Appendixes

Appendix A

METHODS TO ESTIMATE FORAGE PRODUCTION

Proper forage production estimation can optimize forage utilization while accounting for plant and animal requirements. Following are forage mass measurement methods.

CANOPY HEIGHT

Measuring canopy height with a pasture ruler (figure 78) can give you an estimate of the pounds of grazeable forage mass per inch of standing forage in the field (table 13). This measurement alone, however, does not consider canopy density, which can be an issue in terms of accuracy of estimate.

Figure 78. Pasture ruler on field.

Table 13. Pounds of Grazeable Forage Available per Inch in the Field

Forage Species	Average (lb. per inch)	Range (lb. per inch)
Alfalfa (grazing types)	225	45–400
Annual ryegrass	250	75–400
Bahiagrass	200	100–350
Bermudagrass	260	150–500
Native warm-season grasses	100	50–250
Orchardgrass	180	75–300
Small grains	150	75–250
Tall fescue	210	100–350
Tall fescue + clover	190	80–325

CUT AND DRY SAMPLE METHOD

Using a microwave (see Appendix B), build a quadrat (an open frame with a known area) using PVC pipe, steel wire, or wood (figure 79). The area of the quadrat must be known because it will be required to calculate forage mass per acre.

After the quadrat is built, select a few sites on your pastures to cut and dry forage samples. These sites should represent the general pasture condition (canopy height and density). To avoid bias, predetermine the number of steps you will take in each pasture to collect the forage sample. Once the forage is harvested, it can be dried using the microwave method.

VISUAL ESTIMATION

With practice, some people can visually estimate forage mass in a stand. This skill usually can be developed. Training requires harvesting a few forage samples from an area of known size to check for the accuracy of your visual estimates.

For more information, see "Measuring Forage Mass to Adjust Stocking Rates" on the Extension website or scan the QR code to access the publication.

Figure 79. Quadrat detail (bottom) and in use (top) on alfalfa-bermudagrass pasture.

Appendix B

Figure 80. Use a microwave to dry samples.

STEPS FOR DRYING SAMPLES USING A MICROWAVE METHOD

Supplies needed: glass of water, plate with samples, and a bathroom or kitchen scale

Weigh approximately 3.4 ounces (100 grams) of harvested forage and place on a plate. If weighing plate and the sample together, remember to tare (zero) the scale with the plate beforehand. Put the glass of water inside the microwave and set it to high for 2 minutes. The water helps to prevent combustion. If water boils at any point, replace it with new water. After 2 minutes, allow the sample to cool to room temperature and weigh.

Repeat this process in increments of 2 minutes until the sample weight remains constant. Keep in mind that samples with higher initial moistures will require a longer time to achieve a constant weight (i.e., silage or baleage samples).

For a more accurate measurement, dry two or more of the forage samples from the same area, then average the weights. To calculate forage mass per area, use the correct formula for the quadrat you used (dry weight [oz] ¸ quadrat area [ft^2]) and then convert to pounds per acre by multiplying by 2,722.5. This method requires harvesting multiple sites in the pasture to obtain a better estimate. Also be sure to use a dedicated microwave, not the one used in your family kitchen.

Appendix C

ADJUSTING STOCKING RATE

Measuring forage production is an efficient way to monitor the use of forage and help to estimate the pasture stocking rate and carrying capacity. Stocking rate (SR) is defined as the number of animals grazing within a unit of land over a specified period of time. When SR is incorrect, it can lead to issues such as overgrazing, which compromises stand longevity. Carrying capacity is defined as the maximum number of animals or animal units (AU) that a pasture can support over a period without compromising stand health.

It is crucial to maintain a balance between forage availability and removal to support goals for animal gains on pasture and to allow the stand to replenish carbohydrate reserves (the "engine" for regrowth after defoliation). Once you have measured forage mass on a given pasture, use these simple formulas and steps to make animal stocking decisions on your farm:

Number of paddocks (NP): $NP = \frac{\text{days of rest}}{\text{days of grazing}} + 1$

Example: $\frac{28 \text{ days of rest}}{4 \text{ days of grazing}} + 1 = 8 \text{ paddocks}$

Then calculate the acres required per paddock (AP):

$$AP = \frac{\text{weight} \times \text{DMI} \times \text{number animals} \times \text{days per paddock}}{\text{DM available} \times \% \text{ forage utilization}}$$

Whereas DMI = dry matter intake, DM = dry matter

Example: $\frac{600 \text{ lb} \times 3\%) \times 40 \text{ head} \times 4 \text{ days}}{2{,}700 \frac{\text{lb}}{\text{ac}} \times 60\%} = 1.8 \text{ acres}$

The total acres required per cycle is equal to the number of paddocks times acres required per paddock.

Example: 8 paddocks 1.8 acres = 14.4 total acres required

The stocking rate (SR) is calculated using $\frac{\text{number of animals grazing}}{\text{total acres grazed}}$

Example: $\frac{40 \text{ head}}{14.4 \text{ acres}} = 2.8 \text{ head per acres}$

Stocking density (SD) will be $\frac{\text{number of animals grazing}}{\text{paddock size in acres}}$

Example: $\frac{40 \text{ head}}{1.8 \text{ acre paddock}} = 22 \text{ head per acre}$

Figure 80. CUTLINE NEEDED.

Appendix D

RESOURCES FOR FORAGE GROWERS

ALABAMA FORAGE FOCUS PROGRAM
www.alabamaforages.com
Facebook: Alabama Forage Focus Program

ALABAMA BEEF SYSTEMS EXTENSION PROGRAM
www.alabamabeefsystems.com
Facebook: Alabama Beef Systems Extension

ALABAMA CATTLEMEN'S ASSOCIATION
www.bamabeef.org
Facebook: Alabama Cattlemen's Association

ALABAMA FARMERS FEDERATION HAY AND FORAGE COMMITTEE
www.alfafarmers.org

USDA NATURAL RESOURCES CONSERVATION SERVICE
www.usda.nrcs.gov

USDA FSA
www.fsa.usda.gov

The Alabama Forage Basics Handbook provides beef and forage producers in Alabama and the Southeast region with Extension and research-based information on animal, environment, forage, and soil topics. Objectives are to increase profitability and resilience, assist with risk management, and promote competitiveness in the livestock industry.

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