



Produção primária, secundária e composição botânica de uma pastagem natural melhorada com festuca (*Festuca arundinacea*), leguminosas e gramíneas anuais hibernais

Jefferson Araújo Flaresso¹, Ulisses de Arruda Córdova¹, Cassiano Eduardo Pinto¹

¹Pesquisador Epagri/Estação Experimental de Lages, Santa Catarina, Brasil. E-mail: flaresso@epagri.sc.gov.br

Resumo: Um dos entraves para a expansão do melhoramento de pastagens naturais na Serra Catarinense é a baixa tolerância das forrageiras a extremos climáticos, que com frequência tem a parte aérea crestada por geadas fortes, ou mesmo ventos frios durante o inverno. Algumas forrageiras possuem tolerância a esses eventos climáticos. O ensaio teve como objetivo avaliar o rendimento primário e secundário de uma pastagem natural melhorada em uma área de 6,5 ha, subdividida em 6 piquetes, com introdução de festuca, aveia-branca, azevém-anual e centeio no outono, e correção química do solo. A cada 28 dias os animais foram pesados para medição da produção secundária. Os resultados demonstraram aumento na produção de pasto, maior diversidade de espécies na composição florística, um ganho por área de 455,28 kg de PV/ha/período de 305 dias de pastejo; 0,520 kg animal/dia de ganho médio diário, com uma carga animal média de 744 kg de PV/ha.

Palavras-chave: Manejo de pastagens, adubação, cultivo mínimo, diversidade vegetal.

Primary, secondary production and botanical composition to native grassland improved with fescue (*Festuca arundinacea*), legumes and temperate grasses

Abstract: One of the barriers for expansion on improvement of native grasslands in Santa Catarina is the low tolerance of forage to extremes climatic events, which often has damaged shoots by strong frosts or even cold winds during the winter. Some forage species has tolerance to these climatic events. The aim was to evaluate the primary and secondary production in a native grassland improved in an area of 6.5 ha, divided into 6 paddocks with introduction of fescue, white oats, annual ryegrass and rye in the fall, and soil chemical correction. Every 28 days, the animals were weighed for measuring the secondary production. The results showed an increase in pasture production, greater diversity of species in the floristic composition, a gain per area of 455.28 kg LW/ha/period of 305 days of grazing; average daily gain of 0.520 kg/head/day, with an average stocking rate of 744 kg LW/ha.

Keywords: Pasture management, fertilizing, no tillage, vegetal diversity.

Introduction

The native grasslands from Santa Catarina were identified and mapped in nine different physiognomic groups. According to Brandenburg (2004) there are about 220 species of grasses and 80 species of legumes. The management preconized by farmers in the region with use of fire has selected native species of summer cycle with low quality, which leads to a concentration of forage production in the spring-summer period, thereby generating a nutritional deficit in the autumn-winter period which in turn causes autophagy in cattle. Santa Catarina had until 1995 approximately 1,325,000 hectares of natural pastures, recent estimation using satellite images indicate that this area is currently 919,600 hectares occupied by native pastures (Araújo et al., 2007).

These remanescant native pastures have low economic returns, with a stocking capacity of only 0.3 to 0.4 AU/ha and producing only 60 to 70kg of live weight per hectare per year (Carvalho et al., 2006), and with low zootechnical performance indexes (Pinto et al., 2014). The improvement of natural pasture is an alternative to preservation by the correction of chemical deficiencies in the soil, neutralization of toxic elements and the introduction of cool season species that increase the production of dry matter, quality, and reduces seasonal pasture fluctuation offer for animals. In addition, preserves biodiversity, and present a lower cost for pasture establishment compared to conventional cultivation.

The experiments conducted by Ritter & Sorrenson (1985) with the introduction of annual ryegrass, white clover, red clover and birdsfoot trefoil, demonstrated average daily gain (ADG) ranging from 0.518 to 0.756kg/head/day, and a gain by area of 299 kg LW/ha/year. Recently Córdova et al. (2012), in a work conducted at the municipality of Campo Belo do Sul in three distinct farms, obtained average gains of 511.63 kg LW/ha /year, ADG of 0.789 kg and stocking rate of 648 kg LW/ha.



The introduction of annual temperate grasses in native grasslands has a main purpose of forage production in the coldest months of the year, reducing the emptiness of autumn-winter forage offer. The objective of this study was to evaluate the primary and secondary production of a natural pasture improved with the introduction of grasses and temperate legumes in the fall, as well as evaluating the fescue when introduced in native pasture.

Material e Methods

The experiment was conducted in Lages, SC, Brazil, geographic coordinates 27 ° 56'44.87" S and 50° 15'34.33" O. The local altitude is 1.050 m, with constant occurrence of periods with very low temperatures, the weather is Cfb according to Köppen classification, and the soil is Cambisol type. The correction and fertilization were performed in function of soil analysis and recommendations according to ROLAS (2004) for introduction of species in native grasslands. The pasture establishment and fertilization were performed from 28 to 31 July 2011 in no-till system. Sowed forages were: *Lolium multiflorum* cv. Barjumbo (25 kg/ha); *Festuca arundinacea* cv. Rizomat (10 kg/ha); *Holcus lanatus* cv. La Magnolia (6 kg/ha); *Trifolium repens* cv. Zapican (3 kg/ha) and *Trifolium pratense* cv. Quinquelli (6 kg/ha). In the following years (2012, 2013 and 2014) in the fall, there were sowed annual grasses: *Lolium multiflorum* cv. Barjumbo (25 kg/ha); *Avena sativa* cv. Fapa 2 (80 kg/ha) and *Secale cereale* cv. BRS Serrano (50 kg/ha). These species were planted in 6.5 ha, divided into six paddocks grazed in rotation.

The floristic composition was measured by the percentage of contribution parameters in forage mass of the five main species of the stratum grazed using BOTANAL method, the evaluation was performed in an area near the experimental plot that had not received inputs and remained managed in the traditional system, and in experimental plots in November 2012 and December 2013 and 2014. The pasture management criterion was when 70% of forage mass was grazed. The experimental animals were weaned beef calves from six to ten months, with an average weight of 166.12 ± 35.72kg. The initial stocking rate was fixed on the basis of data generated by previous experiments of natural pastures improvement conducted under the same conditions (Córdova et al. 2012). To evaluate the dry matter production (DM) and animal production (LWG and LW) was considered a period of 305 days in the year, and the remaining 60 days for pasture establishment for the autumn and winter period, involving the realization of maintenance fertilization, mowing and seeding of annual grasses.

The evaluations of primary and secondary production occurred every 28 days. Forage production was quantified by cuts near the ground in 0,25m² square using six grazing exclusion cages. The forage accumulation rate was estimated according Klingman et al. (1943). A visual estimate of pasture mass availability was performed by three trained evaluators and sward height measured with sward stick, it was done five readings on 0,25m² square. All samples were dried at 65 ° C until constant weight to estimated available dry matter.

Results and Discussion

The initial floristic composition of natural pastures under traditional management were characterized by 22 native species, the top five species are *Paspalum notatum*, *Piptochaetium montevidense*, *Paspalum maculosum*, *Axonopus compressus*, and *Paspalum plicatulum* contributing to 87.81% of forage mass. During three years of experiment, species as *Axonopus compressus*, *Paspalum notatum*, *Paspalum maculosum*, *Paspalum dilatatum*, *Piptochaetium montevidense*, passed to contributed 56.33% the proportion of forage mass. Introduced species such as *Trifolium pratense*, *Holcus lanatus*, *Festuca arundinacea*, *Trifolium repens* and *Lolium multiflorum* contributed 32.1% of forage mass. *Festuca arundinacea* contributed 22.3% in forage mass. The legume *Lotus tenuis* did not persist after three years of its introduction under the management adopted. The average pasture production in 10 months was 7126.69kg DM/ha, two months of the year were used for sowing and establishment of annual species. The average daily accumulation rate of the ten months was 23.50 ± 11.82 kg/DM/ha/day. Despite the occurrence of three consecutive water deficits in the experiment period of 2012, these results demonstrate the potential of soil correction, fertilizing and introduction of species in enhancing the growth of native pastures from Santa Catarina.

The primary and secondary production are shown in table 1. The average daily live weight gain was 0.587 ± 0.379kg LW/head/day, average stocking rate of 739.99 ± 173.33 kg/LW/ha, and a gain by area of 468.15 ± 29.4kg/LW/ha/year during the grazing period of 305 days. The production showed in this work are higher compared to traditional systems that have an average capacity from 0.3 to 0.4 AU/ha and gain per area of 60 to 70 kg LW / ha (Carvalho et al., 2006).

Table 1. Primary and secondary production of a native pasture of Santa Catarina improved with the introduction of annual species (average for the period from November 2011 to October 2013).



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Month	----- Average pasture variables -----				-- Average animal variables --		
	Forage mass kg DM/ha	Sward height cm	Accumulation forage rate kg DM/ha/day	Forage production kg DM/ha/mês	Stocking rate Kg LW/ha	Daily average live weight gain kg LW/head/day	G/ha kg LW/ha
November	931.391	10.624	25.079	752.357	701.610	0.885	78.115
December	702.768	6.590	28.329	878.202	685.805	0.850	63.729
January	867.921	7.869	25.310	784.606	734.300	0.600	48.577
February	627.189	6.042	23.171	648.792	931.110	0.500	88.340
March	666.402	5.266	33.667	1043.667	1062.460	0.480	41.540
June*	734.032	7.100	35.366	1060.966	854.615	0.290	24.770
July*	680.251	6.063	11.728	363.580	644.920	0.260	25.230
August	543.688	4.790	22.324	674.463	514.000	0.000	0.000
September	354.577	3.627	12.250	367.500	565.230	1.360	51.230
October	377.591	4.540	17.825	552.561	705.850	0.640	46.620

* Months from June to October have data collection of one year.

Cordova et al. (2012) in an experiment conducted in a native grassland from Santa Catarina during three years, also with 305 days of grazing, observed animal live weight gain of 511.64 kg LW/ha, average daily gain of 0.79 kg and stocking rate of 648 kg LW/ha. Prestes & Cordova (2004) reported productivity in similar improved native grassland between 520-672 kg LW/ha/year. Finally, the results observed in this work are superior to those obtained by Ritter & Sorrenson (1985) of 299 kg of LW/ha/year. Associated with the fact that the region has a land structure guided on small farms dedicated to beef cattle, improvement of native grasslands shape up as a potential economic alternative to the preservation of grasslands from the Atlantic Forest biome, increasing income to the farmers per unit area.

Conclusions

The improvement of the native grassland increased the productivity of cattle throughout the year, adding more income to farmers. It was possible to introduce the fescue in the grassland improvement.

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