Long-Term Cattle Grazing Affected Specific Leaf Area and Its Components in Two Range Plant Species

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Morphological changes associated with forage quality in temperate pastures fertilized with nitrogen in autumn

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Introduction In the humid temperate region of South America , low temperatures of autumn and winter limits grasses growth (Gastal et al . , 1992) and the rate of soil organic nitrogen mineralization . In consequence , strategic nitrogen application at this time is an effective tool to reduce the seasonal forage deficit . Growth , morphology , anatomy and nutrient content are related in forage plants (Lin et al . , 2001) . Nitrogen effects on growth dynamics and its short-term impact on the sward structure and forage digestibility , change in agreement to species composition , evaluation dates (Duru and Ducrocq , 2002) and rest defoliation periods considered . The aim of this study was to examine the modifications of some fractions of the herbage mass related to forage quality of annual and perennial grasses , occurring in the short term as a consequence of 50 kgN/ha applied in autumn .

Materials and methods The experiment was carried out in Gral . Las Heras , Buenos Aires province of Argentina (34°59′S and 58°50′W) in a 2-year-old pasture composed by Dactylis glomerata (orchadgrass-OR-) and Bromus catharticus (brome grass-BG-) . The treatments were two , N0 : 0 kg N/ha and N1 : 50 kg N/ha applied in autumn , arranged in a complete random design with 3 replicates ; the experimental units were paddocks of 40 m×220 m which randomly received the treatments . Data were compared by a T test ($p < 0.05$) . The evaluation period took place between fertilization date , May 11 and the first grazing event , June 1 , 20 days from fertilization date . Ten subsamples of the herbage mass were cut in each experimental unit ; the harvested material was separated into died and alive , the latter in lamina and sheaths and oven dried . The determination of acid fiber detergent (AFD) was an indicator of forage digestibility .

Results and discussion Despite it was predicted a higher response of the annual grass , the short rest period from fertilization until defoliation probably would not allow the expected response [Figure 1(a) and (b)] . The perennial grass didn't show a significant response either .

Figure 1 *(a) Lamina mass (g/m^2) and (b) Lamina/sheath (g/g) . Minuscule different letters indicate significant differences ($p < 0.05$) between treatments . Capital different letters indicate significant differences ($p < 0.05$) between grasses .*

The perennial OR showed a decreasing trend in lamina/sheath ratios when it was fertilized (N0 : 3 .12 g/g 0 .45 vs . N1 : 2. 06 g/g 0 .22 , p=0 .1069) and a trend towards major AFD values compared with the annual BG when it was fertilized (BG : 20 .57 ±0 .54 vs . OG : 22 .55±0 .62 , p=0 .07) . This would indicate that during the evaluation period , when successive leaves appeared , they were longer and contained more structural material , especially in case of nitrogen fertilization ; also , AFD increments may be associated with the presence of longest sheaths which elongation occurred rapidly (Duru and Ducrocq , 2002) . OR reduction in the proportion of lamina (p=0 .012) took place with aging when it is frequently observed a concomitant nutritional value reduction (Lloveras and Churches , 2001) .

Conclusions Attention must be paid about nitrogen fertilization decisions because of the occurrence of modifications such as lamina/sheath ratios in the perennial grass , issue potentially associated with forage digestibility decrease and its quality . Besides , a trade off seems to exist between the duration of the rest period required to generate significant increases in herbage mass , specially of the annual grass .

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