



## UTILIZING A GRAZING STICK

This document was developed with the help of the resources on grazing sticks from South Dakota State University Extension and the Oklahoma Cooperative Extension Service.<sup>1,2</sup>

Grazing sticks can be an effective and low-cost tool for producers to use in the grazing management planning process. Utilizing a grazing stick can enable producers to determine the production of their pastures for various types of forages, which is important for determining stocking rates for pasture units, tracking forage production over time and developing a successful grazing management plan.

Plant leaf height measurements are taken by the grazing stick to estimate the amount of production using the average height of the grasses. For each inch of leaf growth, the grazing stick estimates the amount of dry plant material in pounds. These measurements can be used in calculations to determine stocking rates for your operation. Outlined below is a step-by-step guide to utilizing a grazing stick in your grazing management planning process.

### 1. Measure Forage Height

Gathering measurements for an adequate representation of the forage heights in your pastures is important. It is recommended to take at least 15-20 measurements per pasture. Ensuring that these measurements are taken throughout the pasture to represent the entire pasture unit is important to getting an adequate representation. These measurements should be random and represent the forage growth of the entire pasture not just low or high producing areas.

*To determine forage height, follow the below steps:*

- a) Place the grazing stick upright at the base of the plant and measure the height of the leaves.
- b) Gently push your hand down into the canopy and record the height where you start to feel resistance indicating that most of the plant leaves are touching your hand.
- c) If there are various forage types at different heights, measure the representation of the various species.
- d) If possible, measure plants that are upright, however, if only trampled forage or lodged forage is available, hold the forage upright on the grazing stick to obtain a measurement but do not stretch the plant beyond its natural stand.
- e) Add together your measurements in inches and divide by the number of total measurements to obtain the average height of forage in the pasture.





## 2. Determine Forage Coverage and Forage Type

Forage cover refers to the relative closeness of desirable plants across the pasture unit. Determining forage cover is done by understanding the ground cover and thickness of desirable plants. Forage cover should only consider forages that will be utilized in the grazing system and should discount for undesirable forage cover. Excellent forage cover would have greater than 85% coverage and the forages should be vigorous. Average/good forage cover would represent a coverage of 50 – 85% of the forages in the pasture unit.

*To determine forage cover, follow the below steps:*

- In the same location as where you have measured forage height, slide your grazing stick horizontally at the base of the forage below the forage cover with the ruler side facing up.
- Count the uncovered, visible, inch marks out of 33 marks to obtain a covered number of marks out of 33.
- Multiply the covered inch marks by 3 to estimate the percent forage cover. (e.g., 25 covered inch marks multiplied by 3 would equal to 75% forage cover)

Forage type factors into forage production and should be considered when calculating stocking rate. Identifying forage species in your operation not only factors into forage production but can also help to determine growth periods and calculate air-dry weight of forage in your pasture. Forage types have varying growth heights that should be considered when making management discussions and to determine when to not graze certain forages. Your grazing stick will list a variety of forage types to assist you with your calculations. The grazing stick will have start and stop heights for different forages which will come in handy in quantifying forage production in step 3.

## 3. Quantify Forage Production

Now that you have forage cover and forage type you can determine estimated dry matter in pounds per acre inch (lbs/acre inch). This metric can then be used to determine forage production in pounds of forage per acre. Most grazing sticks will have tables, such as Table 1 below, which show the estimated dry matter in lbs/acre inch using forage type and forage cover. The value on the table indicates the estimated standing dry matter in lbs/acre inch for the forage type you select.

- To determine estimated dry matter in pounds per acre inch, follow the steps below:

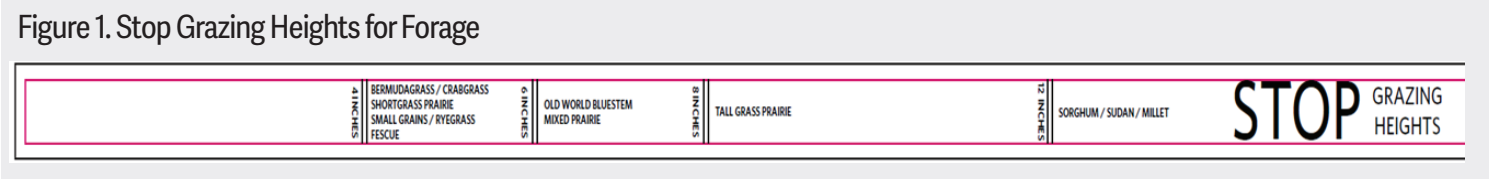
  - Identify the most common forage type in your pasture from Table 1.
  - Use your previously calculated forage cover (step 2) to assist in determining your estimated dry matter in pounds per acre inch. If your forage cover is 50-85% then your dry matter in lbs/acre inch can be estimated as "Average / Good" in Table 1 below.
  - The value selected for estimated dry matter in lbs/per acre inch will be used to calculate estimated forage production below.

Forage production (pounds of forage per acre) can be determined using the measured height and the estimated dry matter in lbs/acre inch. When calculating forage production, you must also account for the residue height of forage to be left after the grazing period. The rule of "take half, leave half" of the forage leaf can be applied when making these calculations.
- To calculate forage production, follow the steps below:

  - Use your grazing stick to determine the stop grazing height for each plant species (Figure 1). This indicates the height each specific forage type should not be grazed below.
  - Subtract your desired residual height (your stop height) from the average measure forage height (calculated in step 1) to determine an available forage height.
  - Multiply the available forage height by the estimated dry matter lbs/acre inch (calculated in 3a-c above) will provide the estimated average pounds of forage per acre.

For example, the average measured height of the forage was 8 inches and if you wish to leave 4 inches of residue height there would be 4 inches of available forage height. If the estimated lbs/acre inch was 150 pounds you would multiply that by 4 for an average of 600 pounds of forage per acre.

TABLE 1. ESTIMATED AVAILABLE STANDING DRY MATTER IN LBS/ACRE INCH		
FORAGE	AVERAGE / GOOD	LOW – HIGH RANGE
BERMUDAGRASS	250	80 – 750
SMALL GRAINS / RYEGRASS / FESCUE	150	20 – 450
CRABGRASS	130	60 – 300
OLD WORLD BLUESTEM	175	90 – 485
NATIVE PRAIRIE	115	30 – 195



#### 4. Allocating Forage to Livestock

There are two primary equations that can help to determine the days of grazing in a pasture unit for a particular number of livestock or the number of livestock the pasture can adequately support for a given number of days. These equations determine a value by using estimated forage amounts and may need to be adjusted to ensure that pastures are properly grazed. Days of grazing can also be used to determine the number of pastures needed to meet desired days of rest for forages in a rotational grazing system. Use Equations 1, 2 and 3 below to estimate days of grazing for a pasture unit, number of animals per pasture unit and number of pastures needed for desired rest, respectively.



### Equation 1: Days of Grazing for a Pasture Unit

Use this calculation to obtain an estimated number of days that a pasture unit could be grazed by a set number of animals.

$$\text{Days of Grazing} = \frac{\text{Lbs. of Forage Per Acre} \times \text{Acres} \times \text{Harvest Efficiency}^*}{\text{Animal WT} \times \text{Forage Intake \% of Body WT} \times \text{Animal \#}}$$

✂️ “*Harvest Efficiency*” is defined as the amount of forage allocated by the manager for the animal’s consumption. Common values utilized are 25% for rangeland and/or native pasture and 50% for introduced pasture. Harvest Efficiency is generally used when establishing the stocking rate for a ranch, as a whole. *Harvest Efficiency* can be substituted with “*Percentage Utilization*” for individual pasture recommendations to determine how much forage is available for a particular grazing event. An estimate of 50% is recommended when using *Percentage Utilization*, but this will vary depending on the pasture in question. Look to local advisors or range conservation specialists if you need assistance in establishing an appropriate value for *Harvest Efficiency* or *Percentage Utilization*.

### Equation 2: Number of Animals per Pasture Unit

Use this calculation to obtain an estimated number of animals that a pasture unit could carry.

$$\text{Animal \#} = \frac{\text{Lbs. of Forage Per Acre} \times \text{Acres} \times \text{Harvest Efficiency}^*}{\text{Animal WT} \times \text{Forage Intake \% of Body WT} \times \text{Days}}$$

✂️ Similar to calculating Days of Grazing (Equation 1), “*Harvest Efficiency*” can be substituted with “*Percentage Utilization*”. It is recommended to use *Harvest Efficiency* when setting the stocking rate at the whole ranch level within a given timeframe (usually 365 days, though can vary by location). It is recommended to use *Percentage Utilization* when estimating how many animals can graze a given pasture for a given number of days. Look to local advisors or range conservation specialists if you need assistance in establishing an appropriate value for *Harvest Efficiency* or *Percentage Utilization*.

### Equation 3: Number of Pastures Needed for Desired Rest Period

Use this calculation to obtain the estimated pastures needed to give forage the desired rest period after grazing.

$$\text{\# of Pastures Needed} = \frac{\text{Planned Day of Rest}}{\text{Planned Grazing Days on Pasture}} + 1$$

#### References

1. Bauman, P. (2021). Using the ‘Grazing Stick’ To Assess Pasture Forage. South Dakota State University Extension. Retrieved from <https://extension.sdstate.edu/using-grazing-stick-assess-pasture-forage>
2. Rocateli, A. (2016). Plan grazing management using the Oklahoma grazing stick. Oklahoma Cooperative Extension Service. Retrieved from <https://extension.okstate.edu/fact-sheets/print-publications/pss/plan-grazing-management-using-the-oklahoma-grazing-stick-pss-2594.pdf>

