0	100	100	100	100	97	89	88
Mean	4.9	1.5	3.1	4.9	100	100	100	100	98	98	95
CV,%	5.5	48.4	35.5	27.4	0	0	0	0	2	2	9
LSD,0.05	0.2	0.9	1.3	1.6	0	0	0	0	2	10	10

[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. Grazing time before rating; 2012-29 days, 2013-16 days, 2014-9 days.
*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 August 30, 2012 in a cattle grazing tolerance study at Lexington, Kentucky.

	Seedling Vigor[1]	Grazing Preference[2]		Percent Stand				
		2013	2014	2012	2013		2014	
Variety	Oct 8, 2012	May 8	May 1	Oct 8	Mar 21	Oct 14	Apr 3	Nov 3
Commercial Varieties—Available for Farm Use								
Elise	3.4	3.7	5.5	99	100	100	100	99*
Benchmark Plus	4.5	2.0	3.5	99	99	99	99	98*
Tekapo	3.3	4.0	4.8	100	100	99	99	98*
Profit	4.3	1.8	5.3	100	100	99	98	97*
Persist	3.8	1.8	4.0	99	99	99	99	96
Experimental Varieties								
PPG-OG 106	2.7	4.2	5.8	98	99	99	99	98*
Mean	3.7	2.9	4.8	99	99	99	99	98
CV,%	14.4	19.7	18.8	1	1	1	1	2
LSD,0.05	0.6	0.7	1.1	2	1	1	1	2

[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. Grazing time before rating; 2013-16 days, 2014-9 days.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Table 9. Seedling vigor, grazing preference and stand persistence of orchardgrass varieties sown September 6, 2013 in a cattle grazing tolerance study at Lexington, Kentucky.

Variety	Seedling Vigor[1] Oct 14, 2013	Grazing Preference[2] May 1, 2014	Percent Stand 2013 Oct 14	Percent Stand 2014 Apr 2	Percent Stand 2014 Oct 6
Commercial Varieties—Available for Farm Use					
Prodigy	4.1	7.0	83	51	63*
Persist	3.3	7.6	70	31	51*
Benchmark Plus	3.7	7.8	77	33	49*
Prairie	4.2	6.8	78	34	48*
Profit	3.7	7.8	71	31	39*
Harvestar	3.4	7.8	63	18	29
Tekapo	4.5	8.3	88	12	23
Experimental Varieties					
B-SIG 613	3.0	7.3	45	23	38*
Mean	3.8	7.5	72	29	42
CV,%	17.7	9.3	21	43	49
LSD,0.05	0.8	0.9	18	15	24

[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. Grazing time before rating; 9 days.
*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 and festulolium (FL) varieties sown September 1, 2010 in a cattle grazing tolerance study at Lexington, Kentucky.

Variety	Seedling Vigor[1] Oct 14, 2010	Grazing Preference[2] 2011 Apr 25	2012 May 2	2013 May 8	2014 May 1	Percent Stand 2010 Oct 14	2011 Mar 15	2011 Oct 4	2012 Mar 23	2012 Oct 10	2013 Mar 21	2013 Oct 29	2014 Apr 3	2014 Nov 3
Commercial Varieties—Available for Farm Use														
BG34	4.2	7.7	1.2	3.5	5.2	100	100	100	100	86	86	85	88	85*
Barfest (FL)	4.0	6.7	2.2	3.5	5.8	100	100	99	99	90	91	78	76	73
SpringGreen (FL)	3.7	5.7	2.5	3.7	5.0	100	100	100	100	87	87	84	81	72
Linn (certified)	3.7	4.5	1.2	1.7	4.3	100	100	100	100	91	91	82	83	68
Power	3.7	7.5	2.5	2.8	4.8	100	100	99	99	93	92	78	72	67
Grand Daddy	3.7	6.3	1.7	2.2	4.7	100	100	100	100	86	86	75	68	63
Boost	4.3	4.8	2.2	4.2	5.0	100	99	99	100	79	81	70	68	52
Duo (FL)	5.0	4.0	3.0	2.8	5.7	100	99	88	93	72	72	63	50	45
Mean	4.0	5.9	2.0	3.0	5.1	100	100	98	99	95	86	77	73	66
CV,%	12.7	19.6	28.4	34.7	24.4	0	1	1	2	6	6	9	12	13
LSD,0.05	0.6	1.4	0.7	1.2	1.5	0	1	1	2	6	6	8	10	10

[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. Grazing time before rating; 2011-7 days, 2012-29 days, 2013-16 days, 2014-9 days.
*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 13, 2011 in a cattle grazing tolerance study at Lexington, Kentucky.

Variety	Seedling Vigor[1] Oct 11, 2011	Grazing Preference[2] 2012 May 2	2013 May 8	2014 May 1	Percent Stand 2011 Oct 11	2012 Mar 23	2012 Oct 10	2013 Mar 21	2013 Oct 14	2014 Apr 3	2014 Nov 3
Commercial Varieties—Available for Farm Use											
BG34	4.0	1.3	3.7	4.8	100	100	98	99	98	98	98*
Power	4.1	2.7	4.0	5.3	100	100	99	100	97	93	93*
Barfest (FL)	4.0	3.3	4.5	5.2	100	100	98	99	97	93	93*
Linn (certified)	3.8	1.3	1.8	5.2	100	100	99	99	98	94	93*
SpringGreen (FL)	4.1	2.7	4.3	5.7	100	100	98	99	97	93	93*
Grand Daddy	3.9	2.3	3.3	5.0	100	100	98	99	96	90	90
Boost	4.1	3.2	3.7	5.2	100	100	98	98	96	89	87
Duo (FL)	5.0	3.2	3.5	4.3	100	100	91	92	85	66	67
Experimental Varieties											
KYFA1016 (FL)	4.2	2.8	3.7	5.2	100	100	98	98	97	94	94*
KYFA1015 (FL)	3.9	3.7	4.5	5.8	100	100	99	99	97	90	91
Mean	4.1	2.7	3.7	5.2	100	100	98	98	96	90	90
CV,%	5.1	30.9	28.4	21.9	0	0	2	2	3	7	5
LSD,0.05	0.2	1.0	1.2	1.3	0	0	2	2	4	7	6

[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. Grazing time before rating; 2012-29 days, 2013-16 days, 2014-9 days.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

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 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 avoid overgrazing it during times of extreme stress, such as drought.

About the Authors

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Table 12. Seedling vigor, grazing preference and stand persistence of perennial ryegrass and festulolium (FL) varieties sown August 30, 2012 in a cattle grazing tolerance study at Lexington, Kentucky.

Variety	Seedling Vigor[1] Oct 8, 2012	Grazing Preference[2] 2013 Apr 30	Grazing Preference[2] 2014 May 1	Percent Stand 2012 Oct 8	2013 Mar 21	2013 Oct 14	2014 Apr 3	2014 Nov 3
Commercial Varieties—Available for Farm Use								
BG34	3.8	4.0	5.3	99	100	99	99	98*
Calibra	4.5	3.7	3.8	100	100	99	99	97*
Spring Green (FL)	4.1	4.3	4.7	100	100	99	99	97*
TetraGain	3.4	5.0	4.7	98	99	98	98	97*
Power	4.3	4.3	3.7	100	100	98	98	96*
Boost	4.4	3.8	4.8	100	100	98	98	96*
Duo (FL)	4.5	4.7	4.0	100	100	99	99	96*
Grand Daddy	4.1	4.3	4.3	100	100	99	99	95
Linn (certified)	4.2	3.2	3.8	99	100	100	99	90
Meadow Green (FL)	5.0	6.7	–	100	85	2	0	0
Mean	4.2	4.4	4.4	100	98	89	90	86
CV,%	13.2	26.9	26.5	1	3	2	1	3
LSD,0.05	0.6	1.4	1.3	1	3	2	1	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. Grazing time before rating; 2013-16 days, 2014-9 days.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Table 13. Seedling vigor, grazing preference and stand persistence of perennial ryegrass varieties sown September 6, 2013 in a cattle grazing tolerance study at Lexington, Kentucky.

Variety	Seedling Vigor[1] Oct 14, 2013	Grazing Preference[2] May 1, 2014	Percent Stand 2013 Oct 14	2014 Apr 2	2014 Oct 6
Commercial Varieties—Available for Farm Use					
Linn (certified)	3.6	4.8	95	95	96*
Grand Daddy	3.6	6.2	95	94	94*
PayDay	3.6	5.8	92	93	94*
Victorian	4.6	4.7	98	93	94*
Power	3.7	6.0	94	95	94*
Experimental Varieties					
B-13.0205	3.8	5.8	95	95	93*
Mean	3.8	5.6	95	94	94
CV,%	15.7	14.3	3	4	3
LSD,0.05	0.7	0.9	3	4	4

[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. Grazing time before rating; 9 days.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Table 14. Summary of persistence of tall fescue varieties under heavy grazing pressure across years at Lexington, Kentucky.[1]

Variety	Proprietor/ KY Distributor	2010[2]								2011						2012				2013	
		Mar	Oct	Mar	Oct	Mar	Oct	Apr	Nov	Mar	Oct	Mar	Oct	Apr	Nov	Mar	Oct	Apr	Nov	Apr	Nov
		2011[3]		2012		2013		2014		2012		2013		2014		2013		2014		2014	
Commercial Varieties—Available for Farm Use																					
BarOptima PLUS E34	Barenbrug USA	x[5]	*	*	x	x	x	*	*	*	*	*	*	*	*	*	*	*	x	*	*
Bronson	Ampac Seed	*	*	*	*	*	*	*	*												
Bull	Caudill Seed																			x	*
Cajun II	Smith Seed Services	*	*	*	x	*	x	*	*											x	x
Cowgirl	Pure Seed															*	*	*	*		
Flourish	Allied Seed															*	x	*	x		
Goliath	Ampac Seed	*	*	*	x	*	*	*	*												
HyMark	Fraser Seeds									*	*	*	*	*	*						
Jesup EF	Pennington Seed	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
Jesup Max Q	Pennington Seed	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	x	*	*
KY 31+[4]	KY Agric. Exp. Station	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Select	FFR/Southern States	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Experimental Varieties																					
AgR 1502	AgResearch (USA)	*	*	*	x	x	x	x	x												
AgR 1521	AgResearch (USA)	*	*	*	*	*	*	*	*												
AGRFA 148	AgResearch (USA)									*	*	*	*	*	*						
AGRFA-179/AR584	AgResearch (USA)																			x	*
AGRFA-200/AR584	AgResearch (USA)																			*	*
AGRFA-201/AR584	AgResearch (USA)																			x	x
BARFAF13131	Barenbrug USA																			x	x
GA-29	Univ. of Georgia	*	*	*	*	*	x	*	x												
GT213/AR584	AgResearch (USA)																			x	*
HTWC4	KY Agric. Exp. Station																			x	*
KY 31-[4]	KY Agric. Exp. Station	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	x	*
KYFA0601	KY Agric. Exp. Station	*	*	*	*	*	*	*	*												
KYFA0701	KY Agric. Exp. Station	*	*	*	*	*	*	*	*											*	*
KYFA0804	KY Agric. Exp. Station									*	*	*	*	*	*						
KYFA0901	KY Agric. Exp. Station	x	*	x	x	x	x	x	*							*	*	*	*		
KYFA0902	KY Agric. Exp. Station									*	*	*	*	*	*						
KYFA0905	KY Agric. Exp. Station									*	*	*	*	*	*	*	*	*	*		
KYFA0906	KY Agric. Exp. Station															*	*	*	*		
KYFA9732/AR584	KY Agric. Exp. Station																			*	*
KYFA9301/AR584	KY Agric. Exp. Station																			*	*
KYFA9821/AR584	KY Agric. Exp. Station																			x	*
NFTF 1411	Noble Foundation									*	*	*	*	*	*						
PPG-FTF 104	Mountain View Seeds															*	x	*	x		
TF0202	Allied Seed	*	*	*	*	*	*	*	x												

[1] For detailed stand ratings over years, see individual trial tables.
[2] Establishment year.
[3] Date of rating of percent stand.
[4] KY 31- is the variety KY31 from which the toxic endophyte has been removed. KY31+ contains the toxic endophyte. Jesup MaxQ, AgR1502 and AgR1521 contain a non-toxic endophyte. BarOptima PLUS E34 contains a beneficial endophyte. AR584 is a non-toxic endophyte inserted into experimental tall fescue varieties. The other fescue varieties in this table do not contain an endophyte.
[5] x in the block indicates the variety was in the test but plant survival was significantly less than the most persistent variety. An open block indicates the variety was not in the test.
*Not significantly different from the most persistent variety in the test.

Table 15. Summary of persistence of orchardgrass varieties under heavy grazing pressure across years at Lexington, Kentucky.

Variety	Proprietor/KY Distributor	2010[1]								2011						2012				2013	
		Mar	Oct	Mar	Oct	Mar	Oct	Apr	Nov	Mar	Oct	Mar	Oct	Apr	Nov	Mar	Oct	Apr	Nov	Apr	Oct
		2011[2]		2012		2013		2014		2012		2013		2014		2013		2014		2014	
Commercial Varieties—Available for Farm Use																					
Benchmark Plus	FFR/Southern States	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	x	*
Elise	Pure Seed															*	*				
Harvestar	Columbia Seeds	*	*	*	*	*	x	x	x	*	*	*	x	*	x					x	x
Persist	Smith Seed Services	x[3]	x	x	x	x	*	*	*	*	*	*	*	*	*	*	*	*	x	x	*
Prairie	Turner Seed									*	*	*	*	*	*					x	*
Prodigy	Caudill Seed																			*	*
Profit	Ampac Seed Co.	*	*	*	*	*	*	*	x	*	*	*	*	*	*	*	*	x	*	x	*
Tekapo	Ampac Seed Co.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	x	x
Experimental Varieties																					
B-SIG 613																				x	*
OG 0503	FFR/Southern States	*	*	*	*	*	*	*	*												
OG 9902	FFR/Southern States	*	*	*	*	*	*	*	*												
PPG-OG 106	Mountain View Seeds															*	*	*	*		

[1] Establishment year.
[2] Date of visual rating of percent stand.
[3] x in the block indicate the variety was in the test but stand survival was significantly less than the most persistent variety. Open blocks indicate the variety was not in the test.
*Not significantly different from the most persistent variety.

Table 16. Summary of persistence of perennial ryegrass and festulolium (FL) varieties under heavy grazing pressure across years at Lexington, Kentucky.

Variety	Proprietor/KY Distributor	2010[1]								2011						2012				2013	
		Mar	Oct	Mar	Oct	Mar	Oct	Apr	Nov	Mar	Oct	Mar	Oct	Apr	Nov	Mar	Oct	Apr	Nov	Apr	Nov
		2011[2]		2012		2013		2014		2012		2013		2014		2013		2014		2014	
Commercial Varieties—Available for Farm Use																					
Barfest (FL)	Barenbrug USA	*	*	*	*	*	*	x	x	*	*	*	*	*	*						
BG34	Barenbrug USA	*	*	*	x[3]	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
Boost	Allied Seed	*	*	*	x	x	x	x	x	*	*	*	*	x	x	*	*	*	*		
Calibra	DLF International															*	*	*	*		
Duo (FL)	Ampac Seed Co.	*	x	x	x	x	x	x	x	*	*	x	x	x	x	*	*	*	*		
Grand Daddy	Smith Seed	*	*	*	*	*	x	x	x	*	*	*	*	x	x	*	*	*	x	*	*
Linn	Public	*	*	*	*	*	*	*	x	*	x	*	*	*	*	*	*	*	x	*	*
Meadow Green (FL)	Pure Seed															x	x	x	x		
PayDay	Mountain View Seeds																			*	*
Power	Ampac Seed Co.	*	*	*	*	*	*	x	x	*	*	*	*	*	*	*	*	*	*	*	*
SpringGreen (FL)	Rose Agri-Seed	*	*	*	*	*	*	*	x	*	*	*	*	*	*	*	*	*	*		
Tetra Gain	Pure Seed															*	*	*	*		
Victorian																				*	*
Experimental Varieties																					
B-13.0205	Blue Moon Farms																			*	*
KYFA1015 (FL)	KY Agric.Exp. Station									*	*	*	*	x	x						
KYFA1016 (FL)	KY Agric.Exp. Station									*	*	*	*	*	*						

[1] Establishment year.
[2] Date of visual rating of percent stand.
[3] x in the block indicates the variety was in the test but plant survival was significantly less than the most persistent variety. An open block indicates the variety was not in the test.
*Not significantly different from the most persistent variety.

Table 17. Summary of 1996-2014 Kentucky tall fescue grazing tolerance trials (stand persistence shown as a percent of the stand rating of KY 31+).

		Lexington																Princeton	
		1996[1,2]	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2002	Mean[3]
Variety	Proprietor	3yr[4]	4yr	3yr	4yr	4yr	4yr	4yr	4yr	4yr	4yr	4yr	4yr	4yr	4yr	4yr	3yr	4yr	*(#trials)*
Advance MaxQ	Pennington Seed											94							–
Bariane	Barenbrug USA								89		75	47	29						60(4)
Barcel	Barenbrug USA	92																	–
BarElite	Barenbrug USA												96						–
Barolex	Barenbrug USA										78	101	86						88(3)
BarOptima PLUS E34	Barenbrug USA										100		97			98	100		99(4)
BAR9TMPO	Barenbrug USA				75														–
Bronson	Ampac Seed			39											98	98			78(3)
Cajun II	Smith Seed Services															98			–
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															–
Goliath	Ampac Seed															98			–
Hoedown	DLF-Jenks					88													–
HyMark	Fraser Seeds													95			100		98(2)
Jesup EF	Pennington Seed		63	91					99							99	100		90(5)
Jesup MaxQ	Pennington Seed			114	79			103	97		68	102	97	97	99	98	100	105	96(12)
Johnstone	Proseeds		65	107			92												88(3)
KY31+[5]	KY Agri. Exp Sta.	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100(17)
KY31-[5]	KY Agri. Exp Sta.	94	90	102	84		98	103	98	100	82	100	100	98	99	99	100	105	97(16)
Kenhy	Public			116															–
Kokanee	Ampac Seed					43													–
Martin II	International Seeds		59																–
Maximize	Rose Agri-Seed						99												–
Nanryo	Japanese Grassland For. Seed												100						–
Orygun	–							99											–
Resolute	Ampac Seed						23												–
Select	FFR/Sou. St.			109	69	107	101	100	100		67	100	93	95	97	99	100	98	95(14)
Southern Cross	–		25																–
Stargrazer	FFR/Sou. St.	90			52	86	89												79(4)
Stockman	Seed Res. of OR									102									–
Texoma MaxQ	Pennington Seed										88	100	98						95(3)
TF33	Barenbrug USA			34															–
Tuscany II	Seed Res. of OR											100							–
Verdant	Am.Grass Seed											97							–
Vulcan	International Seeds			109															–

[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 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.

[5] KY 31- is the variety KY31 from which the toxic endophyte has been removed. KY31+ contains the toxic endophyte. Jesup MaxQ, Texoma MaxQ and Advance MaxQ contain a non-toxic endophyte. BarOptima PLUS E34 contains a beneficial endophyte. The other fescue varieties in this table do not contain an endophyte.

Table 18. Summary of 1998-2014 Kentucky orchardgrass grazing tolerance trials (stand persistence shown as a percent of the mean of the commercial varieties in the trial).

		Lexington												Princeton	Mean[4]
		1998[1,2]	1999	2000	2001	2002	2003	2004	2005[3]	2007	2009	2010	2011	2002	
Variety	Proprietor	3yr[5]	4yr	4yr	4yr	4yr	4yr	4yr	4yr	4yr	4yr	4yr	3yr	4yr	*(#trials)*
Abertop	Pennington Seed					38									–
Albert	Univ. of Wisconsin				115										–
Amba	DLF-Jenks				71										–
Ambrosia	Pennington Seed									94					–
Athos	DLF-Jenks				93				60						77(2)
Benchmark	FFR/Sou. States	115	94	118	123	114								133	116(6)
Benchmark Plus	FFR/Sou. States					120			152	135	106	106	104	133	117(6)
Boone	Public	131		102											117(2)
Cheyenne	Western Prod. Inc.	94													–
Command	Seed Research of OR							81							–
Crown	Donley Seed	96													–
Crown Royale	Donley Seed				100										–
Crown Royale Plus	Donley Seed					124								83	104(2)
Hallmark	James VanLeeuwen	104	103		115		113							83	104(5)
Harvestar	Columbia Seeds									75		89	93		86(3)
Haymate	FFR/Sou. States	102	96	53	115	100	118							83	95(7)
Intensiv	Barenbrug USA						51								–
Mammoth	DLF-Jenks				115										–
Megabite	Turf Seed				77										–
Niva	DLF-Jenks					76								83	80(2)
Persist	Smith Seed								138	107	103	100	103		103(4)
Pizza	Advanta Seeds	63													–
Potomac	Public					116		119						117	117(3)
Prairie	Turner Seed			127	121								102	83	108(4)
Profile	Scott Seed					116									–
Profit	Ampac Seed										95	99	98		97(3)
Tekapo	Ampac Seed	92	104		55	74	118		50	103	95	105	103	100	95(10)
Takena	Smith Seed				99										–
Seco	FFR/Sou. States									85					–
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 1999 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] Due to high variation during 2005 these values are not included in the overall mean.
[4] Mean only presented when respective variety was included in two or more trials.
[5] Number of years of data.
Stand thinning may have been greater for preferred varieties due to closer grazing. See individual trial tables for preference ratings.

Table 19. Summary of 2000-2014 Kentucky perennial ryegrass and festulolium (FL) grazing tolerance trials in Lexington (stand persistence shown as a percent of the mean of the commercial varieties in the trial).

Variety	Proprietor	2000[1,2] 4yr[4]	2001 3yr	2003 4yr	2005 3yr	2007 4yr	2008 4yr	2010 4yr	2011 3yr	Mean[3] *(#trials)*
AGRLP103	AgResearch USA	128		86						107(2)
Aries	Ampac Seed		139							–
Barfest (FL)	Barenbrug USA							111	104	108(2)
BG 34	Barenbrug USA				176[5]	145[5]		129	110	140(4)
Boost	Allied Seed						101	79	97	92(3)
Citadel	Donley Seed	107								–
Duo (FL)	Ampac Seed	116					95	68	75	89(4)
Grand Daddy	Smith Seed Services		121			70		95	101	97(4)
Lasso	DLF-Jenks		130							–
Linn (certified)	Public	112	129	63			95	103	104	101(6)
Maverick	Ampac Seed		36							–
Polly II	FFR/Southern States	36	68							52(2)
Power	Ampac Seed					134		102	104	113(3)
Quartet	Ampac Seed		77		63	50				60(3)
Remington	Barenbrug USA			151[5]						–
Spring Green (FL)	Rose Agri-Seed	101					109	109	104	105(4)
Tonga	Ampac Seed				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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