

Preference, Yield & Forage Nutritive Value of Annual Grasses

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With one of the greatest expenditures of horse ownership being feed costs, owners often look for ways to decrease these costs. Pastures can provide a lower cost forage source and have the capability to meet or exceed dietary requirements for many categories of horses. Therefore, maximizing pasture productivity can be a valuable tool for reducing feed costs. In the Midwest, cool-season perennial grasses are the foundation of productive horse pastures. However, there may be opportunities to utilize alternative forages such as annual cool-season grasses to extend the grazing season earlier in the spring or later in the fall. In addition, annuals can be used to provide forage in emergency grazing situations when perennial forages are lost to winterkill, floods, or drought.

University of Minnesota researchers set out to evaluate the preference, yield, and forage nutritive value of annual cool-season grasses under horse grazing during the summer and fall seasons. The research was completed in the summer and fall of 2013 and 2014. Annual grasses seeded in the spring and grazed during the summer included spring barley, spring oat, spring wheat, winter wheat, and annual ryegrass. Grasses seeded in the summer and grazed during the fall included the same five spring-planted species plus winter barley, winter rye, and a forage-type spring oat. Prior to grazing, all grasses were evaluated for maturity and sampled to determine yield and forage nutritive value. Adult horses grazed all grasses for 4 hours, beginning in June for summer-grazed grasses and beginning in September for fall-grazed grasses. Immediately after grazing, horse preference was determined by visually assessing the percentage of available forage removal on a scale of 0 (no grazing activity) to 100 (100% of the existing vegetation grazed). Grasses were mowed to an even height, allowed to regrow, and grazing was repeated.

Horses showed distinct preferences among the grasses. In general, horses preferred annual ryegrass, spring wheat, and winter wheat, which had percent removals from 35-94%. Horses had a lesser preference for spring oat, spring forage oat, winter barley, and winter rye, which had percent removals from 7-32%.

Yield differed among grass species. Among the summer-grazed grasses, yields were typically higher for annual ryegrass and spring oat (1.7-2.1 tons/ac) and lower for spring wheat, spring barley, and winter wheat (1.1-1.8 tons/ac). Among the fall-grazed grasses, yields were typically higher for spring forage oat, annual ryegrass, and winter barley (1.2-2.9 tons/ac) and lower for spring wheat, spring barley, and winter rye (0.9-1.9 tons/ac). Additional consideration should also be given to regrowth potential, as a greater amount of regrowth following grazing will result in increased forage availability for future grazing events. In general, annual ryegrass and the winter species had the greatest regrowth potential (Figure 1), producing more even and consistent yields across subsequent grazing events. In contrast, spring barley, spring oat, and spring wheat produced a higher portion of their total season yield during the first grazing, but had little to no regrowth.

Figure 1. Regrowth after two grazing events for spring oat (left), spring barley (middle), and annual ryegrass (right).



Table 1. Forage nutritive values of annual cool-season grasses grazed by horses in either the summer or fall in 2013 & 2014.

Species	2013 Grazing				2014 Grazing			
	CP (%)	NDF (%)	NSC (%)	DE (Mcal/lb)	CP (%)	NDF (%)	NSC (%)	DE (Mcal/lb)
Summer								
Annual Ryegrass	21 ^{cd}	46 ^c	17 ^a	1.08 ^b	23 ^{ab}	49 ^{ab}	15 ^{ab}	1.04 ^a
Spring Barley	25 ^b	48 ^{bc}	13 ^b	1.05 ^{bc}	25 ^a	47 ^b	15 ^{ab}	1.05 ^a
Spring Oat	20 ^d	51 ^{ab}	16 ^{ab}	1.02 ^{cd}	20 ^b	52 ^a	17 ^a	1.02 ^{ab}
Spring Wheat	24 ^{bc}	53 ^a	10 ^c	0.98 ^d	24 ^a	53 ^a	11 ^c	0.99 ^b
Winter Wheat	29 ^a	40 ^d	16 ^{ab}	1.13 ^a	26 ^a	47 ^b	14 ^b	1.05 ^a
Fall								
Annual Ryegrass	27 ^b	43 ^{cd}	17 ^a	1.10 ^a	32 ^{bc}	42 ^{cd}	14	1.09 ^{ab}
Spring Barley	27 ^b	48 ^{bc}	13 ^b	1.05 ^a	33 ^b	44 ^c	12	1.07 ^{bc}
Spring Forage Oat	29 ^b	44 ^{cd}	13 ^b	1.08 ^a	33 ^b	43 ^c	12	1.08 ^{bc}
Spring Oat	18 ^c	58 ^a	13 ^b	0.95 ^b	25 ^d	53 ^a	13	0.98 ^c
Spring Wheat	27 ^b	53 ^{ab}	12 ^b	0.99 ^b	30 ^c	49 ^b	12	1.02 ^{de}
Winter Barley	31 ^{ab}	44 ^{cd}	13 ^b	1.08 ^a	33 ^b	46 ^{bc}	12	1.05 ^{cd}
Winter Rye	33 ^a	42 ^d	13 ^b	1.10 ^a	37 ^a	39 ^d	13	1.12 ^a
Winter Wheat	31 ^{ab}	45 ^{cd}	14 ^b	1.07 ^a	31 ^{bc}	44 ^c	13	1.07 ^{bc}

^{a-b}Within column and season, means without a common superscript differ ($P \leq 0.05$).

Forage nutritive values differed among annual grass species (Table 1). Forage nutritive values were affected primarily by plant maturity, with winter species remaining more vegetative and generally having greater forage nutritive values compared to spring species. However, all grasses contained $\geq 18\%$ crude protein (CP), $\leq 58\%$ neutral detergent fiber (NDF), $\leq 17\%$ nonstructural carbohydrates (NSC), and ≥ 0.95 Mcal/lb of equine digestible energy (DE) and would meet the CP and DE requirement of many classes of adult horses.

When making forage pasture decisions, it is important to consider horse preference, total yield, yield distribution, and forage nutritive values. Based on a combination of these factors, annual ryegrass appears to be a good option for horse owners looking to extend the grazing season or in need of emergency forage during both the summer and fall seasons.