Rising Plate Meter Helps Farmers Manage Pasture

Device Measures Dry Matter Yield

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Farmers have been turning to pasture in order to attain high forage quality at low cost. However, many have found that using pasture isn't as easy as just opening the gate and letting the animals graze. In order to get the maximum benefit from pasture, farmers need to be able to judge when pasture is ready to be grazed and make plans to ensure that an adequate supply of high quality pasture is available for the entire grazing season. A tool developed in New Zealand and recently calibrated for the Northeast helps farmers with these sometimes difficult pasture management decisions.

The device is called a rising plate meter and it relates a pasture's height and thickness to yield through a carefully calibrated equation. The rising plate meter consists of a thin aluminum plate mounted on a shaft by a gear connected to a mechanical counter. As the rod is lowered into the pasture, the plate is supported at a height determined by the sward's thickness, height, and the plants that compose it.

The rising plate meter is used by taking 25-30 measurements in a single paddock. The initial height on the counter is recorded before the measurements and then the final height is recorded after the last measurement has been taken. Generally, it takes approximately 5-10 minutes to take 25-30 measurements in a paddock. The difference between the final and initial reading is the total accumulated height, which, when divided by the number of readings taken, gives the average height. This average height is then placed in an equation that gives the yield for the paddock.

A commercially available version of the rising plate meter was calibrated on several New York dairy farms during 1997, 2000, and 2001. Previous research on rising plate meters indicated that they needed to be calibrated to account for different plant species and for different times of the growing season. Since the meter was developed in New Zealand where there are different pasture types and growing conditions, separate equations were needed from those developed by the manufacturer.

The calibration done on New York pastures found different equations for pastures of different species and for different times of the growing season. There are separate equations for pastures containing either mainly fine grasses such as Kentucky bluegrass and perrenial ryegrass or mainly coarse grasses such as orchardgrass, timothy, smooth bromegrass, quackgrass, and reed canarygrass. There are also separate equations for late April through early May, mid-May through June, July through mid-August, and late August through September.

The different species and times of year require different equations because they affect the relationship between the plate height and the pasture yield. Coarse grasses such as orchardgrass support the plate more readily so they have less yield per rising plate meter height than fine grasses such as Kentucky bluegrass. The different times of year may correspond to different stages of grass growth during the year such as early spring vegetative growth, stem elongation and heading, vegetative growth after heading, and growth into the fall in preparation for the winter. These different grass growth stages likely affect the rising plate meter height to yield relationship as well.

The equations are accurate enough to be useful to farmers making management decisions about pasture. The exact accuracy of these equations is still being evaluated, but we think they will estimate yield within 10-15 percent. This level is more accurate than visual assessment or the grazing stick and is accurate enough to make it worthwhile for farmers to spend the time taking measurements with the device.

The primary use for the rising plate meter is to determine whether pastures are ready to be grazed and to make pasture budgeting plans. The equations report the pasture yield in pounds of dry matter per acre, which is an important characteristic for pasture management. Animals are not able to maximize their dry matter intake of pasture if there is less than 1,000 pounds of dry matter per acre available, and 1500-2000 pounds is ideal. Generally, 2,000 pounds of dry matter per acre is equivalent to 6- to 8-inch tall pasture.

By taking regular measurements of all of the paddocks on the farm, it is also possible to assess the average amount of dry matter per acre for the farm and determine whether pasture growth is increasing or decreasing. Increasing pasture growth may indicate that some paddocks will need to be set aside for hay harvest while decreasing growth may indicate that additional acres need to be brought into the grazing system or supplemental feeding needs to be increased.

Our research along with that of others indicates that there are some conditions that are not appropriate for using the rising plate meter. The meter gives the best results when it is used on pasture that will be grazed in the next several days. It is not accurate when used on recently grazed pastures or those with lots of weed pressure (especially newly seeded pastures with areas of bare ground and annual weeds). Care should also be taken when using the rising plate meter on pastures different than those on which the meter was calibrated.

Lastly, the calibration indicated that there are year-to-year differences in the calibration equations. Our investigation detected some differences between the equations found in 1997, 2000, and 2001. At present, the cause of these year-to-year differences is not known. Future research may show that separate equations may be required for growing seasons of different types (ie., wet years vs. dry years).

Alfalfa As A Fuel And A Plastic?

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USDA bioenergy funds are being used to convert alfalfa into the first dual-use biofuel plant. The leaf serves as a factory for raw, biodegradable plastic beads, other industrial products or better livestock feed, while the stem goes to ethanol production.

JoAnn Lamb, a plant breeder who serves on a team of five scientists at the Agricultural Research Service's Plant Science Research Unit in St. Paul, Minn., has created the "parents" for new alfalfa varieties by crossing European varieties with unusually thick stems with modern alfalfa varieties developed for dairy feed. The thick stems provide more raw material for ethanol production.

Team member Deborah Samac, an ARS plant pathologist, has transformed alfalfa so it can manufacture plastic. The process isn't practical yet, but it could be, if a cell wall barrier could be prevented from trapping beads of plastic.

Besides plastics and fuel, alfalfa may be a renewable resource for replacing other petroleum-based products and nonrenewable resources, such as nitrogen and phosphorus fertilizers. Carroll Vance, team member and unit research leader, has isolated many genes for creating new varieties, including one that helps alfalfa fix more nitrogen from the air and take in more phosphorus.