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This collection is currently under construction.

The XIX International Grassland Congress took place in São Pedro, São Paulo, Brazil from February 11 through February 21, 2001.

Proceedings published by Fundacao de Estudos Agrarios Luiz de Queiroz

ID # 07-17

INFLUENCE OF SWARD HEIGHT, CONCENTRATE SUPPLEMENTATION AND SEASON ON GRAZING ACTIVITY OF BEEF COWS

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Abstract

The influence of sward height, concentrate supplementation and season on daily pattern of forage consumption of lactating beef cows grazing cool season pastures was determined. Cows (n=24; BW=535±10.8 kg) were randomly assigned to eight plots maintained at sward heights (SH) of either 4-8 cm or 8-12 cm and fed three levels of concentrate supplement: none = 0 kg/day, low = 3.12 kg/day or high = 6.24 kg/day. Cows on lower SH had greater (P<.08) forage dry matter intake and spent an additional 1.2 hours/day (P<.01) grazing compared to the higher SH. Cows on lower SH consumed 7.7 kg/day of forage dry matter and grazed 9.4 hours/day whereas those on higher SH consumed 7.1 kg/day and grazed 8.2 hours/day. Cows on lower SH grazed 0.7 hours/day (P<.06) and 0.4 hours/day (P<.08) longer at 06:00-10:00 hour and 11:00-13:00 hour, respectively, compared to the higher SH. Grazing efficiency (kg of forage consumed/hour of grazing) decreased (P<.01) as season progressed. Season influenced duration of grazing activity (P<.01). Cows grazed 0.5 hours longer (P<.01) at 06:00-10:00 hour late in summer (August) compared to spring (May) and mid summer (June/July). Cows grazed 0.3 hours longer (P<.08) at 11:00-13:00 hour during spring compared to late summer.

Keywords: Sward Height, Supplementation, Grazing, Cattle

Introduction

Concentrate supplements are offered to grazing cattle to increase animal performance or to compensate for low herbage mass in order to maintain performance. Changes in normal grazing activity from feeding of supplements can affect performance and intake of grazing beef cattle (Adams, 1985). Studies with nonsupplemented cattle indicate that > 60% of grazing time occurs during daylight (06:00-19:00 h) over a wide range of environmental temperatures, grazing management, and forage types (Krysl and Hess, 1993). Grazing patterns were different between supplemented and nonsupplemented steers with supplemented steers idle for 2-4 h after supplement feeding (Adams, 1985). Data is limited concerning the effect of SH, concentrate supplementation and season on grazing behavior (grazing pattern and meal duration) and grazing efficiency (kg of forage consumed/hour of grazing) of supplemented beef cattle grazing cool season pastures. The objective of this study was to examine the influence of SH, concentrate supplementation and season on pattern and duration of grazing activity of lactating beef cows.

Material and Methods

Twenty-four multiparous crossbred Angus beef cows (BW=535±10.8 kg) and their calves (BW=114±4.8 kg) were grouped by calving date and body weight. Cow-calf pairs within groups were randomly assigned to four replicates of sward height (SH) treatments, either 4-8 or 8-12 cm. Each cow received one of three levels of concentrate supplement: none (U) = 0 kg/day, low (L) = 3.12 kg/day or high (H) = 6.24 kg/day fed in two equal portions at 0700 and 1900 hour. The experiment was repeated over three 15 d periods in 1996: spring (May), mid summer (June/July) and late summer

(August). Each cow was assigned to a different level of supplement during each of the three periods. The supplement comprised of corn (82.6%), soybean meal (16.4%) and limestone (1%). Animals were allowed free access to water and a trace mineralized salt block. The pasture was comprised of mainly cool season grasses, predominantly Kentucky bluegrass (*Poa pratensis* L.) and some orchardgrass (*Dactylis glomerata* L.); legumes, mainly white clover (*Trifolium repens* L.) and some red clover (*Trifolium pratense* L.) and weeds were mainly broad-leaved. Ytterbium was used to estimate fecal output after correcting for indigestible fraction of supplement using in vitro dry matter digestibility values. Alkaline peroxide lignin (APL) in feed was used as an internal marker to estimate intake as reported by Sunvold and Cochran (1991), using the following formula: forage dry matter intake (kg/day) = (APL in feces, kg/day) – (APL in suppl., kg/day) ÷ APL in forage (kg/kg of forage). Sward height measurements were taken using an acrylic plastic disc meter (Rayburn and Rayburn, 1998). Grazing time (GT) was measured using a vibracorder equipment (Kienzle Apparate Gmbh, Villingen, Germany) fitted around the neck of each cow (for 48 hour) during each experimental period. Five grazing time intervals were considered: 06:00-10:00 hour, 11:00-13:00 hour, 14:00-17:00 hour, 18:00-22:00 hour and 23:00-01:00 hour. A grazing time interval was estimated to be equivalent to a period of time in which a cow spent at least 0.5 hour of continuous grazing.Results were analyzed as a split plot design (SAS, 1985) with SH as the main plot. Each subplot was a 3 x 3 Latin square with cow, supplement level and period as factors.

Results and Discussion

There was no SH x supplement x period or SH x supplement interaction (P>.10) on forage dry matter intake (DMI), forage dry matter digestibility , GT and grazing efficiency. Sward height influenced (P<.08) forage DMI. Cows on lower SH consumed 7.7 kg/day of forage dry matter (DM) whereas those on higher SH consumed 7.1 kg/day. Sward height influenced (P<.10) pattern and duration of grazing (Table 1). Cows on lower SH grazed 0.7 hours (P<.06) and 0.4 hours (P<.08) longer at 06:00-10:00 hour and 11:00-13:00 hour, respectively, and grazed 1.2 hours/day more compared to the higher SH. Supplement level influenced forage DMI (P<.10). Nonsupplemented (U) cows consumed 9.8 kg/day, L cows 7.5 kg/day and H cows 4.9 kg/day of forage DM. However, supplement level did not influence (P>.10) the pattern of daily grazing activity although nonsupplemented cows tended (P=.10) to graze longer at 06:00-10:00 hour (2.6 hours vs 2.4 hours) compared to those supplemented. This observation contrasts with findings of Adam (1985) who reported that supplemented steers did not graze for 2-4 hours after supplement feeding.

Season influenced (P<.10) duration of grazing activity (Table 2) and forage DMI (P<.01). Forage DMI per cow was 8.1, 8.2 and 5.8 kg/day during spring, mid and late summer, respectively. Period influenced GT (P<.01), in that cows spent an additional 1.0 hours/day grazing during mid summer and 1.3 hours/day during late summer compared to spring (Table 2). Grazing efficiency decreased (P<.01) as season progressed (1.0, 0.9 and 0.6 kg/hour for spring, mid and late summer, respectively) possibly due to declining pasture quality and herbage mass as well as declining energy requirements of the cow as lactation needs decreased. At 06:00-10:00 hour, cows grazed 0.5 hours longer (P<.01) during late summer compared to spring and mid summer probably because of ambient temperature differences. At 11:00-13:00 hour, cows grazed 0.3 hours longer (P<.08) during spring compared to late summer again probably because of higher temperatures during the latter period. At 18:00-22:00 hour, cows grazed 0.5 hours longer (P<.02) during mid and late summer compared to spring most likely because of increased day length and lower temperatures at this time of day and year. These results suggest that the pattern and duration of grazing activity are not affected by supplemental feeding. However, SH and season did influence the duration of certain grazing time intervals, especially early morning and late evening periods.

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Table 1 - Effect of sward height on times and duration of grazing activity

	Sward Height			
Time (hour)	4-8 cm	8-12 cm	SEM	Significance
	hours/day	hours/day		
06:00-10:00	2.6	2.2	0.6	*
11:00-13:00	1.3	0.8	0.5	*
14:00-17:00	1.6	1.3	0.6	NS[a]
18:00-22:00	2.3	2.2	0.5	NS
23:00-01:00	0.9	0.8	0.5	NS
Total	9.4	8.2	0.2	***

* = P<.10; *** = P<.01; [a]NS = non significance

Table 2 - Effect of season on times and duration of grazing activity

	Season				
Time, hour	Spring	Mid Summer	Late Summer	SEM	Significance
	hours/day	hours/day	hours/day		
06:00-10:00	2.2	2.3	2.8	0.6	***
11:00-13:00	1.2	1.1	0.9	0.5	*
14:00-17:00	1.3	1.4	1.5	0.6	NS[a]
18:00-22:00	1.9	2.4	2.4	0.5	***
23:00-01:00	0.8	0.8	0.8	0.4	NS
Total	8.0	9.0	9.3	0.2	***

*** = P<.01, * = P<.10; [a]NS = non significance