

# Guide to Estimate Forage Growth

## Clipping Procedures for Forage Estimates

- Range and pasture forages use a 1.92 square foot (ft<sup>2</sup>) clipping frame. This is so a conversion factor of 50 can be used. For every one (1) gram of forage that is clipped inside the frame, it equates to 50 pounds per acre (lbs/ac).
- Drilled and planted forages are different than sod type forage estimates. Row spacing is a good method to determine the conversion factor to use when clipping annually seeded forages. Procedures for determining this conversion factor are included in this help sheet and summarized in the table of conversion factors.
- Using the 1.92 ft<sup>2</sup> frame (that is used in pasture and rangeland clippings) may overestimate or underestimate the actual production in the field, based on where the frame is placed in or along the rows. If the forage crop is broadcast seeded, then the 1.92 ft<sup>2</sup> frame could be used, as long as the broadcast cover crop was consistent in coming up. One may have to take more clipping samples and/or use a larger frame size to estimate forage production on broadcast forages.

## Drying Procedures for Forage Estimates

- Due to large stem size and high moisture content in some annual forages, samples should be cut into short lengths and/or crimped in some way to allow moisture to escape cuttings. Spreading out the sample into thin layers on newspaper helps with the drying process and makes it easier to collect back into a bag for re-weighing.
- Estimate five (5) days for drying in a low humidity environment and weigh samples daily until there are no changes in weight from one day to the next.
- Example of Oat Forage:  
The total wet weight was 366 grams.  
Two (2) bags were used to collect two (2) rows (7.5 inch drill spacing and 24 inches long).  
Air-dry weight is 51 grams (13.9% air-dry).



51 grams/plot x 38.4 = 1,958.4 lbs/acre



### **Example of 1.92 ft<sup>2</sup> Frame on Rangeland**

The typical rectangle frame size is 11.5 inches wide by 24 inches long. This equals 276 square inches (in<sup>2</sup>). The frame area equals 1.92 ft<sup>2</sup> (276 in<sup>2</sup> divided by 144 in<sup>2</sup>/ft<sup>2</sup>). One gram divided by 1.92 ft<sup>2</sup> equals 0.521 grams/ft<sup>2</sup>. 43,560 ft<sup>2</sup>/ac multiplied by 0.521 grams/ft<sup>2</sup> equals 22,694.8 grams/acre. 22,694.8 grams/acre divided by 453.6 grams per pound (lb.) equals 50 lbs/ac for every 1 gram per frame. The conversion factor is 50.



### **Example of 7.5" Drill Row Spacing**

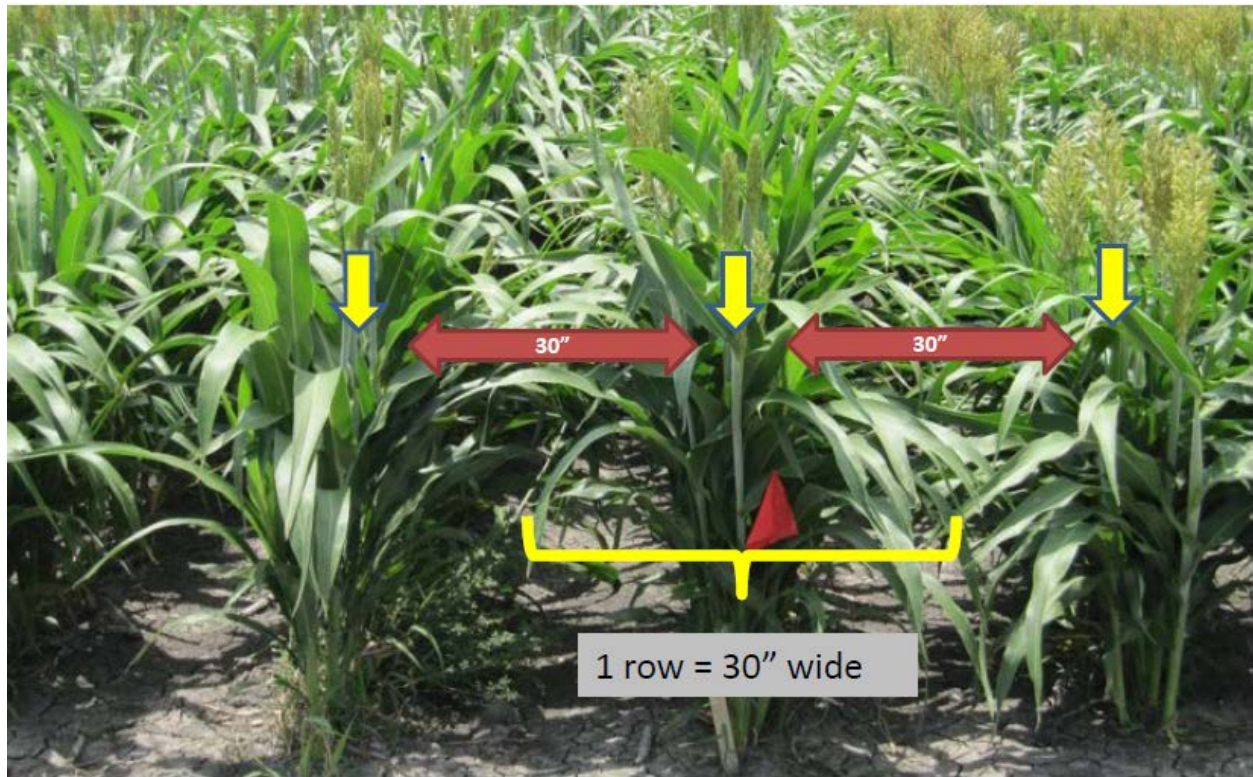
The plot size that could work for drilled forages in 7.5" spacing is 15 inches wide by 24 inches long (2 rows). The plot area would equal 2.5 ft<sup>2</sup> (15 inches multiplied by 24 inches equals 360 in<sup>2</sup> divided by 144 in<sup>2</sup>/ft<sup>2</sup>). One gram divided by 2.5 ft<sup>2</sup> equals 0.4 grams/ft<sup>2</sup>. 43,560 ft<sup>2</sup>/ac multiplied by 0.4 grams/ft<sup>2</sup> equals 17,424 grams/acre. 17,424 grams/acre divided by 453.6 grams per lb. equals 38.4 lbs/ac for every 1 gram per frame. The conversion factor is 38.4.





### **Example of 30" Planter Row Spacing**

The row length works better for wide spaced plantings. The spacing is 30 inches wide by 24 inches long. The plot area equals 5 ft<sup>2</sup> (30 inches multiplied by 24 inches equals 720 in<sup>2</sup> divided by 144 in<sup>2</sup>/ft<sup>2</sup>). One gram divided by 5 ft<sup>2</sup> equals 0.2 grams/ft<sup>2</sup>. 43,560 ft<sup>2</sup>/ac multiplied by 0.2 grams/ft<sup>2</sup> equals 8,712 grams/acre. 8,712 grams/acre divided by 453.6 grams per lb. equals 19.2 lbs/ac for every 1 gram per frame. The conversion factor is 19.2.



### **Table of Conversion Factors**

(Converts 1 gram per plot to pounds per acre)

Seeding Equipment Spacing (inches)	Number of Rows	Length of Row (inches)		Plot Size (square feet)	Conversion Factor
7.5	1	24	=	1.25	76.8
10	1	24	=	1.67	57.6
15	1	24	=	2.50	38.4
20	1	24	=	3.33	28.8
30	1	24	=	5.00	19.2
36	1	24	=	6.00	16.0

### Table of Conversion Factors, Continued

(Converts 1 gram per plot to pounds per acre)

Seeding Equipment Spacing (inches)	Number of Rows	Length of Row (inches)		Plot Size (square feet)	Conversion Factor
7.5	1	36	=	1.88	51.2
10	1	36	=	2.50	38.4
15	1	36	=	3.75	25.6
20	1	36	=	5.00	19.2
30	1	36	=	7.50	12.8
36	1	36	=	9.00	10.7

Using two (2) rows of 7.5 inch spacing has the same conversion as one (1) row of 15 inches. Two (2) rows of 10 inch spacing has the same conversion as one (1) row of 20 inch spacing, etc.

### Calculating Conversion Factor for Plot Size Row Spacing Technique

$$\begin{array}{l} \frac{\text{Row Width}}{\text{inches}} \times \frac{\text{# of Rows}}{\text{rows}} = \frac{\text{Plot Width}}{\text{inches}} \times \frac{\text{Row Length}}{\text{inches}} = \frac{\text{Plot Size}}{\text{in}^2} \\ \downarrow \\ \frac{\text{Plot Size}}{\text{in}^2} \div \frac{144}{\text{in}^2/\text{ft}^2} = \frac{\text{Plot Size}}{\text{ft}^2} \\ \swarrow \\ \frac{1}{\text{Gram per Plot}} \div \frac{\text{Plot Size}}{\text{ft}^2} = \text{grams per ft}^2 \\ \swarrow \\ \frac{43,560}{\text{ft}^2/\text{acre}} \times \frac{\text{g/ft}^2}{\text{g/ft}^2} = \text{grams per acre} \\ \downarrow \\ \frac{\text{Grams per Acre}}{\text{g/ac}} \div \frac{453.6}{\text{Grams per Lb}} = \boxed{\text{Conversion Factor}} \text{ lbs per acre for every 1 gram per plot} \end{array}$$

### Calculating Conversion Factor for Plot Size Row Spacing Technique

Example of 7.5 inch drill row spacing (2 rows).

$$\frac{7.5 \text{ inches}}{\text{Row Width}} \times \frac{2 \text{ rows}}{\# \text{ of Rows}} = \frac{15 \text{ inches}}{\text{Plot Width}} \times \frac{24 \text{ inches}}{\text{Row Length}} = \frac{360 \text{ in}^2}{\text{Plot Size}}$$

$$\frac{360 \text{ in}^2}{\text{Plot Size}} \div \frac{144 \text{ in}^2/\text{ft}^2}{} = \frac{2.5 \text{ ft}^2}{\text{Plot Size}}$$

$$\frac{1 \text{ gram}}{\text{Gram per Plot}} \div \frac{2.5 \text{ ft}^2}{\text{Plot Size}} = \frac{0.4 \text{ grams per ft}^2}{} \quad \leftarrow \text{from Plot Size}$$

$$\frac{43,560 \text{ ft}^2/\text{acre}}{} \times \frac{0.4 \text{ g/ft}^2}{} = \frac{17,424 \text{ grams per acre}}{} \quad \leftarrow \text{from Gram per Plot}$$

$$\frac{17,424 \text{ g/ac}}{\text{Grams per Acre}} \div \frac{453.6 \text{ g/lb}}{\text{Grams per Lb}} = \boxed{38.4} \text{ lbs per acre for every 1 gram per plot}$$

Conversion Factor

### Calculating Conversion Factor for Plot Size Hoop Method

$$\frac{\text{Hoop Circumference}}{\text{inches}} \div \frac{6.283}{2 \pi} = \frac{\text{Hoop Radius}}{\text{inches}}$$

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$$\frac{\text{Hoop Radius}}{\text{inches}} \times \frac{\text{Hoop Radius}}{\text{inches}} \times \frac{3.14}{\pi} = \frac{\text{Plot Size}}{\text{in}^2}$$

↓

$$\frac{\text{Plot Size}}{\text{in}^2} \div \frac{144 \text{ in}^2/\text{ft}^2}{} = \frac{\text{Plot Size}}{\text{ft}^2}$$

↓

$$\frac{1 \text{ gram}}{\text{Gram per Plot}} \div \frac{\text{Plot Size}}{\text{ft}^2} = \frac{\text{grams per ft}^2}{} \quad \leftarrow \text{from Plot Size}$$

$$\frac{43,560 \text{ ft}^2/\text{acre}}{} \times \frac{\text{g/ft}^2}{} = \frac{\text{grams per acre}}{} \quad \leftarrow \text{from Gram per Plot}$$

↓

$$\frac{\text{Grams per Acre}}{\text{Grams per Acre}} \div \frac{453.6 \text{ g/lb}}{\text{Grams per Lb}} = \boxed{\phantom{000}} \text{ lbs per acre for every 1 gram per plot}$$

Conversion Factor