

Estimating Pasture Forage Mass From Pasture Height

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How do you decide when to move animals onto a new pasture? How long can they feed on the pasture before they should be moved again? Most likely, your short answer is, "It depends." It depends on animal numbers, pasture size, production goals, available alternative pastures, and the amount of forage present or forage mass. In order to practice pasture budgeting, you need an estimate of forage mass.

Clipped samples are the standard for scientific research, but they require considerable time and labor and are not practical for farm use. However, it is relatively easy to measure pasture height, and there is a strong correlation between pasture height and pasture forage mass.

Forage height can be measured several ways. The simplest is to measure the average height of the pasture canopy surface with a ruler (Fig. 1).

Another method is to use a plate meter that lies on the surface of the pasture, compressing the pasture down to a level that supports the entire weight of the meter plate. There are different types of plate meters, but the two types used most frequently in the United States are the falling plate meter (Fig. 2) and the rising plate meter (Fig. 3).



Fig. 1. To use a ruler to measure pasture height, place the end of the ruler on the ground while holding the ruler vertical to the ground. Estimate the average height of the top of the pasture's canopy, the upper leaves of the pasture.

Measuring pasture forage mass is a three-step process.

1. Record pasture height from different points in the field. Take 15 to 30 or more heights depending on the size of the pasture. Calculate the average pasture height.
2. Evaluate the pasture's density in relative terms as thin, average, or thick. The best way to do this is to get down on your knees and look closely! The pastures used in developing the calibrations presented here differed in density due to species composition and prior management. Each was assigned to one of the three groups after a subjective evaluation.
 - a. Low-tiller-density pastures were generally young swards (one to four years since seeding) or hay meadows recently converted to pasture containing orchardgrass and smooth brome grass. These pastures did not have a significant amount of sod-forming grasses or white clover as an under-story.
 - b. Medium-tiller-density pastures were mostly mixed species stands including tall fescue, orchardgrass, timothy, bluegrass, perennial ryegrass, white clover, and red clover.
 - c. High-tiller-density pastures were mostly established stands of tall fescue or tall fescue mixed with other grasses. These stands were well fertilized and intermittently closely grazed, resulting in the development of high-tiller densities.
3. Using the average pasture height and estimated density, look up the estimated forage mass on the calibration table. Find the row corresponding to the average pasture height and the column corresponding to the estimated density. The number in that cell is the estimated forage mass in pounds of dry matter per acre.

With this information, you can ask yourself whether the available forage mass will be sufficient for the number of animals and the length of stay that you are contemplating.

Each of the three measurement methods has its advantages and disadvantages. The ruler can be a calibrated walking stick; its disadvantage is the subjectivity required in estimating the pasture's ruler height in a diverse sward. The falling plate meter is inexpensive and less subjective, but it is more time-consuming. The ris-

ing plate meter is more costly, but it is handier than the falling plate meter since it provides an automatic calculation of the average height (a disadvantage when the research objective requires a measure of variation as well as an average).

Whichever measurement method you use, it can help you develop greater accuracy in estimating forage mass for the purpose of pasture budgeting.

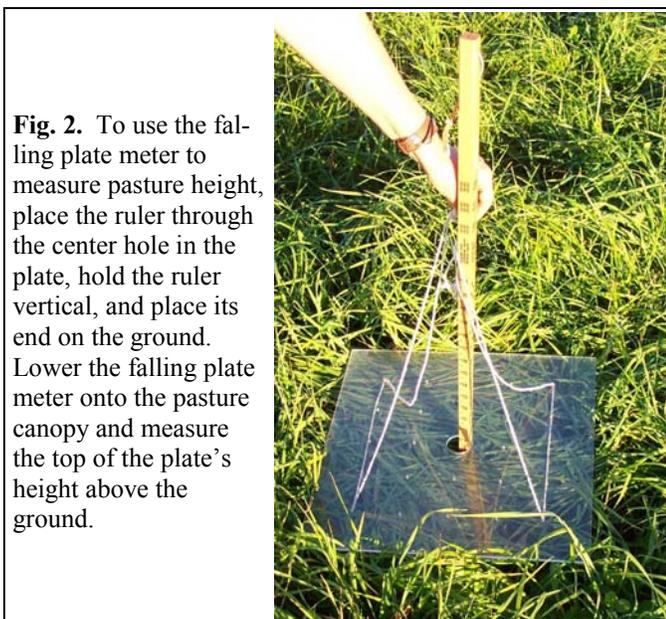


Fig. 2. To use the falling plate meter to measure pasture height, place the ruler through the center hole in the plate, hold the ruler vertical, and place its end on the ground. Lower the falling plate meter onto the pasture canopy and measure the top of the plate's height above the ground.



Fig. 3. To use the rising plate meter to measure pasture height, place the plate on the pasture canopy and, holding the shaft vertically, push it down to the ground. This makes the plate rise up the shaft, moving the counter that measures the height of the plate above the ground.

Table 1. General calibrations for pasture forage density and forage mass at different mean pasture heights as measured with a ruler, a falling plate meter, and a rising plate meter.

Measurement Method			Forage Density			Forage Mass		
			Pasture Tiller Density					
Ruler height	Falling plate meter	Farm Tracker rising plate meter	Thin (aftermath meadow)	Average (mixed grass clover)	Thick (tall fescue)	Thin (aftermath meadow)	Average (mixed grass clover)	Thick (tall fescue)
inches	inches	cm	----- (DM lbs/a/inch falling plate ht) -----			----- (DM lbs/a) -----		
3.0	1.8	7.3	479	583	712	822	1037	1530
4.0	2.4	9.8	464	565	709	1064	1338	1987
5.0	3.0	12.2	448	546	707	1291	1617	2417
6.0	3.6	14.6	433	528	705	1502	1874	2821
7.0	4.2	17.1	417	509	702	1697	2109	3198
8.0	4.8	19.5	401	490	700	1876	2321	3549
9.0	5.4	22.0	386	472	697	2039	2511	3873
10.0	6.0	24.4	370	453	695	2187	2679	4170
11.0	6.6	26.8	355	435	693	2319	2824	4441
12.0	7.2	29.3	339	416	690	2435	2948	4686
13.0	7.8	31.7	324	398	688	2536	3049	4904
14.0	8.4	34.1	308	379	685	2620	3128	5096
15.0	9.0	36.6	292	361	683	2689	3185	5260
16.0	9.6	39.0	277	342	681	2742	3219	5399
17.0	10.2	41.5	261	323	678	2780	3231	5511
18.0	10.8	43.9	246	305	676	2801	3221	5596