Lower DCAD Values in a Tall Fescue Variety Selected for Low Grass Tetany

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A variety of tall fescue (*Festuca arundinacea* Schreb.) called HiMag was developed at the University of Missouri to reduce the incidence of grass tetany (hypomagnesemia) in grazing beef cattle by altering the concentrations of calcium (Ca), magnesium (Mg) and potassium (K) (Sleper et al. 1989; Mayland and Sleper 1993). Grass tetany is an important symptom of cows grazing tall fescue pasture in the southeastern USA. The tall fescue breeding program consisted of plant selections for higher concentrations of Mg and Ca and lower values of the ratio K/(Ca + Mg), expressed in milli-equivalents, and known as the 'grass tetany risk index'. Concentrations of K are also an important component of the DCAD (Dietary Cation Anion Difference) value which is indicative of milk fever risk in dairy cows. Hence, we wondered if selecting for a low grass tetany index would influence DCAD values which are determined by concentrations of K, sodium (Na), chloride (Cl) and sulphur (S). DCAD is calculated as: (Na + K) –(Cl + S).

Conducted under moist conditions in Agassiz, British Columbia, the trial compared the low-tetany variety HiMag with a typical tall fescue variety called Barcel that was not selected for mineral content (Swift et al. 2007). The effects of adding K fertilizer as either KCl or K_2SO_4 on mineral concentrations and DCAD values were also investigated. The three-year-old stand was harvested 5 times which is normal farm practice in the region.

Averaged over harvests, HiMag had consistently higher Ca and lower K when compared to Barcel, but there was very little difference in Mg, S and Cl between the two varieties (Table 1). HiMag also had a lower Na concentration compared to Barcel but the levels in both varieties were very low. Mainly because of the lower concentrations of K, the calculated DCAD value was lower for HiMag than for Barcel (Table 1). Values for both K concentrations and DCAD were lowest in first cut and lower in HiMag than Barcel in each of the five harvests (Fig. 1). HiMag also had a lower tetany index as was expected. The advantage for HiMag over Barcel in DCAD value was greater when K was applied which is the normal practice in the region. Adding K as K_2SO_4 rather than KCl gave lower DCAD values due to higher concentrations of S with little difference in Cl concentrations in the grass. There are increasing reports of S deficiency in many parts of the world (see Chapter 24) so adding S fertilizer is becoming more commonplace and may help to alleviate high DCAD values.

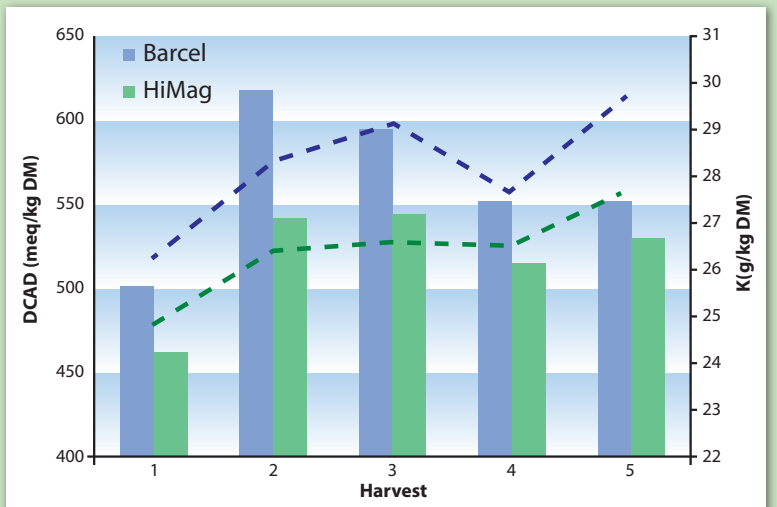

Figure 1. DCAD index (bars) and K content (lines) of HiMag and Barcel tall fescue over five harvests.

Table 1. Mineral content, tetany ratio and DCAD for the tall fescue varieties Barcel and HiMag averaged over five harvests in one season.

Variety	Barcel	HiMag
K (g/kg)	28.2	26.4
Ca (g/kg)	3.34	4.15
Mg (g/kg)	2.81	2.83
Na (g/kg)	0.14	0.07
S (g/kg)	1.92	1.85
Cl (g/kg)	1.60	1.58
Tetany ratio	1.81	1.53
DCAD	566	521

Our trial showed that DCAD can be manipulated by both variety selection and fertilizer application. The differences between treatments in this trial were relatively small but suggest that further improvements in mineral ratios are possible, especially as the cation levels in tall fescue seem to be a highly heritable trait (D. Sleper, pers. comm.).

References available online at www.farmwest.com

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