

## Structural traits in natural grassland grazed by heifers in Southern Brazil

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### Introduction

Caespitose species forming tussocks are common in complex pastoral systems like the grasslands of the Pampas biome. A detailed knowledge of tussock structure is the key to understand the relationships between plants and animals. The abundance and defoliation patterns of caespitose species can be influenced by management that uses animals as the principal agents of structural changes driven by selective grazing (Laca et al., 2001). Thus, factors that determine selection or avoidance of tussocks by cattle can determine the structure and dynamics of tussocks. We evaluated tussock botanical composition and physical structure as factors to explain patterns of defoliation of the upper stratum in natural pastures with and without fertilization and overseeding.

### Materials and methods

This study was conducted at EMBRAPA Pecuaría Sul, Bagé, RS. Two ~7 ha pastures were assigned to each of three treatments: natural grassland (NG), NG plus fertilization (2007: 70 kg ha<sup>-1</sup> P<sub>2</sub>O<sub>5</sub>, 2008 100 kg N ha<sup>-1</sup>, NGF) and NGF overseeded with *Lolium multiflorum* and *Trifolium pratense* (NGFS) in 2007 and 2008. Brangus heifers grazed each pasture continuously using the put-and-take method to reach a forage allowance of 12 kg DM (100 kg LW)<sup>-1</sup> day<sup>-1</sup>. Samples were taken every 20 m by systematic sampling. We recorded tussock species, height, average distance to other tussocks and defoliation score (1=not grazed -5=all leaves exhibit grazing). Defoliation score was modeled by stepwise regression as a function of tussock characteristics both for single- and multi-species tussocks. The effects of plant species, herbage available, height and frequency of tussocks on defoliation score was evaluated with a mixed effects model including a fixed effect for presence of each species that appeared in more than two tussocks and their 2-way interactions. Paddock was included as a random effect.

### Results

*Erianthus angustifolius* (EriAng) and *Andropogon lateralis* (AndLat) were grazed more than the rest of the species (Fig. 1). Because only a few tussocks were pure AndLat, the variance of the estimated grazing was largest for this species. Thus, defoliation score of AndLat was not significantly different from the rest. However, EriAng had significantly greater grazing rank than *Bacharis trimera*, *Eryngium pandanifolium* and *Eupatorium buniifolium*. Fertilization and seeding treatments did not have a detectable effect on grazing of tussocks, but the test for treatment effects had extremely low power due to the low number of replicates. Overall, there was a negative effect of tussock height on defoliation score. However, the effect (slope) of tussock height on defoliation depended on the season and whether AndLat was present or not. Greater height reduced grazing more when AndLat was present. Degree of grazing decreased more with increasing height in fall than in spring. Tussock height exhibited an interaction effect of season and treatment ( $P < 0.01$ ) whereby height in fall was lower and it declined more from NG to NGF to NGFS than in spring. The effect of sward height between tussocks on defoliation score depended on the season: in spring, when forage was more abundant there was not

relationship between sward height and tussock defoliation, likely because animals were not depending on tussock forage to achieve the necessary intake. Conversely, there was a significant negative impact of inter-tussock sward height on tussock defoliation during fall; areas that had short swards were associated with greater tussock defoliation.

### Conclusions

In order to graze these complex pastures efficiently, a balance should be obtained between tussocks and inter-tussock sward height such that tussocks are not over or undergrazed. Achieving this balance is probably difficult due to the observed complexity of interactions between forage species, abundance, and season on defoliation.

### References

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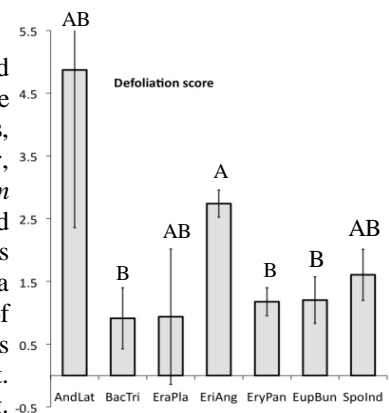


Figure 1 Defoliation score in some grassland caespitose species. Bars without common letters are significantly different with  $\alpha=0.05$ .