Monitoring & Recordkeeping

Monitoring is used to determine if current management actions are meeting management objectives and having the desired effect on natural resources. Monitoring can also quantify the effects of management or environmental variation, at a specific location, over time. Monitoring is a visual assessment by the land-owner and can be short term or long term.

Establishing a monitoring program includes:

1. Defining management and monitoring objectives
2. Determining monitoring techniques
3. Selecting monitoring sites
4. Collecting and recording data
5. Interpreting data
6. Refining management strategy

Benefits

Monitoring can help managers understand the benefit derived from changes in grazing management or from investments in pastureland improvements. Monitoring data is utilized to: (1) evaluate effects of past and present management, (2) confirm effective management practices, and (3) identify trends to predict future changes so management strategies can be adapted accordingly.

Selecting a Monitoring Method

Evaluating the impact of grazing management is important in order to fine tune producer decision making and maximize the benefits from this type of agricultural system. Producers should select a monitoring plan that works best in their situation, with planner guidance.

There are several different monitoring protocols/programs to choose from, including:

1. **Grazing records** - help adjust management over time
2. **Photo Points -** indicate how the landscape is changing
3. **Pasture Condition Scoring -** evaluates the overall health of the grazing system
4. **Step Point Transects -** monitor pasture composition
5. **Dry Weight Rank -** looks at the main plant species present

1. Grazing Records: Good record keeping is critical to the success of any livestock management system, be it grazing or confinement. In a grazing system, keeping records can help determine if pasture allocation or forage quality is adequate or if supplemental forage or grain is needed to maintain livestock production. For dairy, beef and sheep grazing systems, keeping records on pasture allocation and weight gains or body condition can also help determine if sufficient nutrition is being obtained from pasture.

   See the chart below (from Graziers Notebook series, Project Grass) to ensure that the landowner tracks his/her management and meets the recordkeeping requirement under Prescribed Grazing (528).

Paddock Identification:		Size:		Forage Species:		
Fertilizer Amount:		Type:		Date:		
Livestock		Date In	Forage Height	Date Out	Forage Height	Notes: (Milk production, weather, etc.)
Number	Class					

2. Photo point monitoring: This monitoring technique requires a photographic record of vegetation and soil conditions to supplement needed observations. Photo point monitoring involves establishing permanent photo points and returning annually to take photographs at these locations. Photo point monitoring provides a visual record of changes. Over time, these images will show a trend in resource conditions that can be used to guide management decisions.

   Photo point monitoring does not establish the cause of changes in resource conditions. For example, photographs may show a trend of increasing bare ground, but the cause of the trend could be management practices or a natural event, such as drought. Photographs should be used in conjunction with other monitoring methods.

   Every operating unit has a unique combination of soils, topography, vegetation, and management. Appropriate sites for photo point sharing are, therefore, highly site specific. Representative photo points should represent the characteristics of a much larger area. For example, if you have several adjacent management units with similar soil, vegetation, and management, one photo point can be used to represent all of the units.

Required Elements:

- For each photo point, at least one close-up and one landscape photo will be needed. Close-up photographs show specific characteristics of an area such as soil surface, ground cover, or litter. Landscape photographs document broad changes in conditions over time.
- Photographs should be taken at least annually at the same time each year.
- Brief description of how data was utilized in refining management decisions.

Procedure:

- Establish the photo point and mark with a brightly painted steel or wooden post.
- On the data sheet briefly describe the photo point location and why site was selected.
- For landscape photographs, record a compass direction to help position the camera for future photographs. If possible include a landmark in the background or place a second permeate marker about 20 feet away from the photo point marker to line up the photograph.
- For close-up photographs, lay frame at the desired location (next to the marking stake or within a few feet of the stake, if the area is disturbed by livestock). Two carpenter rulers can be utilized to create a 3 ft. X 3 ft. square frame standing over the frame, take a photograph looking down at the frame. Try to avoid casting a shadow across the frame when taking the photo.
- Be sure to include a photo ID card that is large enough to be visible in the picture identifying the date, photo point number, and pasture name and/or number.

Year 1- Close-up

Year 1- Landscape

Pasture Name/ID:

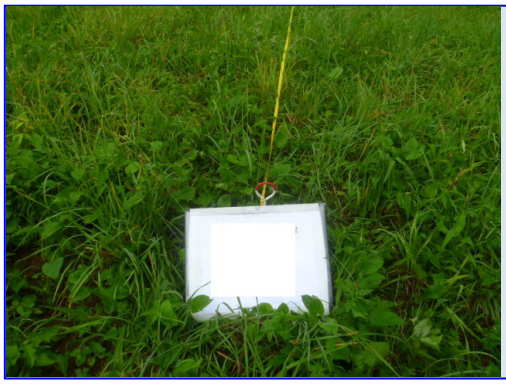
Site Description:

Reason for site selection:

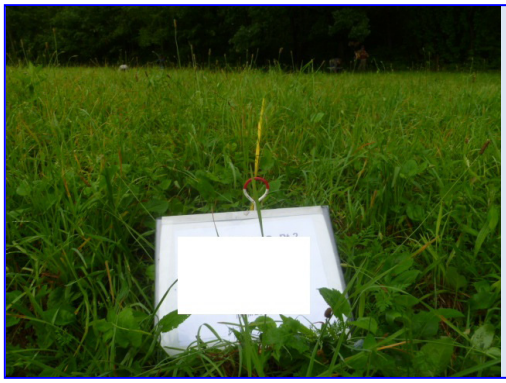
Compass Direction:

Observer:

Date:



Year 2- Close-up



Year 2- Landscape

Pasture Name/ID:

Site Description:

Reason for site selection:

Compass Direction:

Observer:

Date:

3. **Pasture Condition Scoring -** A well-managed pasture is one whose productivity (plant and animal) is optimized while it does no harm to soil, water, and air quality. Pasture condition scoring is a systematic way to check how well a pasture is managed. If the pasture is located on the proper site and well managed, it will have a good to excellent overall pasture condition score. By rating key indicators and causative factors common to all pastures, pasture condition can be evaluated and the primary reasons for a low condition score identified. A condition that can lead to one or more pasture resource concerns such as poor plant growth, weedy species invasion, poor animal performance, visible soil loss, increased runoff, and impaired water quality.

   Pasture condition scoring, to be most useful, should occur several times a year during key critical management periods throughout the grazing season. Scoring should be performed:

   - At the start before placing livestock on pasture
   - At peak forage supply periods
   - At low forage supply periods
   - As plant stress appears
   - Near the end to help decide when to remove livestock

   In addition, pastures used for year-round grazing benefit from pasture condition scoring:

   - Going into the winter season
   - Late in winter
   - During thaws or wet periods

   Pasture condition scoring can be useful in deciding when to move livestock or planning other management actions. It sorts out which improvements are most likely to improve pasture condition or livestock performance.

   For more information and PCS Guide:
   http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_007149.pdf

4. **Step point transect -** Step point transects are a rapid method for quantifying soil cover and the potential for erosion. Plant canopy is the percent of the ground surface covered by vegetation. Bare ground is defined as soil not covered by vegetation, litter or rocks. Soil cover is related to the site's ability to protect the ground surface from wind and water erosion. As percent bare ground increases, the potential for erosion increases.

   For each step point transect; at the beginning point, select a point in the distance along the direction utilized in the photo point landscape photo. Every two paces, record whether the cover is vegetation, rock, or litter. Otherwise, record as bare ground.

Required Elements:

- Collection and recording of step point transect data (Example form provided. Other data collection forms providing similar information are acceptable. Below are resources providing additional information on procedures and data collection forms).
- Brief description of how data was utilized in refining management decisions.

Step Point Transect Sample Sheet

Date: _____ Observer: _____

Pasture: _____ Transect ID: _____

Step No.	Cover			Bare Ground	Step No.	Cover			Bare Ground
	Veg.	Rock	Litter			Veg.	Rock	Litter	
1					11				
2					12				
3					13				
4					14				
5					15				
6					16				
7					17				
8					18				
9					19				
10					20				

% Vegetative cover = ____ vegetation points X 2 = _____%

% Rock cover = ____ rock points X 2 = _____%

% Litter cover = ____ litter points X 2 = _____%

% Bare ground cover = ____ bare ground points X 2 = _____%

5. **Dry Weight Rank Method -** The Dry wieght rank method is used to document species composition by weight. In making this determination, you will observe sites and rank the top three plant species contributing the most weight in the quadrat. As for each method, it is important to have both general view and close-up photos.

   A large amount of data can be obtained very quickly using this method. This method provides you with estimates based on standing biomass production, which is very useful when making management decisions. A drawback of this method is that if your ranch is in an area with sparse vegetation (such as some desert landscapes), many quadrats will have only one species, or may be vacant of vegetation. In this case, larger quadrat areas would be necessary to collect data.

   To conduct this method, three species in each quadrat are selected and recorded as having the greatest yield for current year's growth on a dry matter basis. Species are given a rank of 1, 2, or 3; the highest rank as a 1 descending to the lowest rank, 3. These ranks correspond with 70%, 20%, and 10% of biomass, respectively. Species that can be evaluated using dry weight rank include perennial grasses and forbs, annual grasses and forbs, trees and shrubs. This method can be easily coupled with the Frequency Method since the same quadrat frame is used for both methods. If there are fewer than three species in the quadrat, two or even one species may receive more than one rank. For example, if only one species is found in the quadrat, it would be ranked 1, 2, and 3, or 100%. If two species are found, one may be given ranks of 1 and 2 (90%), ranks 1 and 3 (80%), or ranks 2 and 3 (30%), depending on the relative weight for the two species.

Criteria

- Dry weight rank should be assessed in each quadrat within each transect, and quadrats should be placed at each pace along the transect line.
- If no vegetation occurs within a quadrat, dry weight rank is not assigned.
- The same size frame that is used for Frequency is usually used to evaluate dry weight rank.

Those conducting dry weight rank need to be able to identify plants of interest (or key species) for your farm, which is usually about 6-10 species of plants.

Equipment

- Study location and Documentation Data form (pdf, 13KB)
- Dry Weight Rank Form -- option 1 (pdf, 34KB); option 2 (pdf, 105KB)
- Quadrat frame
- Hammer
- Permanent yellow or orange spray paint
- A ¾ to 1 inch iron stake
- Compass
- Steel post and driver

Conducting the Study and Study Sites

- Dry weight rank is usually conducted in conjunction with frequency and point intercept methods.
- When selecting key areas for setting up these quadrats, be sure the site is located within a single plant community within a single ecological site.
- Quadrats should be located at each pace along the quadrat.
- This type of study can be conducted using a baseline or a linear study design.
- Be sure to permanently mark the site with a stake.

Study Layout

- At the study site, establish a transect with a distinct marker (stake or landmark) at the opposite end.
- Determine which three species supply the greatest annual yield on a dry matter basis; give the species with the highest yield the rank of 1, the next highest 2, and the third highest 3.
- Record the data on the Dry Weight Rank form (pdf, 34KB)
- This method assumes that a rank of 1 corresponds to 70% composition, rank 2 to 20%, and rank 3 to 10%. If there is only one species present, they are ranked 1,2, and 3 to add up to 100%. If two species are present, rank the most prominent species 1 and 2 (90%), and the second species rank 3 (10%), or rank the prominent species 1 and 3 (80%) and the other species 2 (20%), depending on each species' occurrence.

Analyzing Data

- Using the Dry Weight Rank form
- Multiply species ranked 1, 2, and 3 by 7, 2, and 1, respectively and record appropriately on the form.
- Add the amounts in the weight columns of each species evaluated and record the sum in the "Weighted" column.
- Total the "Weighted" columns for all species. The total of the column will always be ten times the number of quadrats.
- Divide the value recorded for each species in the weighted column by the total of the weighted column to get percent composition for each species. Percent composition should equal 100%.