

SWARD HEIGHT ON THE PERFORMANCE OF COW-CALF UNITS AND YEARLING STEERS GRAZING COOL SEASON PASTURE

E.C. Prigge¹, W.B. Bryan² and E.L. Nestor¹

¹Division of Animal and Veterinary Sciences, ²Division of Plant and Soil Sciences
West Virginia University, Morgantown, WV 26506, U.S.A.

ABSTRACT

Performance and grazing time of cow-calf units and yearling steers were determined over four years on naturalized cool season pastures maintained at a sward height of 4-6, 6-8, 8-10, or 10-12 cm. Daily gains of cows and steers responded quadratically ($P < 0.05$) to increasing sward heights, with gains maximized at 8-10 cm. Milk production of the cows and gain of the calves were not affected ($P > 0.10$) by sward height. Grazing days (cow-calf unit/hectare) decreased linearly ($P < 0.01$) with increasing sward height. The proportion of the day spent grazing for cows and steers decreased in a linear manner ($P < 0.05$) as pasture height increased. Cows spent less time grazing than steers ($P < 0.05$) at all but the low pasture height.

KEYWORDS

Cattle, pasture, grazing, sward height, animal performance, grazing behavior

INTRODUCTION

Sward height, through its influence on grazing behavior, is a major determinant of productivity of grazing ruminants (Hodgson, 1986). On perennial ryegrass pastures (*Lolium perenne* L.) (Wright and Whyte, 1989) production of cow-calf units (*Bos taurus* L.) was maximized on pasture maintained between 8 and 10 cm. For gains of steers and bulls similar responses to sward height were reported by Morris et al., (1993) on similar swards. The purpose of this investigation was to determine the sward height to maximize production of cow-calf units and yearling steers grazing naturalized pastures in the Appalachian highlands of the USA. Grazing time as influenced by sward height, month of the year, and cattle type (cows vs steers) was also examined in this study.

MATERIALS AND METHODS

Twelve one hectare plots in three blocks of predominately Kentucky bluegrass (*Poa pretensis* L.) pastures were randomly assigned to be maintained at four sward heights (4-6, 6-8, 8-10, and 10-12 cm) through the grazing season at the initiation of a four year study. From mid April through September cow-calf units and steers were used on a put-and-take basis to maintain pastures at the appropriate heights. One cow-calf unit (multiparous) and one yearling steer, were randomly assigned as tester animals to each plot yearly. All cattle were weighed when placed on or removed from the plots. Grazing of the testers on all plots was initiated when the appropriate height was reached on the 10-12 cm plots within a block. Sward height was monitored using the HFRO sward stick (50 readings/plot) and appropriate adjustments in cattle numbers were conducted on a weekly basis. For determinations of grazing days, two steers equaled one cow-calf unit. Grazing behavior, milk production and forage chemical composition were determined for the first two years of the study and animal production data were collected for four years. Grazing behavior was determined once for the cows (May) and twice for the steers (May and July). Forage chemical composition estimated from clip samples collected at specific grazing sites were determined three times yearly (May, July, September). The clip samples were dried, ground and analyzed for *in vitro* dry matter digestibility (IVDMD) (Barnes, 1969), acid detergent fiber (ADF) and crude protein (CP) (AOAC, 1990). Milk production, estimated using the

weigh suckle weigh technique, was measured at the same times as forage composition the first year. During the second year only values for May were collected due to early removal of the tester cows from the plots. Grazing behavior was monitored over a 3 day period using vibrator recorders.

The experiment was analyzed as a randomized complete block (SAS, 1985) with year considered a random event. Variables measured were tested for linear and quadratic effects in response to sward height.

RESULTS AND DISCUSSION

Quality of the pasture averaged over season showed a linear trend toward increasing ADF ($P = 0.15$) and decreasing CP ($P < 0.10$) and IVDMD ($P < 0.01$) as pasture height increased (Table 1). Forage quality was also influenced by month with IVDMD ($P < 0.01$) values higher in May and lower in July when compared to pastures sampled in September.

Both cow and steer gains (Table 1) showed a quadratic response ($P < 0.10$ and $P < 0.05$, respectively) with sward height. A sward height of 8-10 cm resulted in greater daily gains for steers and cows when compared to pastures maintained at lower or higher heights. Calf gains remained similar regardless of sward height as did milk production (Table 1). The results of this study were remarkably similar to those of Wright and Whyte (1989) in regard to the influence of sward height on gain of the cows and calves and milk production of the cows. These similarities suggest that results from short term studies on perennial ryegrass swards can be applied directly to long term production on Kentucky bluegrass dominated swards.

The number of cow-calf unit grazing days decreased linearly as sward height increased suggesting that the optimal sward height for maximizing profit/hectare may well be different for cow-calf production when compared to yearling cattle production. Since calf gains were not influenced by sward height, the production of weaning calves per hectare would be maximized at the low sward height.

For both cows and steers grazing time decreased linearly ($P < 0.05$) as forage height increased (Table 2). Averaged over all pasture heights steers spent 43% while cows spent 37% of the time grazing, however at the lowest sward height grazing time was similar for both. These results suggest that cows are more efficient grazers than steers when forage is ample. Season also influenced behavior with steers spending more time grazing in May as opposed to July ($P < 0.01$). Reasons for this difference are unclear, however increased size of the steers may have resulted in increased grazing efficiency, or perhaps warmer weather or decreased forage quality were responsible.

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Table 1

Influence of sward height on IVDMD¹, daily gain, milk production and grazing days of cow-calf units on naturalized pastures

Item	<u>Sward height, cm</u>				SEM ²	Significance ³
	4 - 6	6 - 8	8 - 10	10 - 12		
IVDMD,%	69.7	66.8	67.3	64.1	0.6	L**
Cow gain, kg/day	0.12	0.41	0.47	0.39	0.1	Q*
Calf gain, kg/day	1.08	1.16	1.16	1.17	0.03	NS
Steer gain, kg/day	0.81	0.89	0.92	0.74	0.04	Q**
Milk, kg/day	9.6	8.1	7.3	8.7	2.1	NS
Grazing, days/ha ⁴	334	252	223	182	10	L**

¹ IVDMD = In vitro dry matter disappearance

² SEM = Standard error of the mean

³ NS = non significant (P>0.10), L = significant linear effect, Q = significant quadratic effect, * = P<0.05 level of significance, ** = P<0.01 level of significance.

⁴ Per cow-calf unit

Table 2

Influence of sward height on the proportion of day spent grazing

Item	<u>Sward height, cm</u>				SEM ¹	Significance ²
	4 - 6	6 - 8	8 - 12	10 - 12		
Steers ³ , %	45.1	41.9	47.2	38.2		
Cows ³ , %	46.5	37.7	32.0	35.3	1.6	HxA*, L*
May ⁴ , %	45.1	41.9	47.2	38.2		
July ⁴ , %	34.6	32.9	33.5	26.9	1.9	M**

¹ SEM = standard error of the mean

² HxA = significant sward height x animal type interaction, L = significant linear effect for animal type, M = Significant month effect, * = P<0.05 level of significance, ** = P<0.01 level of significance

³ Comparison for month of May only

⁴ Comparison for steers only