

# How to Measure Forage Production For the Astute Producer

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Measuring forage production is an essential part of a management plan. An accurate measurement of forage production is the basis used to calculate carrying capacity.

Clipping of quadrats is the most accurate way of measuring forage production. Once experience is gained, visual estimation can be used effectively.

## **Equipment Needed:**

A set of gram scales, clippers, bags to collect samples, calculator, a frame (quadrat: 1.92 ft<sup>2</sup> - 11.5 in x 22 in), and a camera.



## **Step 1**

Select an area that represents the average forage production for the pasture.

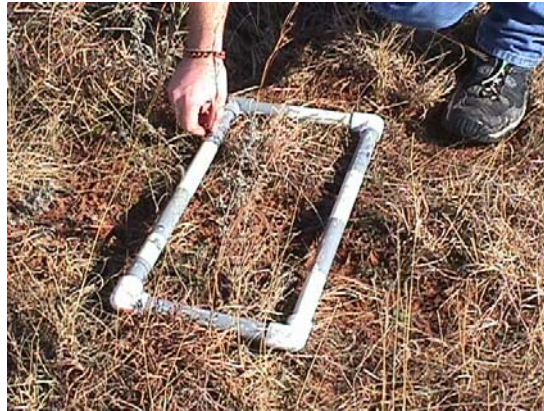
## **Step 2**

Randomly throw the quadrat a distance of approximately 10 to 15 ft., for each clipping.



**Step 3**

Place the frame on the ground. Take a photograph of the vegetation in the frame from an angle and sun position that offers perspective when viewed. Clip at ground level vegetation rooted within the boundaries of the frame. Be sure to only harvest the current year's growth.



**Step 4**

Subtract the weight of the bag, and then record the weight of each clipping in grams on Exhibit 1. Sample until there is confidence that a representative sample has been obtained, usually 10 clippings.



**Table 1. Converting weight in grams to pounds of forage per acre:**

size of quadrat	dimensions of quadrat	factor
1.92 sq. ft	11.5 X 22 inches	multiply grams by 50

Now, by using some relatively simple calculations, the amount of forage production can be determined.

**Step 5**

Congratulations! You have completed the field work. The rest is just accounting! There are **three** other aspects of the forage being sampled that need to be considered. These are timing, utilization, and percentage dry matter.

### 1. Timing

Sampling soon after frost provides a good estimate of standing grass at the end of the growing season. Sampling can also be done in early July on warm season grasses to provide an estimate of anticipated growth. (About 70% of warm season growth has occurred by this time). The growth stage will need to be figured into the equation to properly calculate annual forage production. (See Table 2)

#### Example

Native Warm Season Plant Growth Curve  
Percent of Total Growth by Month  
Based on Yearly Production of 5,000 Lbs.

**Table 2. Estimated Percent of Total Growth by Month**

	J	F	M	A	M	J	J	A	S	O	N	D	Total
% growth	0	0	5	10	20	25	15	10	10	5	0	0	100
cumulative	0	0	5	15	35	60	75	85	95	100	100	100	100
Lbs./ mo.	0	0	250	500	1000	1250	750	500	500	250	0	0	5000
cumulative	0	0	250	750	1750	3000	3750	4250	4750	5000	0	0	5000

**Note: Other growth curves may be needed for different forages.**

### 2. Utilization

Any forage removed by grazing should be reconstructed. The amount of production that would be on the site if it were ungrazed can be calculated by dividing the clipped production by the percent ungrazed (Example: 2200 lbs. clipped / 70% ungrazed = 3142 lbs. production). If the area has been heavily grazed, estimation will be more difficult. This difficulty may be overcome by comparing the heavily utilized area to an ungrazed area in the pasture or a similar area outside of the pasture. Small enclosures can be constructed as reference areas.

### 3. Percent Dry Matter Calculation

Calculate carrying capacity on an air-dry basis. Multiply the weight of the harvested plant material by the percentage needed to get them to an air-dry basis. Percentage dry matter contained in the sampled forage can be calculated by either drying the forage or by referring to Table 3 for the percentages of air-dry matter based on growth stage.

**Table 3. Percentage of air-dry matter in the harvested plant material:**

Plants	before heading	headed out	seed ripe	leaves dry	dormant
<b>Grasses</b>					
<b>cool season:</b>	35	45	60	85	95
Texas wintergrass					
Wildrye					
<b>warm season:</b>	30	45	60	85	95
<b>tall grasses</b>					
<b>mid-grasses</b>	40	55	65	90	95
<b>shortgrasses</b>	45	60	80	90	95
<b>Forbs</b>					
<b>leafy:</b>	20	40	60	90	100
<b>fibrous leaves:</b>	30	50	75	90	100
ragweed					
<b>Shrubs</b>	<b>new growth until leaves are full size</b>	<b>full-size green leaves</b>	<b>green fruit</b>	<b>dry fruit</b>	
<b>deciduous:</b>	35	50	30	85	
sumac					
hackberry					

Exhibit 1 provides a blank worksheet to summarize clipping information. Copies can be made as needed. Exhibit 2 is an example of a completed worksheet where information was collected on individual species. Plants can also be lumped together in categories instead separated by species. Just be aware that some plants may differ greatly in their growth stage which would affect the conversion factor. This completes the exercise for determining forage production.

### **Step 6**

It is time to bring together the grass and the animal. You now know the grass production, but how much does the animal need? A rule of thumb is that an animal unit (1000 pounds of animal) eats 2.6% of their body weight per day or 26 pounds on the average. They eat more during lactation, less when they are dry. This means a 1000 pound cow will eat 9490 pounds of grass a year (1000 times 2.6 percent times 365 days). Exhibit 3 will help with this calculation. For Exhibit 3:

- ✓ Column A - enter the production for each pasture. (Sometimes it is helpful to do it by range or ecological sites.)
- ✓ Column B - enter acres for each site if used. If not enter total acres.
- ✓ Columns C & E - complete based on guidance at bottom of Exhibit 3.
- ✓ Column D – One-half the forage is for protection of the plant and soil resource. One fourth of the grasses is either trampled, weathered away, or consumed by insects, small mammals etc. Therefore, 25% of the total production is the harvestable amount.
- ✓ Column F – Enter Animal Demand which is the daily need times the number of days to be grazed times the herd size.







