Grass for Dry Cows

Dairy nutritionists place great emphasis on the diets of pregnant dry cows during the transition period 3 to 4 weeks prior to calving. The transition diet plays a major role in milk fever. Milk fever is a metabolic disorder in productive cows immediately after calving, due to a sudden large demand for calcium, and an inability of the cow to provide enough calcium. One method of preparing the cow in advance for this situation is to reduce cations, e.g. potassium (K), in the transition diet.

Dietary Cation-Anion Difference (DCAD)

DCAD is calculated as the sum of sodium and K minus the sum of chloride and sulfur, expressed on a milliequivalent (meq) basis. Diets with high K are cationic, while a slightly negative DCAD diet (anionic) is desired for cows in the transition period. Anionic diets tend to increase acidity of the blood and increase mobilization and availability of Ca. Anionic salts can help to make a diet anionic, but if K in the diet is too high, anionic salts cannot solve the problem.

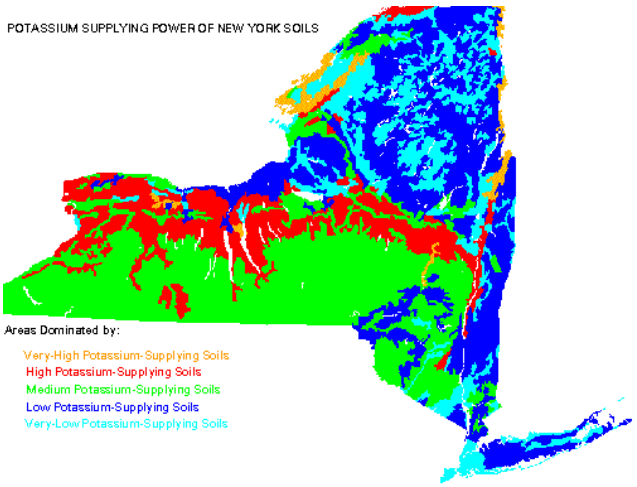

Figure 1. Estimated potassium supplying power of New York soils.

Potassium in Grasses

There is a tremendous range in K supplying power among NY State soils (Fig. 1). Soils with high and very high K supplying power may never need additional K to avoid grass K deficiencies. Sandy soils with very low K supplying power will require annual K fertilizer/manure additions to avoid plant deficiencies. Potassium deficiency is more critical in alfalfa, as K concentration is positively associated with overwintering potential.

The concentration of K in grass forage declines as the plant matures. Spring forage generally has a higher concentration of K than regrowth (Fig. 2). Potassium can also leach from the plant, as it is very soluble. This means that grass hay will have lower K than grass silage, when harvested at the same maturity stage.

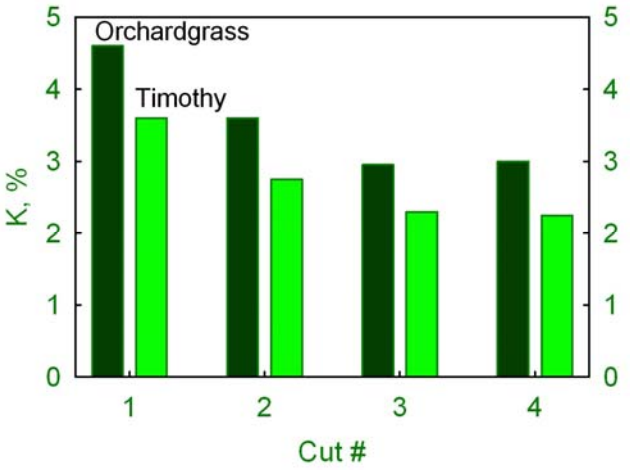

Figure 2. Potassium content of grass forage at four harvests at Canton, NY.

Grass species differences

Grass forage for dry cows should be kept below 2.5 % K, but the lower the better. If the transition diet contains 80% forage, the forage K concentration would need to be 1.5% to produce an anionic diet.

If sufficient soil K is available, there will be a range in K uptake among grass species (Fig. 3). Grasses are “luxury consumers” of K, the more soil K available, the more that grasses accumulate. Even though timothy tends to take up much less K than orchardgrass,

timothy forage in the spring can still exceed 3.5% K if the soil K status is high (Fig. 2). If soil K is limiting, all grass species will be relatively low in K, with much smaller differences among species.

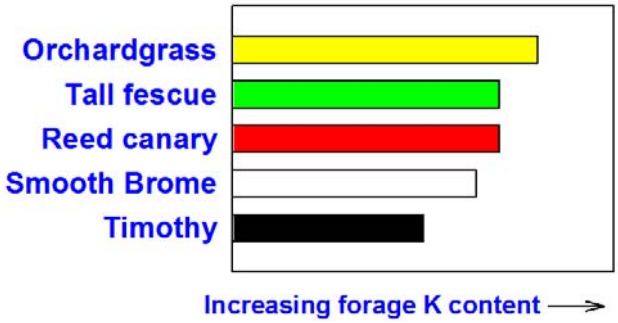

Figure 3. Relative forage K concentration in cool-season grass species.

Forage Management for Low K

The amount of low K forage required may be as high as 15% of the farm's total forage requirement. While K in the diet can be reduced by segregating fall cut grass for dry cows, it may be more effective to manage a percentage of the grass acreage specifically for low K forage. Nitrogen fertilization will increase yield and also annual uptake of K (Fig. 4).

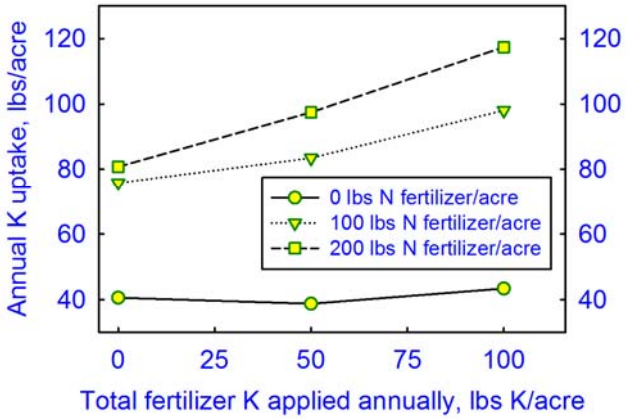

Figure 4. Uptake of K by reed canarygrass as influenced by N and K fertilization.

If soil K is high, N fertilization will increase forage K concentration. Once excess available soil K is removed, however, the opposite trend occurs. If soil K is low, N fertilization will decrease forage K concentration. One or two seasons of high N fertilization will remove excess soil K. We produced reed canarygrass forage with less than 1% K. Grass fields producing mature grass for heifers or dry cows are typically targets for manure application. Manure applications must be avoided on such fields if they are to produce low K forage.

Summary

- Select fields low in K supplying power.
- Identify low K fields with soil testing.
- Use timothy, avoid orchardgrass.
- Avoid all forms of K fertilization.
- Use moderate to heavy N fertilization.
- Fertilization with chloride will lower DCAD.
- Harvest mature forage 2 times a season.
- Use fall-grown grass vs. spring-grown.
- If forage K<1.7%, add some K fertilizer.
- Add anionic salts to cow's ration, if need be.
- Immediately after calving, switch back to a cationic diet.

Additional Resources

- 2011 Cornell Guide for Integrated Field Crops Management. Electronically accessible at: http://ipmguidelines.org/Fieldcrops/.
- Cherney, J.H., and D.J.R. Cherney. 2005. Agronomic response of cool-season grasses to low intensity harvest management and low potassium fertility. Agron. J. 97:1216-1221.
- Cherney, J.H., D.J.R. Cherney, and T.W. Bruulesma. 1998. Chapt. 6. Potassium Management. In (J.H Cherney and D.J.R. Cherney, ed.) Grass for Dairy Cattle. CAB.
- Cherney, J.H., D.J.R. Cherney, and M.D. Casler. 2003. Low intensity harvest management of reed canarygrass. Agron. J. 95:627-634.

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For more information

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Grass Management Manual
http://forages.org

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