

FORAGE

Using a Plate Meter to Measure Forage Productivity

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The goal of many graziers is to increase forage production and utilization. A key component of increasing utilization is the ability to accurately determine forage mass. While some seasoned practitioners have a keen ability to visually estimate forage mass, the rest of us need some objective help.

The classical method of estimating forage mass is to hand-clip the forage from several locations of a known area, place the samples in a paper sack, then weigh the forage after it has dried (the samples are dried because dry matter is really the value of interest, not wet weight). This method is labor-intensive and requires significant processing time; therefore, results are not immediately available. In New Zealand, the rising plate meter is a commonly used tool for estimating forage mass. Because the device is easy to use and yields quick results, we decided to investigate the ability of a rising plate meter to estimate mass of cereal forages in the Southern Great Plains.

A rising plate meter is a device that consists of a weighted plate that slides over a shaft. As the meter is placed over a sward (grassy surface) of forage, the forage is compressed until it will support the plate's weight and the shaft passes through the sward to the ground. The distance



Noble Foundation testing in uniform fields showed that 30 readings with a properly calibrated electronic rising plate meter can accurately estimate forage mass 95 percent of the time to within 260 pounds per acre.

from the point where the shaft contacts the ground and the plate is the plate height.

The plate meters we used measure heights between 0.3 inches and 10.3 inches to the nearest .02 of an inch and electronically record a running average. The theory is that forage mass (dry matter) is proportional to plate

height. The plate meter essentially measures the "standard compressed height" of the forage sward. This measurement can be converted to forage mass through a calibration equation.

We used plate meters during the winter of 2011-2012 during experiments in which steers were grazing wheat or rye pasture. We calibrated ▶

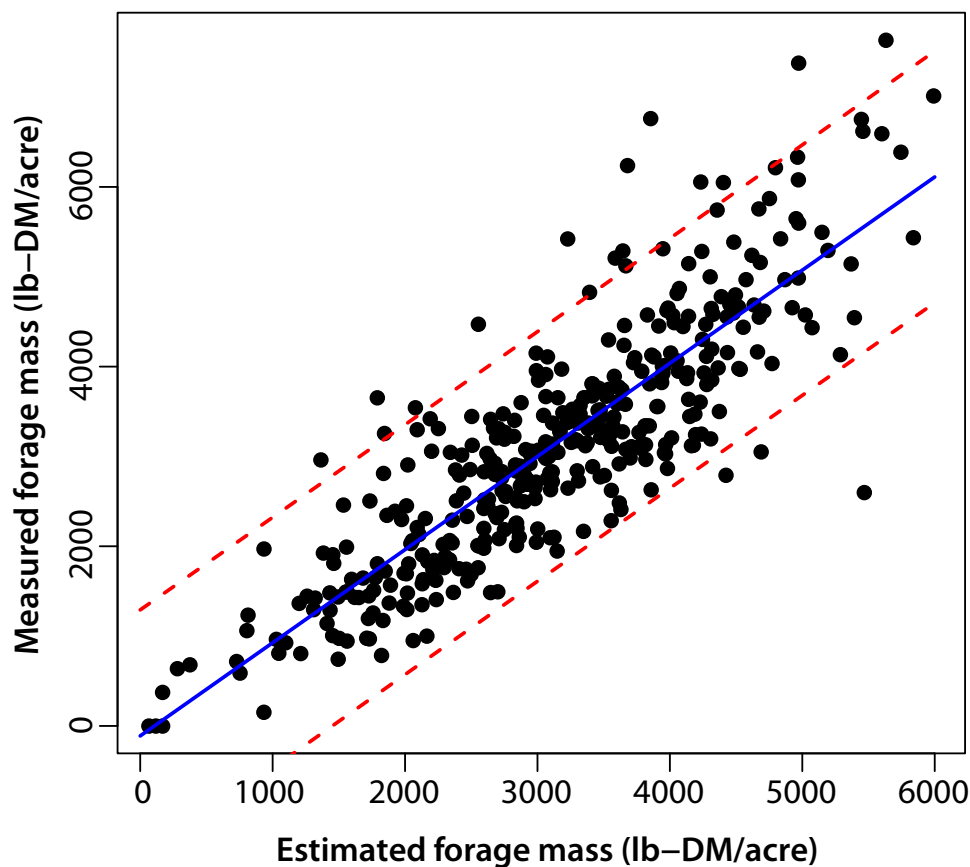
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the plate meter for these forage species by taking a reading on a 15-inch by 15-inch area and subsequently hand-clipping the forage in that area. We obtained 20 such samples for each dataset and collected datasets throughout the growing season (Nov. 15 to April 20).

Overall, calibrated plate meters were able to explain about 73 percent of the variation in clipped forage mass (see chart). In a uniform field, sampling with 30 plate meter readings, the mean forage mass can be estimated to within 260 pounds per acre 95 percent of the time – a very encouraging result.

Keys to getting precise, reliable estimates with a plate meter:

1. Set up and maintain the device properly.
2. Sample consistently (consistent angles, pressure, etc.).
3. Sample the entire paddock, not just the area near the gate or adjacent to the road.
4. Take an adequate number of samples in each paddock.
5. Develop a robust calibration equation to convert plate height to forage mass for your forage conditions.



Relationship between rising plate meter estimated forage mass and measured forage mass. Solid blue line is the average relationship and the red dashed line is the 95 percent prediction interval (95 percent of future paired samples will fall between these two lines).

In application, fields are not uniform and we recommend taking at least 30 measurements across the pasture to capture the spatial variation in forage mass. As forage mass and/or spatial variability increases, more plate height measurements are needed to maintain the same level of precision in the estimate. One of the nice features of the rising plate meter is that you can collect samples about as fast as you can walk. If you are taking samples every 30 paces and decide you need more samples, simply take a sample every 10 paces. Regard-

less of sampling frequency, samples must be distributed randomly across the entire paddock.

We are continuing to investigate use of this device as a potential method to decrease the labor and time needed to conduct our grazing experiments. We think there may also be application for this technology with some producers who are interested in fine-tuning their grazing management. Look for future research reports that will more fully document the ability of these tools to estimate forage mass. ■