Red Clover for Quality Forage for Dairy

Red clover (*Trifolium pretense* L.) is a legume that can supply high quality forage for dairy cattle. Red clover grows best on well-drained soil, but it can also tolerate poorly drained soil and a wide pH range (normal growth pH range 5.8-7.0). As a result, on soils where other legume forages like alfalfa will not produce well, red clover can be an economical forage and rotation option. Fact sheet #60 provides information on timing, rate and method of seeding, fertility and crop management, and also nitrogen credits from red clover grown as a cover crop. This fact sheet covers red clover harvest management.

Forage Quality

Red clover matures after alfalfa. Thus, when clover is clear-seeded and the farm also grows alfalfa, addition of clover allows for an extended harvest window, increasing the chance to harvest dairy quality forage in years of more variable weather.

Forage quality is comparable to that of alfalfa when harvested at the right time. Red clover exhibits higher digestibility than alfalfa or birdsfoot trefoil and the rate of decline in digestibility with maturation is slower, although intake of red clover is slightly lower. As a result, trials in Wisconsin reported no differences in milk, fat, or crude protein production when directly comparing red clover with alfalfa in cattle diets. Red clover also contains compounds that inhibit hyper-ammonia rumen bacteria from destroying protein. Excessive ammonia production in the rumen is a major nutritional inefficiency in ruminant animals, and thus, with red clover addition, the metabolizable energy for milk production is higher. Reduced protein destruction results in more bypass protein that is digested in the small intestines along with microbial protein. Bypass protein allows for increased productivity. When red clover is included in the diet, less (expensive) bypass protein needs to be added to the ration, reducing the cost of milk production, contributing to more sustainable whole farm nutrient balances.

Same Day Red Clover Hay

When mowed and left in windrows to dry for two or three days before ensiling, clover can be difficult to handle (slow dry-down) as it contains 1-4% more moisture than a crop like alfalfa. Recent studies in New York showed that for first cutting of red clover it took 24-30 hours for traditional narrow swaths to dry down enough so it could be ensiled (30% dry matter). Over time, slow dry down has caused some farmers to abandon red clover as a forage crop. However, a change in harvest management can address this issue: with wide swathing, clover can be dried almost as fast as grass (narrow swaths require 1/4 or 1/3 of the time needed for wide swath dry down).

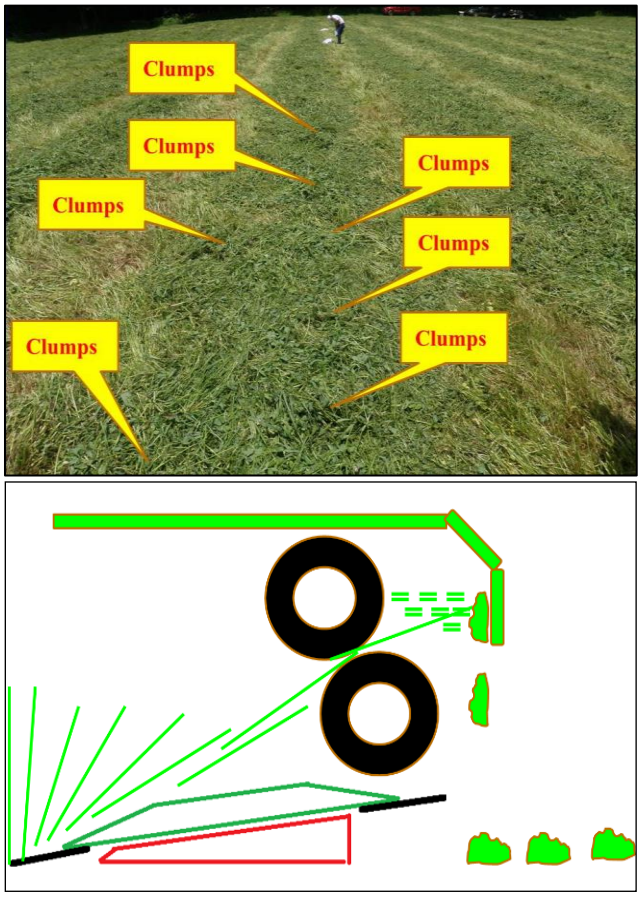

Figure 1: Deflector shields can cause clump formation and unequal drying. To avoid clump formation, remove the deflector shields and use wide swathing (>80% of the cutterbar).

For hay-in-a-day, the swath width should exceed 80% of the cutterbar. In a heavy crop, especially first cutting, deflectors should be removed to avoid formation of clumps that slow down drying time (Figures 1 and 2).

Figure 2: Tedding is essential to avoid partial drying; clover swaths will dry only on the outer three-quarter of an inch of material exposed to the sunlight while the inner portion remains at full moisture.

Clover clumps tend to become more resistant to drying below 75% moisture. Removal of deflector shields to minimize the interruption of flow through the mowing machine allows for the material to be more evenly scattered across the swath. This more uniform swath allows for rapid and more even drying.

Conditioning has no effect on time needed to dry the swath to 35% dry matter. In recent studies in New York, wide swathing and a wide-swath with intermeshing roll conditioners resulted in similar drying rates, comparable to what is typically found for alfalfa harvest. In addition, for both alfalfa and red clover, tine conditioners are not recommended as their use can result in excessive leaf removal from the stems and result in important yield and quality loss.

Tedding will help speed the drying rate of clover, particularly for heavy first cutting. Similar to alfalfa, drying of clover mainly takes place in the outer three-quarter of an inch of the swath that is exposed to the most air and sunlight. The remainder of the swath essentially remains at full moisture, where continuing respiration robs the crop of feed value (Figure 2). Recent work in New York showed that tedding reduced the drying time by 15-20% (on average) compared to wide-swathing without tedding. The tedded forage was more uniform in moisture content than the undisturbed swath as well. It is recommended to ted after two hours of drying of the surface material (the forage takes on a grey cast). It is critical to adjust the tedding forward speed to avoid formation of tedder clumps.

In Summary

Red clover is a viable forage crop option for fields that are not well suited to alfalfa production. Good yields of high quality forage can be obtained when the harvest is well-timed and well-managed. The combination of wide swathing (>80% cutterbar width) with uniform, low swath density (removal of deflectors), and tedding after two hours of drying is key for producing dairy quality forage from red clover.

Additional Resources

- 2014 Cornell Guide for Integrated Field Crops Management. Electronically accessible at: http://ipmguidelines.org/Fieldcrops/.
- Agronomy Fact Sheet 60: Nitrogen Credits from Red Clover as Cover Crop between Small Grains and Corn. Electronically accessible at: http://nmsp.cals.cornell.edu/guidelines/factsheets.html.
- Forages, Volume 1: An Introduction to Grassland Agriculture (2003) by Robert F. Barnes, C. Jerry Nelson, Michael Collins, and Kenneth J. Moore (Editors). Iowa State University Press. Electronically accessible at: http://www.uiowapress.org/.

Disclaimer

This fact sheet reflects the current (and past) authors' best effort to interpret a complex body of scientific research, and to translate this into practical management options. Following the guidance provided in this fact sheet does not assure compliance with any applicable law, rule, regulation or standard, or the achievement of particular discharge levels from agricultural land.

For more information

Cornell University Cooperative Extension

Nutrient Management Spear Program
http://nmsp.cals.cornell.edu

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