

# Effect of Calcium Chloride Fertilization on the Dietary Cation-Anion Difference (DCAD) of Forage Crops in Northern New York



## INTRODUCTION

- Annual manure applications are critical for maintaining soil fertility and quality on dairy farms, but excess potassium (K) from manure applications can increase forage K content and the dietary cation-anion difference (DCAD) of forages.
- Forage DCAD can strongly affect the occurrence of milk fever (hypocalcemia) in post-fresh dairy cows (Charbonneau et al., 2006).
- Studies have shown that chloride (Cl) fertilization has the potential to reduce DCAD of cool season grass and alfalfa stands (Goff et al., 2007; Pelletier et al., 2007).
- The effectiveness of Cl fertilization to reduce DCAD levels of both alfalfa-grass and grass forage crops in the Northeast US has not been investigated.

## OBJECTIVE

- Our objective was to determine if the application of liquid calcium Cl could reduce DCAD levels of alfalfa-grass and grass stands in Northern NY varying in soil type and fertility.

## MATERIALS AND METHODS

- In June 2010, three replicate plots (3.05 m by 3.05 m) were established on alfalfa-grass (*Medicago sativa* and *Festuca arundinacea*) and grass fields (*Festuca arundinacea*) at each of four sites at Miner Institute located in Chazy, NY.
- Treatment plots received 80 kg ha<sup>-1</sup> of Cl as liquid calcium Cl (TETRA Technologies, The Woodlands, TX) applied five days after first cutting.
- Plots were harvested near the third week of June 2010 (second cut), and a second harvest was taken at the end of July (third cut). Analysis of variance was used to determine treatment effects on yield, DCAD level (Ender et al., 1971), and nutritive content.

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## RESULTS AND DISCUSSION

- Mean Cl content of both alfalfa-grass and grass forages nearly doubled from the addition of 80 kg ha<sup>-1</sup> of chloride.
- Cl application reduced alfalfa-grass DCAD from 317 to 179 mEq kg<sup>-1</sup> for the first harvest ( $P \leq 0.001$ ), and 432 to 326 mEq/kg for the second harvest ( $P \leq 0.05$ ) (Figs. 1, 2).

- Grass DCAD was reduced from 115 to -108 mEq kg<sup>-1</sup> with calcium Cl fertilization ( $P \leq 0.001$ ) for first harvest and 293 to 91 mEq kg<sup>-1</sup> for second harvest ( $P \leq 0.001$ ) (Figs. 1, 2).
- There was no impact on yield from Cl addition ( $P \geq 0.58$ ) and no apparent impacts on nutritive value ( $P \geq 0.15$ ).
- Cl fertilization offers another option to manage DCAD while reducing purchased supplements.

## CONCLUSIONS AND IMPLICATIONS

- A one-time application of 80 kg ha<sup>-1</sup> of Cl nearly doubled the Cl content and significantly reduced DCAD levels of both alfalfa-grass and grass forages for two cuttings.
- Future research should investigate the animal performance and economics of fertilizing forages with Cl versus the addition of supplements to the ration to reduce DCAD level.

## REFERENCES

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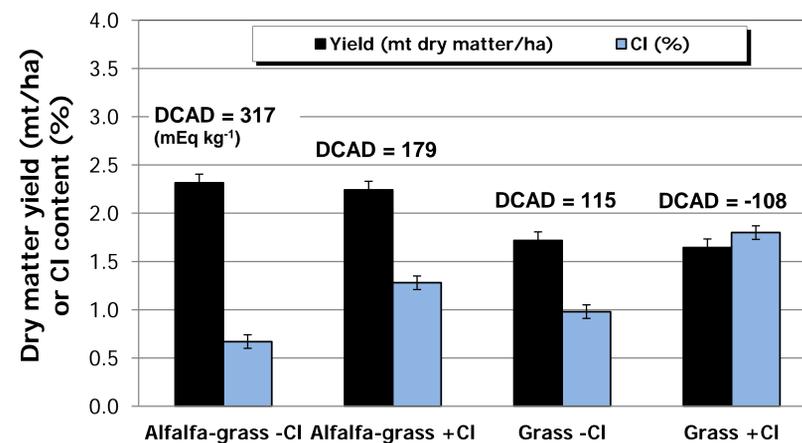


Figure 1. Yield, Cl content, and DCAD of alfalfa-grass and grass plots harvested for second cutting hay crop silage at Miner Institute.

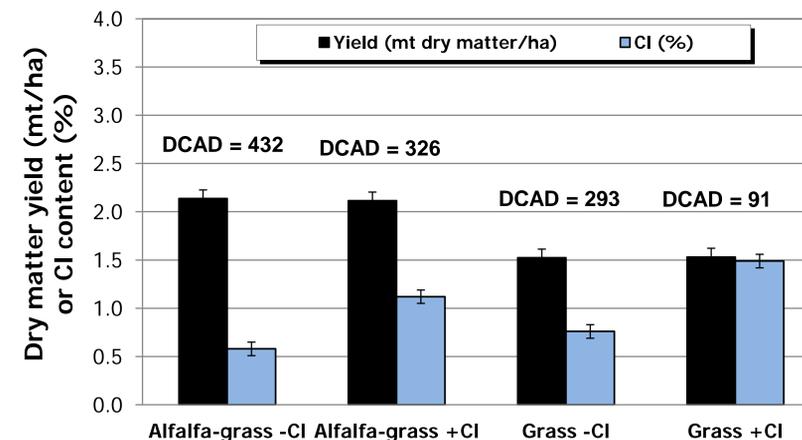


Figure 2. Yield, Cl content, and DCAD of alfalfa-grass and grass plots harvested for third cutting hay crop silage at Miner Institute.