Dynamic of Native Pasture Influenced by Deferment of Grazing and Fertilization

K. E. Gomes
EMBRAPA, Brazil

G. E. Maraschin
Universidade Federal do Rio Grande do Sul, Brazil

J. Riboldi
Universidade Federal do Rio Grande do Sul, Brazil

DYNAMIC OF NATIVE PASTURE INFLUENCED BY DEFERMENT OF GRAZING AND FERTILIZATION

K.E. Gomes[1], G.E. Maraschin[2] and J. Riboldi[3]

[1]EMBRAPA-CPPSUL, C.P. 242, Bagé, RS, Brasil, 96400-970
klecius@cppsul.embrapa.br
[2]Depto. Plantas Forrageiras e Agrometeorologia/UFRGS, C.P. 776,
Porto Alegre, RS, Brasil, 91501-970
[3]Depto. Estatística/UFRGS, C.P. 776, Porto Alegre, RS, Brasil, 91.501-970

Abstract

Native pastures of southern Brazil cover 12 million ha and are the main forage feed resource for most domestic livestock. However, their heavy and continuous use has reduced standing biomass and the presence of good forage species, reducing animal performance and jeopardizing the ecosystem sustainability. An alternative for better use of these pastures and their preservation is grazing deferment that allow natural reseeding. The objective of this research was evaluate native pasture dynamic after six years of grazing deferments (GD) periods and soil fertilization effects by point-quadrat method every season. All pasture components were affected by GD, with prostrate grasses increasing their frequency ($P<0.05$) under continuous grazing while periods of rest encouraged erect plants. Fertilization improved pasture condition by reducing frequencies of no forage species, litter and bare soil, and increasing frequencies and dry matter contribution of good ones like native legumes, especially *Desmodium incanum.*

Keywords: *Desmodium incanum*, dynamic, legume, pasture management

Introduction

Native pastures of southern Brazil cover an area of 12 million ha and are the main forage feed resource for most of the domestic livestock. Variations in site condition promotes the existence of a great number of grasses and legume species in the region. However, high cattle stocking rates of these pastures have reduced pasture dry matter production and the standing biomass (Corrêa and Maraschin, 1994), increasing soil compactation (Bertol et al., 1998) and reducing animal performance (Maraschin and Jacques, 1993), thus jeopardizing the ecosystem sustainability. An alternative for preservation and better use of these native pastures is the deferment of grazing, allowing natural reseeding. On the other hand, pasture fertilization increased the occurrence of better forage species, like native legumes and winter species of the flora. The objective of this research was to evaluate native pasture dynamic after six years affected by deferments of grazing made at different seasons of the year and pasture fertilization levels.

Material and Methods

This research was conducted at Estação Experimental Agronômica (EEA) of the Universidade Federal do Rio Grande do Sul (UFRGS), Southern Brazil, located at 30°05'27"S and 51°39'08" W and caracterized by a Cfa subtropical climate with 1440 mm of annual rainfall. The two soil types (*Rhodic Paleudults* and *Plinthaqualts*) have an average pH of 5.0 and 1.4 ppm P. Native pasture was dominated by summer perennial grasses where *Andropogon lateralis* (coarse grass) and *Paspalum notatum* (prostrate grass) predominated, while winter grasses and native legumes contributed very little (Barreto and Boldrini, 1990). The experimental area was constituted by eight paddocks for native pasture evaluation thorough four treatments of forage dry matter on offer with two replications. Inside of each treatment of this major grazing experiment four split plots for deferment of grazing (DG) were established in march of 1989, namely: Autumn (AUT), from April to July;

Winter/Spring (W/S), from August to November; Summer (SUM), from December to March and No Deferment (ND), as control. Inside each DG, five levels of N, P and K fertilizer were spread on the pasture at the same year, as split-split plot The levels of N, P and K (in kg/ha) were: NPK0 with no fertilization, NPK1 with 12.5-27-12.5, NPK2 with 25-54-25, NPK3 with 50-108-50 and NPK4 with 100-216-100. The higher fertilization level treatment also received 2.2 t/ha of limestone. Botanical composition was established according to the point-quadrat method (Becker and Crocket, 1973) every season. The samplings were made after the end of deferment period, on September/October/94 and January/95 for AUT and W/S deferments, respectively, and on April and May/95 for ND and SUM deferments, respectively. A list of the species was elaborated and their frequency of occurrence were calculated. The species had been classified in function of its botanical families, habit, cycle and quality of the fodder plant and congregated in groups called: WG (winter grasses), CG (coarse grasses = lower quality), FG (fine grasses = high quality), PG (prostrate grasses), LEG (native legumes) and OS (other species). The effect of treatments was evaluated through variance analysis and differences between averages had been tested by MSD to the level of 5 % of probability.

Results and Discussion

Deferment of Grazing. All pasture components were affected by DG (Table 1), except LEG that showed an interaction with pasture fertilization levels. Only PG increased their frequency ($P<0.05$) under continuous stocking. Species with similar grazing response of *Paspalum notatum* like as *Axonopus affinis* tended to increase in the sward. Coarse grasses and another erect species are weakened and decline under frequent defoliation. However, periods of rest encourage the recovery of erect plants, so they can compete for light with PG, occupy spaces and contribute to forage yield. These observations agree with Boldrini et al. (1993) about pasture response in relation of decreased of utilization as well as the response of

Paspalum notatum in more intensive defoliation treatment.

The other components: litter (LIT), other species (OS) and bare soil (BAS) increased their frequencies ($P<0.05$) with the AUT DG, since the temperatures of this season reduced physiological activity of summer forage species and allowed the growth of no forage species as *Oxalis* spp and *Hipoxis decumbens*. On the other hand WG and CG increased their frequencies ($P<0.05$) in AUT and W/S DGs, while FG decreased with continuous stocking. Rest periods in different seasons of the year not only increased the frequencies of forage species but also changed the botanical composition in this kind of subtropical native pasture.

Fertilization. Except for LEG, pasture components WG, OS, LIT and BAS were reduced in their frequencies ($P<0.05$) by the increasing levels of fertilization (data not shown).

DG and fertilization interaction. The LEG component showed a significant improvement in W/S and SUM DGs for all fertilization levels except for NPK0 (Table 2). The LEG component have a growing in its frequency of 7.84 times, increasing from 2.21% average frequency with no fertilization to 17.33% for the higher level of fertilization. The main native legume was *Desmodium incanum*, that contributed up to 94% of the LEG frequency. The response of this summer legume to DG and fertilization was very rapid, intense and proved to be long-lasting on these soil types. Its average frequency ranged from 3.9% to 8.1% in 1989/90 to the levels of 1.6% to 15.2% in 1994/95, by moving from zero to the higher level of fertilizer application, respectively. Table 2 shows increases in *Desmodium incanum* frequencies ($P<0.05$) for the W/S and SUM DGs, and a very markedly increase with the application of, at least, 108 kg/ha of P. With the application of 216 kg/ha of P the legume contribution for forage dry matter yield in the spring season grow up to 23% ($P<0.05$). This increment agrees with Maraschin and Jacques (1993) who have reported 19.7% of legume

forage dry matter yield in this kind of pasture fertilized with 148 kg/ha of P and contrasting with Pizzio and Pallares (1993) who obtained only 5.4% of legume contribution to the forage dry matter on a native pasture fertilized with 92 kg/ha of P.

Deferments of grazing and fertilization can be changed the botanical composition of native pasture improving its condition for cattle production. Native legumes shows an excellent and surprisingly response for fertilizer application, especially *Desmodium incanum* in Spring and Summer seasons.

References

Barreto, I.L. and Boldrini, I.I. (1990). Aspectos físicos, vegetação e problemática das regiões do Litoral, Depressão Central, Missões e Planalto do Rio Grande do Sul, Brasil. Pages 199-210. In: J. Puignau, ed. Introduccion, conservacion y evaluacion de germoplasma forrajero en el cono sur. (PROCISUR. Série Diálogos, 28). IICA/PROCISUR, Montevideo.

Becker, D.A. and Crockett, J.J. (1973). Evaluation of sampling techniques on tall-grass prairie. J. Range Manage., **26**:61-67.

Bertol, I.; Gomes, K.E.; Denardin, R.B.N.; Machado, L.A.Z. and Maraschin, G.E. (1998). Propriedades físicas do solo relacionadas a diferentes níveis de oferta de forragem numa pastagem natural. Pesq. Agropec. Bras., **33:**779-786.

Boldrini, I.; Riboldi, J. and Maraschin, G.E. (1993). Dynamics of the vegetation of a natural pasture under different levels of forage-on-offer and soil types. Proc. 17th. Int. Grass. Cong., Hamilton, New Zealand, p. 1919.

Corrêa, L.F. and Maraschin, G.E. (1994). Crescimento e desaparecimento de uma pastagem nativa sob diferentes níveis de oferta de forragem. Pesq. Agropec. Bras., **29:** 1617-1623.

Maraschin, G.E. and Jacques, A.V.A. (1993). Grassland opportunities in the subtropical region of South America. Proc. 17th. Int. Grass. Cong., Hamilton, New Zealand, p. 1977.

Pizzio, R.M. and Pallares, O.R. (1993). Mineral supplementation and phosphorus fertiliser application on native pastures in north-east Argentina. Proc. 17th. Int. Grass. Cong., Hamilton, New Zealand, p. 2007.

Table 1 - Frequency (%) of native pasture components affected by deferments of grazing (1994/1995).

Deferm.	Components						
	WG	CG	FG	PG	OS	LIT	BAS
AUT	8.2a[1]	15.8a	5.6ab	21.1 c	20.6a	16.6a	9.7a
W/S	9.1a	17.6a	6.8a	25.6 c	10.3 b	12.5 b	5.7 b
SUM	4.2 b	12.7 b	6.8a	30.8 b	12.6 b	11.0 b	7.1 b
ND	3.8 b	7.1 c	3.9 b	45.5a	11.4 b	12.7 b	7.2 b

[1]Values on the same column with different letters are different, $P<0.05$.

Legend: WG (winter grasses), CG (coarse grasses), FG (fine grasses), PG (prostrate grasses), OS (other species), LIT (litter), BAS (bare soil).

Table 2 - Frequency (%) of *Desmodium incanum* on a native pasture affected by deferments of grazing and fertilization levels (1994/1995).

Deferments	Fertilization Levels				
	NPK0	NPK1	NPK2	NPK3	NPK4+Lime
AUT	0.00a[1] A[2]	0.64 b A	0.95 c A	0.79 c A	2.05 c A
W/S	2.21a D	6.12a C	9.09a BC	12.05a B	21.26a A
SUM	3.32a D	6.74a C	8.92a C	13.32a B	24.41a A
ND	0.95a D	1.74 b CD	4.55 b BC	5.98 b B	13.30 b A

Values on the same column[1] or the same line[2] with different letters are different, P<0.05.