

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

Gatti, M. L., A. Ayala Torales y G. Acosta. *Fac. de Agronomía, Universidad de Bs. As., Cátedra de Forrajicultura, Av. San Martín 4453, 1417 DSE, Cdad. Autónoma de Bs. As., Rep. Argentina. E-mail: mgatti@agro.uba.ar, Proj. G005.*

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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* (orchardgrass-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 \pm 0.54 vs. OR: 22.55 \pm 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.

References

- Duru M. y H. Ducrocq. (2002). A model of lamina digestibility of orchardgrass as influenced by nitrogen and fertilization. *Crop Science* Vol. 42: 214-223.
- Lin C.H., R.L. Mc Graw, M.F. George and H.E. Garrett. (2001). Nutritive quality and morphological development under partial shade of some forage species with agroforestry potential. *Agroforestry systems* 53: 269-281.
- Lloveras J. and I. Iglesias. (2001). Morphological development and forage quality changes in *Trifolium incarnatum* L. *Grass and Forage Science* Vol. 56 Issue 4: 395-404.