

Species and chlorine fertilisation affect dietary cation-anion difference of cool-season grasses

G. Bélanger¹, S. Pelletier^{1,2}, H. Brassard^{1,2}, G.F. Tremblay¹, P. Seguin³, R. Drapeau¹, A. Brégar², R. Michaud¹ and G. Allard²

¹Agriculture and Agri-Food Canada, 2560 Hochelaga Blvd., Sainte-Foy, QC G1V 2J3 Canada, Email: belangergf@agr.gc.ca, ²Université Laval, Sainte-Foy, QC G1K 7P4 Canada, ³Macdonald Campus, McGill University, Sainte-Anne-de-Bellevue, QC H9X 3V9 Canada

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Introduction The Dietary Cation-Anion Difference [DCAD = (Na + K) – (Cl + S); Ender *et al.*, 1971] is used in balancing rations for dry dairy cows. Low DCAD diets induce a mild, compensated metabolic acidosis that stimulates bone resorption, improves Ca homeostasis, and prevents milk fever. Dry cow rations contain a high proportion of forage and, therefore, forages fed two to four weeks prepartum should have a low or negative DCAD value. Our objectives were to evaluate the DCAD of five cool-season grass species grown in eastern Canada and to determine the effect of Cl fertilisation on the DCAD value of timothy (*Phleum pratense* L.).

Materials and methods In the first experiment, three cultivars of cocksfoot (*Dactylis glomerata* L.), two of tall fescue (*Festuca arundinacea* Schreb.), meadow bromegrass (*Bromus riparius* Rehm.), and smooth bromegrass (*Bromus inermis* Leyss.), and four of timothy were grown at three locations in Québec (Canada). Forage dry matter (DM) yield and mineral concentration (Na, K, Cl, and S) were measured in the spring growth and the summer regrowth of 2002; locations were considered a random effect. In the second experiment, we determined the effect of increasing rates of Cl fertilisation (0, 80, 160, and 240 kg Cl/ha) on timothy grown at four locations with contrasting soil K contents: two high (Ste-Anne-de-Bellevue, 289 kg K/ha; Normandin, 311 kg K/ha), one intermediate (St-Augustin, 199 kg K/ha), and one low (Ste-Perpétue, 123 kg K/ha). Forage DM yield and mineral concentration (Na, K, Cl, and S) were measured in the spring growth of 2003; locations were considered a fixed effect. All harvests were taken at the early-heading stage of development.

Results For both spring growth and summer regrowth, the DCAD of cocksfoot (CF) was the highest and that of timothy (T) the lowest; the DCAD of meadow bromegrass (MB), smooth bromegrass (SB), and tall fescue (TF) were intermediate (Figure 1). Cultivars within a species did not differ in DCAD. Chlorine fertilisation with CaCl₂ decreased timothy DCAD (Figure 2) at all four locations, and increased Cl concentration with no effect on DM yield. With no Cl fertilisation, the DCAD was lower (199 meq/kg DM) at the low soil K content location (Ste-Perpétue) than at the other three sites (365 - 459 meq/kg DM).

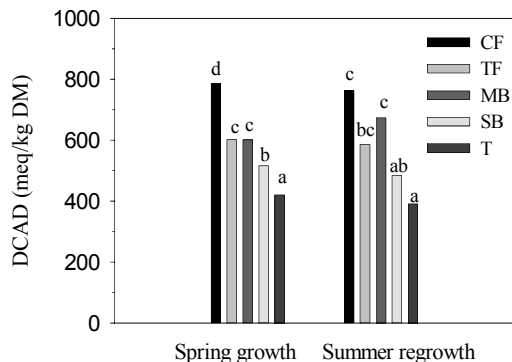


Figure 1 DCAD of five grass species in spring growth and summer regrowth (average of three locations)

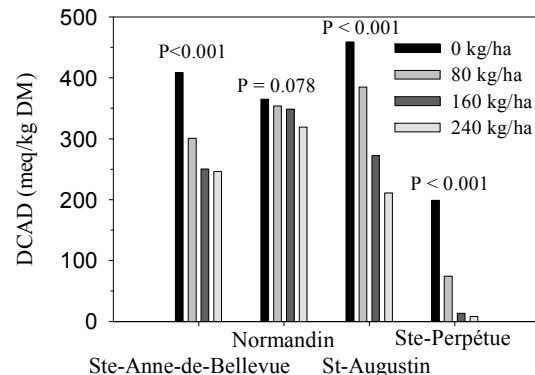


Figure 2 DCAD of timothy with increasing rates of Cl fertilisation at 4 locations. (Probabilities are for the linear effect of fertilisation)

Conclusions Timothy is the best cool-season grass for production of low DCAD forages for dry cows. Timothy with DCAD as low as 8 meq/kg DM can be produced using Cl fertilisation on a soil with a low K content.

Reference

Ender, F., I.W. Dishington & A. Helgebostad (1971). Calcium balance studies in dairy cows under experimental induction and prevention of hypocalcaemic *pariesis puerperalis*. The solution of the aetiology and the prevention of milk fever by dietary means. *Zeitschrift für Tierphysiologie., Tierernährung und Futtermittelkunde*, 28, 233-256.