

# Grazing Response Index: A Simple, Effective Method to Evaluate Plant Responses to Grazing



**M**onitoring gathers information about how rangelands respond to management over time. This information can be used to make changes in management. A good monitoring program provides information on maintaining or improving a resource while producing products like pounds of meat, clean water, and wildlife habitat.

When monitoring rangelands, managers routinely measure forage utilization or the amount of forage eaten. Unfortunately, monitoring utilization alone ignores other factors important to rangeland condition such as, how long animals graze, when they graze and growing conditions.

Recently, Colorado State University's Range Extension and Integrated Resource Management Programs developed the Grazing Response Index (GRI) to help managers evaluate the effects of grazing on rangelands.

**What is GRI?** GRI assesses the effects of grazing on plants during the current year and aids in planning grazing for the next year. GRI uses three factors related to plant health to evaluate impacts of grazing—*frequency* and *intensity* of defoliation (grazing), and *opportunity* for the plant to recover.

**Frequency.** Frequency is the number of times plants are grazed during a grazing period and depends on how long plants are exposed to grazing animals. Grazing the same area over an extended period of time allows animals to select the most preferred plants to their detriment.

Grazing plants three or more times during a growing season reduces productivity and weakens them.

To estimate of how many times plants could be grazed during a grazing period, divide the number of days in the grazing period by 7, up to 10 if plant growth is slower. In late spring and early summer, 7 to 10 is the number of days it takes for plants to grow enough to be grazed again. Seven is more conservative, because it produces the highest probable number of times plants could be grazed.

Number of Times Grazed	Days	Value
1	≤ 7	+1
2	7-14	0
3 or more	> 14	-1

A value of +1 indicates that plants grazed less than twice would respond positively to grazing. A 0 value indicates that plants grazed about two times would be neutral to grazing—being neither depressed nor enhanced. A -1 value indicates the plants have been grazed 3 or more times and is excessive. Continuing to graze at this frequency would negatively impact plants.

**Intensity.** Intensity is the amount of leaf removed during the grazing period. Intensity is described using three levels of defoliation - light, moderate and heavy. Plants regrow more quickly if they are left with more leaf area. Generally, leaving 50% or more of the leaf material

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provides enough leaf area for plants to meet needs and doesn't inhibit plant regrowth.

Grazing Level	% Utilized	Value
Light	< 40%	+1
Moderate	41-55%	0
Heavy	> 56%	-1

Light use, +1, promotes positive plant response because most of the leaf material remains. Moderate use, 0, enables the plant to maintain itself and its current status in the community. Heavy use, -1, would cause plants to decline in health, if this level of defoliation continues over several years. Placing cages in representative areas helps determine percent utilization during the grazing period. Cages must be moved each year.

**Opportunity.** Opportunity is the amount of time plants have to grow before grazing or to regrow and recover after grazing and is critical to maintaining plants. A grazing program should allow plants full growth of leaves before grazing or allow for full recovery after grazing for plants to thrive. Full growth or recovery enables plants to meet requirements during the growing period and allows plants to recover even if they are used relatively heavily or frequently.

Of the three factors used in the GRI, opportunity is most important for long-term health and vigor of plants. The opportunity for plants to grow or regrow is dependent on soil moisture and nutrients, temperature and leaf area. Since this factor is so important in sustaining healthy plants, the rankings are doubled.

Opportunity to Recover	Value
Full recovery	+2
Partial recovery	+1
Some recovery	0
Little recovery	-1
No recovery	-2

Determining opportunity is a judgment call based on the appearance of vegetation at the end of the growing season. If plants appear ungrazed or barely grazed or plants had full opportunity for growth before grazing, use a value of +2. If plants were

grazed, but regrew fairly well after grazing then give a rating of +1. If an area was heavily used, with no opportunity to grow or regrow assign a -2.

Even though opportunity is based upon appearance of the vegetation at the end of the growing season, some general guidelines can help determine the rating. For example, an area that is used season-long can be expected to rate -2 (no chance for regrowth). An area with 2 pastures may provide some chance for growth or regrowth resulting in a rating of 0 or -1. An allotment with multiple pastures used and rested at different times of the year will usually receive ratings of +1 or +2.

**Overall Rating—GRI.** The overall rating of the expected response to grazing is the sum of frequency, intensity and opportunity. A *positive* value indicates the management is *beneficial* to the health, structure and vigor of the plants. A *negative* value indicates that management is *harmful*. A *zero* rating is *neutral*.

Recovery after grazing is based on a plant's ability to produce enough leaf surface area to regrow. GRI links mechanisms that control plant response to grazing. It uses three variables that can be managed—*length of grazing period, stocking rate and season of use*. If the frequency index indicates plant response is likely to be negative, shortening the length of the grazing period will improve plant response. If the intensity index is high on most pastures on the ranch, the stocking rate is too high. Since opportunity is based on plant growth or regrowth, it is influenced by season of use.

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