Effect of Height on Forage Quality of Several Cool-Season Grasses

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Animal movement in Management Intensive Rotational Grazing (MIRG) systems is based on pasture height. Grazing height recommendations are based on optimizing forage quality, yield, and persistence of a given species. Grazing shorter and more frequently, while providing high quality forage, has a negative impact on yield and pasture longevity. Grazing taller increases long-term yield and plant vigor at the expense of quality. Two recent Wisconsin studies suggest the relationship between pasture height and forage quality is poor in well-managed, vegetative pastures. Waldera (unpublished) sampled vegetative pastures in Western Wisconsin at different heights and found no significant relationship between height and quality. Cosgrove and Cooper (2008) sampled vegetative pastures on 7 different farms throughout Wisconsin to determine forage quality as part of a larger study aimed at estimating forage DM intake. Pastures were sampled at a range of heights. When these heights are regressed against quality there is a very poor relationship. Results of these studies, along with grazer personal experience, suggest the relationship between height and quality should be reexamined. Current recommendations, while likely applicable to reproductive grasses, may not be appropriate for grasses during vegetative stages of growth. If, indeed, pasture quality is maintained at heights greater than current recommendations, grazers could graze taller, meaning higher yields and more dense, longer lasting pastures.

Figure 1. *Effect of height on bromegrass quality - reproductive.*

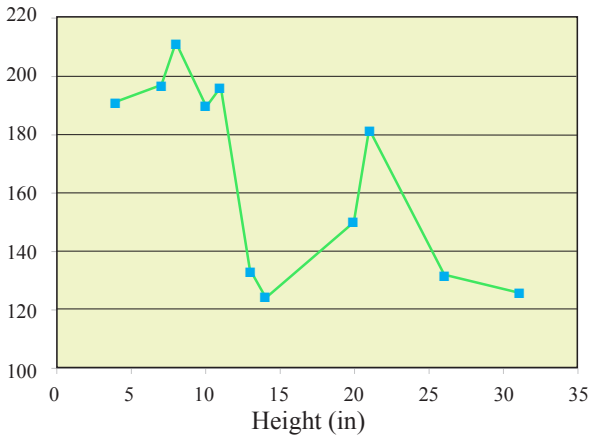
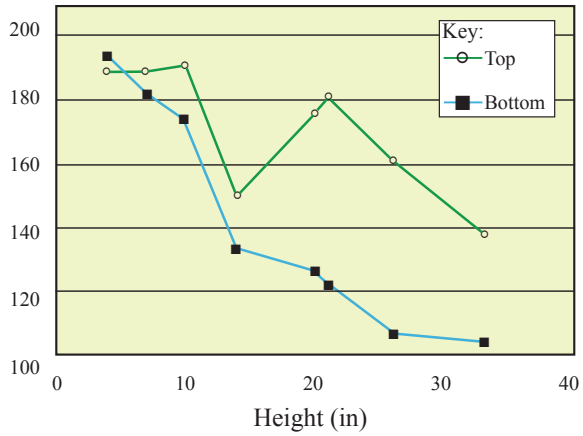


Figure 2. *Effect of height on bromegrass quality - reproductive.*



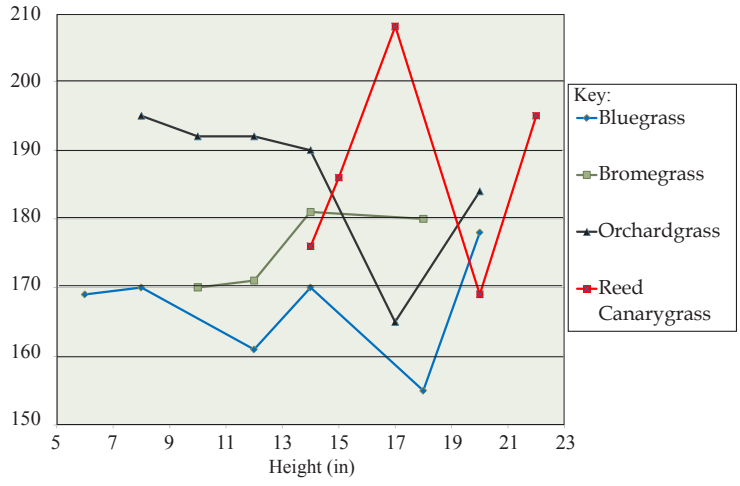
Materials and Methods

Species examined were smooth bromegrass, orchardgrass, Kentucky bluegrass and reed canarygrass. Data were collected at the UW-River Falls Laboratory Farm. Plant height was measured approximately every 3 days beginning in May and continuing until plants were fully headed. Height was measured each day and plants were sampled for quality. Samples were clipped at the recommended residual height for that species. Separate samples were separated into "top half" and "bottom half" to simulate a higher and lower residual. Height was measured ten times at each sampling date for each species. Three samples were taken for forage quality analysis at each date for each species. Following heading stage, pastures were clipped. The sampling process was repeated after clipping to obtain samples representative of vegetative stage. Sampling at this stage continued until quality dropped below acceptable levels. This entire process was repeated 2 years in order to obtain data from different environments.

Results and Discussion

Recommended grazing heights for examined species: bluegrass - begin at 6 in. and stop at 2 in.; orchardgrass, bromegrass and reed canarygrass - begin at 10 in. and stop at 4 in. Collected data support these recommendations for grasses in the reproductive stage. The point at which RFQ dropped below 150 (dairy quality) was 12 in. for smooth bromegrass and reed canarygrass, and 8 in. for Kentucky bluegrass. Heights correspond closely to recommended heights at which to begin grazing. A delay in grazing beyond these heights resulted in significant quality drops. The exception was orchardgrass which maintained quality at heights up to 18 in. - well above the recommended height to begin grazing. Smooth bromegrass data are presented in Figures 1 and 2.

Figure 3. *Effect of height on pasture forage quality - vegetative stage.*



Separating plants into top and bottom halves showed the top portion drops in quality less rapidly than the bottom. Bromegrass bottoms dropped below 150 RFQ at 10 in. compared with over 20 in. for tops. Reed canarygrass bottoms were below 150 RFQ at 18 in. compared with 28 in. for tops. Kentucky bluegrass bottoms dropped below 150 at 9 in. compared to 12 in. for tops. Orchardgrass held quality longer with bottoms dropping below 150 at 20 in. compared with 13 in. for tops. Results support the practice of "leader-follower," where animals with higher nutritional requirements graze first followed by those with lower requirements.

Table 1. *Average heights to begin and end grazing for common cool-season grasses.*

Species	Plant Height (in.)			
	Reproductive Phase		Vegetative Phase	
	Start Grazing	Stop Grazing	Start Grazing	Stop Grazing
Orchardgrass *Bromgrass* *Tall fescue* *Timothy* *Reed canarygrass*	**10**	**4**	**10 or more**	**4**
Perennial ryegrass *Kentucky bluegrass*	**6**	**2**	**6 or more**	**2**

Relationship between height and forage quality is strong in grass in the reproductive stage, but weaker in the vegetative phase. Figure 3 shows effect of height on quality in the vegetative phase for the grasses sampled in this study. Regardless of height, forage quality remained high (above 150 RFQ).

Results suggest current grazing height recommendations are appropriate for grasses in the reproductive phase (spring growth). Once seed heads are removed and grasses consist only of vegetative growth, grazing heights can be increased without a significant quality loss. Proposed recommendations for grass grazing heights in the vegetative stage are shown in Table 1.

References. *Cosgrove, D.R. and D.P. Cooper. 2008. Estimating Forage Dry Matter Intake of Dairy Cattle on Pasture. Proc. WI Grazing Conf.*