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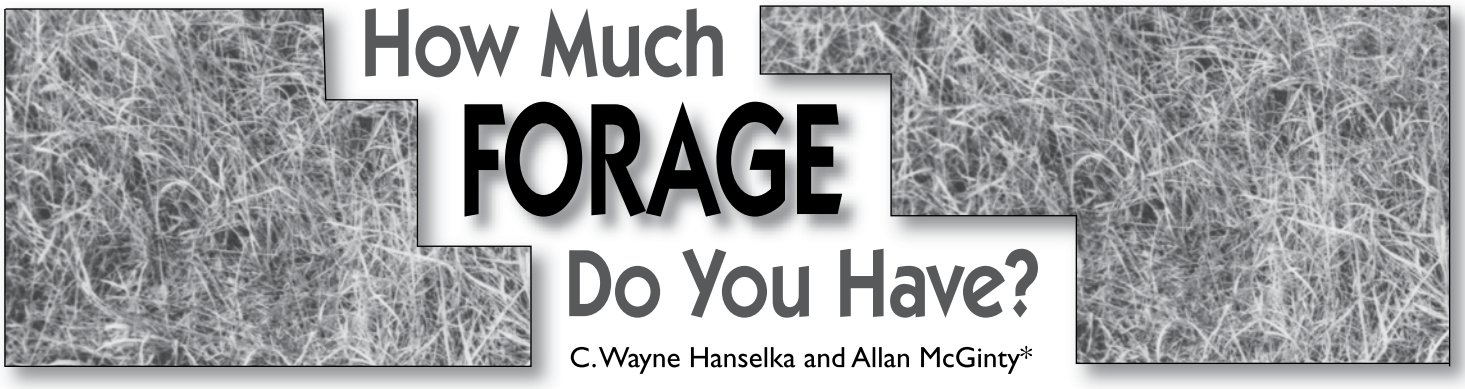

How Much FORAGE Do You Have?

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Forage production varies considerably, depending on rainfall, season of the year and past and present grazing management. Since forage production is unpredictable, forage supply must be monitored and compared to current and predicted forage requirements. For proper management of range resources, animal numbers must be balanced with current forage supply. Forage supply information also can be used to forecast a potential forage shortage or surplus and make needed stocking rate adjustments.

Ranchers often conduct forage surveys informally while riding through their pastures during daily livestock management tasks. Many of them have the experience and observational skill to notice general changes in forage quality and quantity, but having more quantitative information will improve stocking rate decisions and help avoid overuse or underuse of forage resources. Overuse can damage range resources and lead to a crisis situation with fewer livestock marketing alternatives. Underuse can reduce ranch revenue.

This forage survey procedure is easy to use and provides unbiased estimates of the forage supply, requires minimum sampling time, and provides specific information for improving stocking rate grazing management decisions. The only materials required are a range site map (aerial photograph), plot frame, grass shears, paper sacks, drying oven, camera, weigh scales, notepad (data sheet), pencil and calculator. A sample photo guide is included and can be removed to be used in the field.

When Should Forage Supplies Be Surveyed?

Forage supplies should be monitored visually throughout the year. However, more detailed information might be required before important decisions are made. Since forage production is unpredictable, forage surveys should be conducted at the end of normal forage production cycles. This allows the rancher to estimate immediately how long the accumulated forage supply will last during expected non-growth periods.

Late June-early July and late October-early November surveys are recommended for rangelands that normally receive spring and fall rains. Surveys for summer rainfall areas, such as the Trans-Pecos region of Texas, are best conducted in late October-early November. A March evaluation is needed in all regions to document the forage lost over the winter because of grazing and weathering. Forage remaining in March might have to last until mid-summer if spring rainfall is less than normal.

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Seven Steps for Conducting a Forage Survey

1 *Determine grazable acres per range site and pasture.*

Using a recent aerial photograph and soil survey information, draw the pasture and range site boundaries. Include non-grazable areas, such as lakes, roads, homestead, thick brush, inaccessible terrain and unproductive areas. It might be necessary to inspect each range site to estimate unproductive acreage, including brush mottes or thickets not observable on the aerial photograph. Determine total acres for each range site; then calculate grazable acreage by subtracting non-grazable acreage from the total.

2 *Select the appropriate plot size that matches the type of vegetation to be sampled.*

Construct the plot frame using a ⅜-inch reinforcement rod (welded) or ½- to ¾-inch PVC pipe with inside dimensions as shown in Table 1.

3 *Locate representative areas in each range site.*

Because they will be sampled to determine the forage supply, these areas should be representative of the average grazing use for the range site. Do not sample adjacent to bed grounds, water points, mineral/feeding locations or areas that are seldomly grazed.

4 *Develop a representative photo guide.*

A photographic reference of known forage quantities for the various range sites on the ranch is used to improve estimation consistency between samples. The photo guide represents the variation of forage supply conditions that will be observed in the pastures. Use approximately ten photographs of known forage quantities arranged from the lowest to the highest quantity. (See the sample photo guide, Extension publication L-5476.)

In the representative range site areas, select plot locations that have different quantities and species mixtures. Place the plot frame over the vegetation to be photographed. The frame perimeter should be clearly visible in the photograph (e.g., the PVC pipe used in the sample photo guide). Because only vegetation rooted in the plot should be sampled, separate vegetation into or out of the plot frame. Each photograph should indicate height, density and cover of vegetation. High contrast black-and-white photographs are recommended.

Stand to photograph the plot. Fill the frame with the plot and include a notepad or small dry erase board with identifying information in the photograph. After photographing the plot, make any important notes and clip all the standing herbaceous vegetation rooted within the plot to the soil surface. Do not include dead plant material on the ground. Place the clipped vegetation in a properly labeled paper bag (pasture name, date, range site and plot number) for drying and weighing.

Calculate the dry weight in pounds per acre represented by the forage in the plot by weighing each sample to the nearest gram or tenth of an ounce. Heat the bag containing the clipped forage sample in a microwave set on high for 30 seconds. Re-weigh the bag and sample and record the new weight. Continue to heat the bag for another 30 seconds and re-weigh it until the sample stops losing measurable weight. Subtract the weight of the bag and then use Table 1 to convert weight to pounds per acre. Do not microwave samples for more than 30 seconds at a time to avoid spontaneous combustion.

Samples also may be placed in a shaded, dry area for several days until dry. Although not as accurate, estimates also can be obtained by using a Moisture Conversion Table (Table 2). Finally, determine

Table 1. **Suitable plot size and associated conversion factors.**

Plot area	Length per side	Conversion factor
4.00 ft^2	24.0 in	680 * wt in ounces = lbs/ac
9.00 ft^2	36.0 in	302 * wt in ounces = lbs/ac
4.50 ft^2	25.6 in	600 * wt in ounces = lbs/ac
9.07 ft^2	36.1 in	300 * wt in ounces = lbs/ac
1.00 m^2	39.0 in	10 * wt in grams = kg/ha (lb/ac)

Table 2. **Moisture conversions (percent dry matter).**

Plant type	Initial growth to heading	Headed out to flowering	Seed ripe: leaf tips drying	Stems partly dry	Dormant
Mid grasses	40	55	65	90	95
Short grasses	45	60	80	90	95
Forbs	20	40	60	90	100

dry weight (less sack weight) in grams or ounces. Pounds per acre equal grams or ounces per plot multiplied by the appropriate conversion factor shown in Table 1. A photo guide of actual forage supplies in pounds per acre can be developed by taking a series of these photographs.

5 *Sample each representative area.*

The forage survey on each representative area involves four basic steps: tossing the plot frame, estimating the forage quantity in the plot, determining the samples needed and correcting estimates. In each representative area, walk in a selected direction and toss the plot frame every ten paces. Avoid biasing where the frame hits. Because samples should represent actual conditions, bare spots and different quantities of forage should be sampled. Use the photo guide to estimate the amount of forage in each plot and record information about the site. The more samples you take, the more accurate your estimate will be.

6 *Determine the forage supply.*

After completing the forage survey, calculate the average estimated pounds per acre of forage for each range site per pasture. This is determined by multiplying grazable acres by the average pounds per acre of forage. Sum all range sites per pasture to calculate the total pounds of forage per pasture.

7 *Determine animal unit days of available grazing.*

An animal unit is based on the metabolizable energy requirements (17.3 mega calories per day) for a 1,000-pound cow in the last third of pregnancy. This requirement converts to a daily forage intake of almost 20 pounds (2 percent of body weight) of 53.6 percent digestible forage. This requirement increases to 2.5 percent of body weight for lactating cows and 3 percent for stocker cattle (Table 3).

Table 3. **Intake conversions for various classes of livestock.**

Livestock	Conversion factor
Sheep	3.0% * body wt
Goats	4.0% * body wt
Stocker cattle	3.0% * body wt
Dry cow	2.0% * body wt
Lactating cow	2.5% * body wt

Table 4. **Optimal amounts of nongrazed forage for different types of rangeland.**

Desert	Shortgrass	Midgrass	Tallgrass
250 lb/ac	300–500 lb/ac	750–1,000 lb/ac	1,200–1,500 lb/ac

Minimum forage thresholds are an important factor to consider when balancing existing forage supplies with livestock numbers (Table 4). They represent the amount of forage that should be present at all times to protect the soil surface from rainfall impact, to slow water movement across the soil, to moderate soil temperatures and to sustain the growth of forage plants.

To calculate the animal unit days of available grazing, subtract the residue to be left in a pasture (Table 4) from the total pounds of dry forage in that pasture (using the photo guide). For example, 800 pounds of total forage – 500 lbs/ac residue = 300 lbs/ac. The calculation represents the pounds of forage available for use by grazing animals. Unfortunately, grazing animals are only about 50 per cent efficient in utilizing the available forage, so multiply the pounds available by .5 to determine the amount of actual forage that will be consumed by livestock (e.g., 300 lbs/ac x .5 = 150 lbs/ac consumed).

Finally, multiply the pounds of forage to be consumed by the grazable acres in the pasture, and then divide by the pounds of forage per head per day for the species and type of livestock to be grazed (Table 3). For example,150 lbs/ac x 100 acres = 15,000 lbs of forage; 15,000 lbs of forage divided by 20 lbs/day = 750 animal unit days of grazing if using 1000 lb dry cows.

Remember two key points: (1) revise your estimates every time it rains and new forage growth occurs, and (2) this technique is more accurate when predicting forage supplies a few weeks ahead as compared to months.

The number of animal unit days of available grazing per pasture can then be used to determine if the forage supply is adequate for the planned stocking rate until reqrowth is expected. Also, the average number of animal units that will be grazed during this time can be determined. Total days that the forage supply will last at the current stocking rate are determined by dividing the planned number of stock units into the animal unit days of available grazing.

Conclusion

Using this forage survey procedure, while training the "eye" and using photo guides to estimate forage supplies, should help improve grazing management decisions and reduce the damage that over-grazing can cause. Timelier destocking during drought will help keep plants healthy for future growth. Soil with good vegetative cover traps rainfall effectively and is less apt to erode. Rather than waiting until the forage supply is gone, a forage supply survey will help forecast whether a change in stocking rate is appropriate. This allows better planning to meet crisis situations.

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