PASTURE DYNAMICS OF MOTT DWARF ELEPHANTGRASS AS RELATED TO ANIMAL PERFORMANCE

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ABSTRACT
In the subtropic of southern Brazil (27S; 49W), Ituporanga, SC, EPAGRI, the Mott dwarf elephantgrass (MDE; *Pennisetum purpureum* Schum) was evaluated under four levels of forage on offer. The actual levels of green leaf lamina dry matter (GLLDM) were 3.8; 7.5; 10.5 and 14.7 kg/100 kg liveweight per day, arranged in a randomized block design, two field replications and three tester steers (8-10 mo.) per pasture, under continuous stocking and the put-and-take technique. Intensive sampling characterized pasture attributes and animal responses. Lenient grazing allowed better performance of pasture canopy, root system and residual dry matter. Higher rates of green leaf lamina accumulation sustained daily liveweight gain (DLG) above 1.0 kg/an, along the 210 days of the growing season. GLLDM available for grazing assures high DLG, promotes sustainability and defines the animal potential of MDE under continuous stocking.

KEYWORDS
Mott dwarf elephantgrass, forage on offer, continuous stocking, residual dry matter, morphological characteristics, rate of dry matter accumulation, daily liveweight gain, gain per ha

INTRODUCTION
Mott dwarf elephantgrass (MDE) was selected in Tifton, Georgia (Burton, 1989), and introduced in Brazil by 1980. The appropriate grazing management was linked to the presence of 2300-2500 kg of residual green leaf lamina dry matter (GLLDM) along the growing season (Veiga et al., 1985). When the very first information on animal potential of MDE, was given by Mott and Ocumpaugh (1984), the impact on livestock industry could be foreseeable. Research was conducted promoting stand establishment, its adoption and use and its superiority to other tropical grasses was shown by Sollenberger and Jones (1989) when it was compared to pensacola bahiagrass under N fertilization. The available information developed a skilled knowledge to manage MDE and incorporate its forage quality into animal gains. To generate coefficients for livestock feeding on pastures and to improve sustainable animal performance, it is paramount to relate pasture dynamics to animal response under continuous stocking grazing.

MATERIAL AND METHODS
In Cfa climate of Southern Brazil (27S; 49W), on a Cambissol Alic soil with 1500 mm rainfall and mean temperature of 17 C, was conducted a grazing experiment at the Estacao Experimental de Ituporanga, EPAGRI, SC, with Mott dwarf elephantgrass (*Pennisetum purpureum* Schum.). The soil was amended to pH 6.0, and fertilized with 35-150-70 kg/ha of N, P2O5 and K2O, respectively. The culms of MDE were planted in furrows and hand covered, from October/93 to March/94. By October/94 the stand was ready for grazing. The experiment was set for grazing under continuous stocking, and submitted to four intended forage on offer levels (FO), namely: 4.0, 8.0, 12.0 and 16.0 kg of green leaf lamina dry matter (GLLDM)/100 kg liveweight (LW) per day, expressed as % LW. The pasture treatments were arranged in a randomized block design, with two replications. Nitrogen fertilizer was applied in early spring and summer, plus late summer, in equal doses, totaling 250 kg N/ha, as urea. Three tester steers (8-10 mo.) were used plus put-and-takes needed to maintain the intended levels of FO. The pastures ranged from 0.3 to 1.2 ha in size, and were sampled every 28 days for total DM yield, botanical composition, GLLDM available, tiller number and weight, and plant diameter, with the soil related observations made at the end of the growing season (Campbell and Arnold, 1973; Burns et al., 1989). Samples for forage quality were harvested by hand and plucked, dried, ground and stored. The grazing season extended from October/94 to April/95, and the grazing steers were weighted at 28 days interval, shrunk for the first and last weightings.

RESULTS AND DISCUSSION
The intended levels of FO turned out to be actual values of 3.8, 7.5, 10.5 and 14.7% LW and were used as the independent variable. The GLLDM residues for the FO values were: 826, 1472, 2330 and 2578 kg/ha ($P<0.03$). Increasing FO increased pasture profile, root mass, plant diameter, internode length and tiller weight, but not tiller density (Table 1). Lower levels of FO led the steers to graze more frequently and deeply into the pasture profile. This rate of defoliation under continuous stocking increased tiller density but other morphological components of the pasture were adversely affected, possibly by the priority of photosynthate allocations during the growing season. Reasons for that can be on the LAI of the pastures, where less leaf lamina were present to intercept incident radiation by the canopy, and possibly with a reduced rate of photosynthesis. At the higher FO levels, with greater GLLDM residues, a greater proportion of the incident radiation could be intercepted and used for tissue production. And the regrowth of the plant requires carbohydrates. According to Richards and Caldwell (1985) reserve carbohydrates would be used mainly for respiration and root maintenance within a short period after defoliation. But under continuous stocking grazing these short periods are endless. Most of the carbohydrates used for regrowth are expected to come from current photosynthesis. Weight changes for morphological components (Table 1) suggest a sustainable response of MDE to a more lenient form of pasture defoliation.

The quali-quantitative aspects of the pasture were also affected by FO levels (Table 2). Both GLLDM accumulation rate and total GLLDM increased with increasing FO. Higher levels of GLLDM residues were able to intercept more of the incident radiation, allowing for greater proportion of the canopy to contribute to the whole photosynthetic process, and increase the supply of photossynthates to all plant parts. Important to consider is the way the grazing steers treated the forage according with what was available for grazing. With increasing FO levels, they removed less leaf lamina tissue, and more leaf mass was present in the more leniently grazed pasture treatments. In this way one can expect high rate of intake, approaching maximum DLG, and express the overriding importance of the animal potential for pasture evaluation, and contribute to upgraded animal products (Maraschin et al., 1993).

The DLG showed a curvilinear response to FO ($Y=0.6973+0.0662x-0.0032x^2$), $R^2=0.97$, with a maximum DLG of 1.043 kg per animal for 10.44% LW as FO. The animal-days and G/ha exhibited a linear response, with the higher values at a depleted pasture condition with an unpredictable future (Table 1), and uncertain sustainability. The sustainable DLG at 10.5% LW, yielding 1188 kg/ha LWG, may offer a finished steer to slaughter after 210 days of a grazing season on

MDE. The animal potential of this subtropical grass is paramount to gains per hectare from the pasture.

CONCLUSIONS

MDE exhibit sustainable pasture condition under lenient and defined level of defoliation under continuous stocking. Its forage quality warrants conditions for finishing steers at the end of the growing season.

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Table 1

Morphological responses and botanical composition of a Mott dwarf elephantgrass pasture under four levels of forage on offer.

Forage on Offer	Root Mass	Plant Diameter	Internode Length	Tiller Density	Tiller Weight	GLLDM other species
% LW	Kg/m3	cm	cm	nº/m2	g/u	%
3.8	0.389	21.8	0.1	273	0.53	40.7
7.5	0.615	35.0	0.3	246	1.52	12.3
10.5	0.948	41.2	0.7	231	2.94	6.9
14.7	1.132	39.5	0.8	196	3.94	4.4
L.	P<0.01	P<0.14	P<0.03	P<0.01	P<0.01	P<0.12
Q.	P<0.14	P<0.04	P<0.24	P<0.07	P<0.12	P<0.12

Table 2

Green leaf lamina dry matter accumulation and animal parameters on Mott dwarf elephantgrass under four levels of forage on offer.

Forage on Offer	GLLDM	Total GLLDM	Animal-days/ha	DLG	G/ha
% LW	kg/ha/d	kg/ha	nº	kg	kg
3.8	48.8	8352	1578	0.907	1431
7.5	66.2	11317	1201	1.004	1206
10.5	73.9	12606	1126	1.055	1188
14.7	76.7	13088	842	0.983	828
L.	P<0.07	P<0.07	P<0.02	P<0.44	P<0.03
Q.	P<0.01	P<0.02	P<0.17	P<0.16	P<0.22