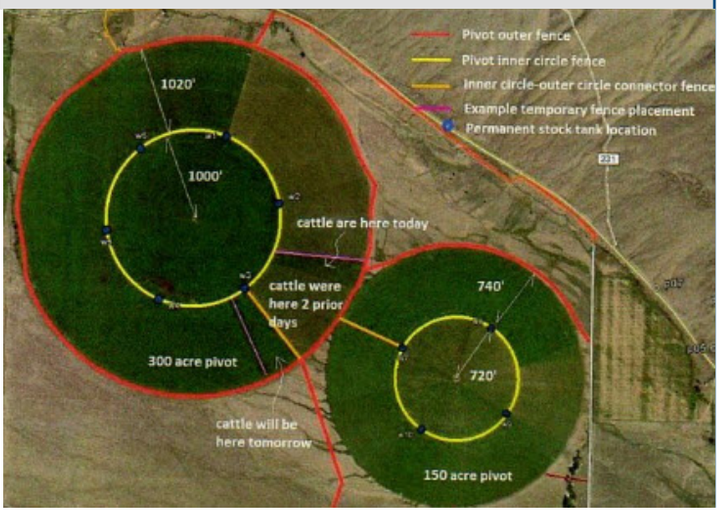
Grazing Agronomy Guide

Introduction

Grassland ecosystems exist throughout the world. An essential component of these ecosystems is grazing that helps maintain vegetation by cycling nutrients back into the soil. These animals could be considered the first “rotational” grazers, as they continuously harvest forage and move on to a new area, allowing the plants to recover.

Livestock production is an important part of the global food supply. According to the Food and Agriculture Organization of the United Nations (FAO), roughly 26% of the earth’s surface is used for grazing and supports around 1.5 billion head of cattle and 2 billion sheep and goats. Unfortunately, much of this land is of marginal quality.

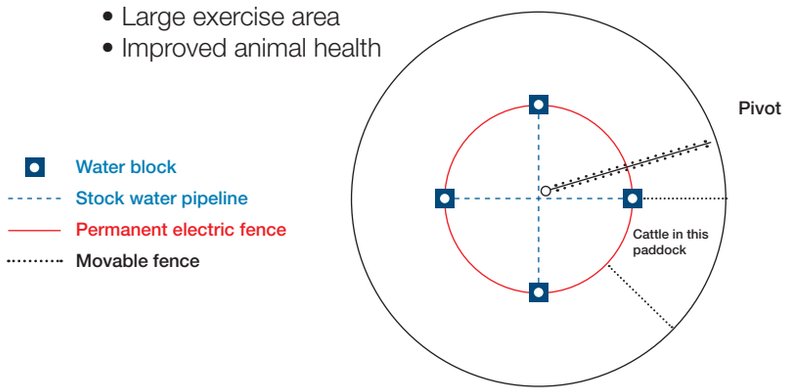


Grazing System Considerations

One managed grazing system, intensive grazing, has demonstrated success when used in conjunction with adequate rainfall or irrigation systems such as center pivots. In this system, livestock are confined to small fields, known as paddocks or corrals, and frequently rotated to new areas. This allows for efficient consumption of forage and allows the paddocks to recover between grazing events. Irrigation, along with proper grass types, weed control and fertility, enables fields to produce higher-quality forage, increase biomass production, and shorten plant recovery time following grazing. The net result is increased sustainability and increased meat and milk production.

Other benefits include:

- High carrying capacity per land unit
- Increased forage quality
- Minimize the need for mowing, baling and storing activity
- Eliminating the transport and spreading of manure from feed lots. (Note: Growers may still choose to “top off” cattle in feed lots, typically for the final 100 days, using high-grain rations to reach a prescribed finish (fat cover) before marketing.
- Potential marketing advantages (“Grass-fed beef”)
- Compared to feedlots:
    - Lower livestock density
    - Large exercise area
    - Improved animal health



Typical layout of center pivot grazing, Gerrish, Jim, Developing MiG Grazing Cells Under Center Pivot Irrigation

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Planning a Pivot-irrigated Intensive Grazing System

For more than 50 years, growers have used center pivot-irrigated fields in a variety of ways to provide forage production for livestock. With the need to increase food production to meet rising demand, intensive grazing systems in combination with irrigation have become more popular. To successfully implement a system of pivot-irrigated intensive grazing, it's important to have clear goals and an understanding of possible constraints.

Potential benefits of pivot-irrigated grazing include:

- Minimize or eliminate mechanical harvesting
- Address specific marketing targets (e.g., grass-fed beef)
- Optimize the number of animals that can be supported on specific areas
- Relatively consistent operations and production
- Greater forage yield can lead to improved milking and faster cattle growth, which can lead to increased profitability

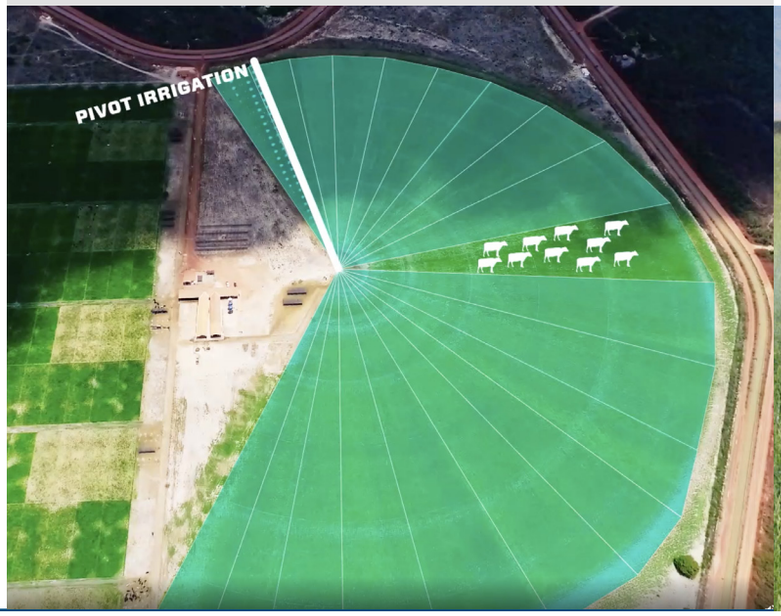
Possible constraints include:

- Climate
- Supplemental nutrition will be needed (both for forage and for animals)
- Source of supplemental forage, if needed, and facilities to store hay
- Suitable land for pasture
- Access to a reliable source of irrigation water
- Labor to manage frequent handling of animals

One should carefully consider the climate and how much of the year is feasible for grazing to supply the nutritional needs of the livestock (Rickard 2005). If year-round forage production for grazing is not possible, it will be necessary to supplement the diet of the livestock with stored grain and/or hay.

Depending on the overall farm cropping system, the livestock may be used to glean fields already harvested for grain production. In particular, cattle are often used to graze cornfields after the field is harvested for grain. This can provide valuable feed for the cattle as well as removing volunteer plants from subsequent field operations. Growers planning to employ gleaning should additionally consider the soil type because livestock may damage the soil structure by compaction, particularly if the soils are clays or clay loams and relatively wet.

Alternatively, the food requirements of the livestock can be met with hay and grain harvested and stored from non-grazed fields. Another option may be to graze cropped fields planted with a cover crop (SARE, 2012).



PVCunder-rigger to allow pivot towers to cross poly-fences, Gerrish, Jim, Developing MiG Grazing Cells Under Center Pivot Irrigation

Design Guidelines

Once goals and constraints are clearly understood, the project can be designed. Specific areas that will need to be addressed include, but are not limited to, the following:

- Water rights and the need for water use permits, if required. Outside consulting to assist with the permitting process may be required.
- Irrigation system design, installation and maintenance (irrigation dealer)
- Water source (well driller/pump provider).
- Fencing layout and watering plan for the grazing system (consultant).
- Crop plan, including plant selection and management plan (agronomist).

Fencing

Permanent fencing will be required and temporary (movable or portable) fencing added as needed for the particular grazing application.
One design approach taken to paddock subdivision under center pivots is installation of a circular fence located just off the center pivot wheel path. Fence placement depends on the application depend on the application. Many growers place the fence approximately midway between the pivot center and the outer reach of the end gun; however, pivot length is also a factor, so the inner grazing sections do not become too small for effective grazing.
Another is temporary fencing to create the controlled grazing areas and allow the towers to walk over the poly-fences. This allows simple movement between paddocks by both pivot and herd.

Fence material

- Single-wire electric fencing is commonly used for the moveable fencing. This may require training cattle to understand and respect the fence.
- For permanent fencing, use a design best suited for the particular needs of livestock management and construction common to the area.

Lanes

Lanes are areas reserved specifically for traffic of animals and equipment, such as for pasture rotation, health care, marketing or breeding. Be sure to design the lane(s) for the size of equipment that may need to be moved into particular areas.
In addition, these lanes are to provide livestock access to minerals, salt and water. You generally want cattle to be within 800 feet (245 m) of water (Green).

Additional design considerations include the following:

- Shelter – may be required if extreme weather conditions are experienced, particularly during calving.
- Shade – may be beneficial if heat indexes are commonly over 100° F (38° C) (Undersander, 2002).
- Livestock handling – you need to have available facilities for working with the cattle. Activities include artificial insemination, tagging, veterinary care, castration and weaning. The layout and equipment would be similar to any other cattle operation.

Agronomy Considerations

Like all crops, forage needs to be managed using good agronomic principles to maximize production and quality. Attention to soil fertility, forage selection and establishment, pasture management, and irrigation are critical to the success of an intensive grazing operation.

Soil Fertility

Soils are highly variable, and may have significantly different characteristics and nutrient availability between regions, fields or even different areas within the same field. Soil samples should be collected annually and analyzed by a trusted lab with experience making nutrient recommendations for forage. Center pivots can be used in many instances to apply nutrients and crop protectant during irrigation, including variable rate application based on soil sampling results or paddock needs.

Pasture Establishment

One of the most important aspects of intensive grazing management is the selection and establishment of appropriate forage. Select forage species and varieties that are adapted to the region and will supply appropriate nutrition for livestock. These are often a mix of grasses and legumes. For additional guidance, contact an expert agronomist.

Fields intended for pasture will then need to be prepared. If the area is already used for pasture, it must be evaluated to determine if the forage present is suitable for intensive grazing and if it has weeds or issues that need to be addressed. New fields never before used for grazing may need tillage or other forms of soil preparation before seeding. Reference Field Scouting on the following page.

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Field scouting – weekly or at least every two weeks

- Forage stand and species – Consider application of the Pasture Condition Score Sheet (see Appendix) to guide needed adjustments.
- Weeds, insects and diseases
- Fertility needs
- Center pivot visual inspection
- Fences
- Water tanks
- Cattle health
- Soil Moisture Monitoring (see Valley Scheduling on next page)
- Irrigation Management (see next page)

Agronomic practices

- Management decisions revolve around the period of rest plants receive during the growing season. During the rest period, plants recover from grazing and produce new growth.
- The length of rest varies with season and forage species. It depends on the amount of forage left in the pasture after the animals are moved. Pastures will recover faster and produce more usable forage when sufficient forage is left after grazing (Kerr Center).
- The use of high stock density with frequent moves and short grazing periods will result in more uniform use of the available forages. It will also provide more even distribution of the animal waste across the pasture. (Realize that 80-85% of the consumed nutrients are returned back to the soil.)
- Maintain enough residual leaf area to provide for maximum recovery. Depending on the grass species, this height can range from three to eight inches (7-20 cm).
- Appropriate rest or recovery periods are essential to maximize quality and quantity of the forage produced. This time can vary from 20 to 40 days. Too short of a rest period will not allow sufficient dry matter production to take place. Resting too long may reduce the quality of the forage. (Scriven, 2002)

Pasture Management

In-season needs of intensive grazing systems can be just that: intensive. Once forage is established and paddocks are defined, maintaining a healthy system will require regular upkeep. This should include regular field scouting.

Periodic decisions for irrigated, intensively grazed pastures. Cropping plan – annually

- Annual review of pasture performance may lead to changes
- Use Pasture Condition Score Sheet

	Species	Seeding rate Lb. PLS/acre[1]	Mixture composition (%)	Seeds per sq. ft.
I	Orchardgrass	5	62	75
	Smooth bromegrass	3	8	9
	Meadow bromegrass	5	8	9
	Creeping foxtail	1	14	17
	Alfalfa	2	8	10
	Total	16	100	120
II	Orchardgrass	5	64	75
	Smooth bromegrass	4	10	12
	Meadow bromegrass	7	11	13
	Creeping foxtail	1	15	17
	Total	17	100	117
III	Orchardgrass	3	38	45
	Festulolium	3	13	15
	Tall fescue	3	13	16
	Meadow bromegrass	3.5	7	8
	Smooth bromegrass	3	8	9
	Creeping foxtail	1	14	17
	Alfalfa	1.5	7	8
	Total	18	100	118
IV	Orchardgrass	5	68	75
	Smooth bromegrass	8	23	25
	Alfalfa	2	9	10
	Total	15	100	110
V	Orchardgrass	6	74	90
	Smooth bromegrass	10	26	31
	Total	16	100	121
VI	intermediate wheatgrass	22	100	45
VII	Alfalfa	15	100	75

[1]PLS = Pure live seed: PLS = Germination x purity.

Examples of historically succesful mixtures and species for seeding irrigated pastures in Nebraska.

What Center Pivots Offer

- Increased yields – Growers report tripled yields and doubled protein content (or more) compared to forage irrigated with flood irrigation.
- Drought protection – Pivot irrigation offers insurance against nature's uncertainty
- Water and energy savings – Pivots and linears offer uniformity of water distribution, and up to 97% application efficiency, compared to 50% for flood.

How Valley solutions help overcome challenges specific to grazing

Soil fertility: Different areas of a field have different soil types, resulting in forage of different quality.

Valley solution: Integrate soil moisture monitors with Valley Scheduling to know exactly how much to irrigate and when. Valley Scheduling results in a 10% average reduction in irrigation water and power use. Valley VRI (variable rate irrigation) enables you to irrigate precisely based on field-specific prescriptions, for uniform quality and optimized yield.

VRI is also useful to avoid areas where cattle are grazing, as well as other unnecessary places such as low or wet areas.

Supplemental nutrition: Forage crops may require additional nutrition

Valley solution: Growers can easily apply crop protectant and fertilizer through the pivot, and with variable rate irrigation, they can be applied in a highly accurate, efficient way at any crop stage.

Access to water: Water restrictions are becoming common. Monitoring usage and keeping accurate records is required in many areas.

Valley solution: Flowmeters from Valley offer maximum durability and minimum maintenance. They can help growers be more efficient and monitor their application precisely, saving water, energy, money and effort.

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What Valley Irrigation Offers

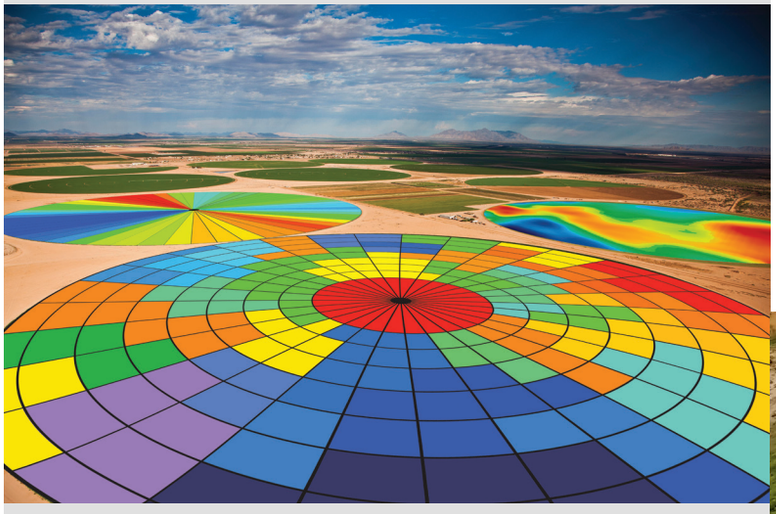
Valley is the founder of the entire pivot irrigation industry. We have helped generations of growers overcome watering challenges with the most durable machines and most reliable technology available.

Labor: Intensive grazing may require increased labor to manage frequent handling of animals.

Valley solution: With Valley remote management of irrigation machines, one person can easily control multiple pivots or linears/laterals with just a smartphone, allowing grazing operations to devote labor resources where they are most needed.

Differing irrigation requirements: Different grass species require various irrigation depths.

Valley solution: VRI allows customizable applications based on prescriptions for optimum forage production. In addition, Valley Scheduling provides irrigation recommendations based on real-time soil moisture, weather and other data.



We recommend protecting soil moisture probes from cattle that may chew exposed equipment or cords with a simple fence, such as pictured, which the pivot can easily pass over.

- The most durable drive train – Built to handle the toughest conditions and most difficult terrain efficiently, for lower maintenance costs
- The industry's longest and strongest spans give you higher return on investment for your operation
- Valley pivots can last 25-35 years with proper maintenance, and retain their value better than any other brand
- Customizable options – Valley machines are adaptable enough to meet the needs of any grower, area, field size, climate, and soil type. The final product is delivered according to your exact specifications, and the team members involved in your project are factory trained, ensuring Valley quality.
- Innovative technology – Valley 365® combines the best features of our tried-and-true technology into a single sign-on. It's highly secure, fully connected crop management, so you can save time, water, energy and labor.
- Superior Service – The Valley Dealer network is the largest and most responsive in the irrigation industry. Your Valley Dealer is your trained partner, providing the expertise you need to produce more while using fewer resources.

VALLEY

USDA NRCS
Natural Resources Conservation Service

Grazing Lands Technology Institute

May 2001

Pasture Condition Score Sheet

Purposes

- Evaluate current pasture productivity and the stability of its plant community, soil, and water resources.
- Identify what treatment needs, if any, are required to improve a pasture's productivity and protect soil, water, and air quality.

Suggested uses

This score sheet may be used to rate different pastures in a single growing season or the same pasture over a period of years. Rating a pasture yearly can track trends, either improvement or decline, in its condition. Some indicators change slowly in response to stresses caused by management or climate. Also, some indicators may change as each season progresses. An indicator or causative factor may rank high at one time and low another. Uniformity of use, plant residue, percent legume, severity of use, weather, and insect or disease pressure can vary widely on the same pasture depending on when they are scored during the year and the degree of management the pasture re-ceives. Therefore, it is often wise to score a pasture at different, key times during the year before deciding to make changes in management. Indicate on the form the date the scoring occurred.

Procedure

Step 1—Rate each pasture one by one that is occupied all at the same time by a herd or flock and separated from other pasture areas by portable or fixed fencing. Paddocks in rotational pastures may be rated separately or as a combined unit. It depends on how alike they are. If any indicator looks markedly different from paddock to paddock, it may pay to rate each one separately.

Step 2—Score all 10 indicators regardless of your feelings of their relative worth. To learn or recall how each indica-tor reflects on how well a pasture is being managed, see *Guide to Pasture Condition Scoring.*

Step 3—Using the attached score sheet and indicator criteria, read the scoring criteria for each of the 10 pasture condition indicators one at a time and rate before moving onto the next. Use the 1 to 5 scale provided. Estimate by eye or measure as precisely as you feel is needed to rate the indicator reliably.

Step 4—When scoring plant vigor, enter a score based on the general criteria given on page 2 using the most limiting trait listed. Use this number to determine the overall pasture score. If the plant vigor score is less than 4, refer to the plant vigor causative factors' criteria on page 6 to identify the plant stress(es) causing reduced vigor. Rate each causative factor independently on the score sheet provided on page 5. Do not average to adjust the original vigor score.

Step 5—When scoring erosion, rate sheet and rill erosion every time. Rate other types of erosion only if present. When present, indicate which one(s) by identifying the erosion type with a unique symbol next to its score. Di-vide the box as needed to score them separately. Erosion is rated by averaging the individual scores. A need re-mains to prioritize which erosion problem is controlled first and how.

Step 6—Total the score for each pasture and compare to the following chart. Also, focus on any low scoring individual indicators or causative factors.

Pasture condition score Overall	Individual	Management change suggested
45–50	5	No changes in management needed at this time.
35–45	4	Minor changes would enhance, do most beneficial first.
25–35	3	Improvements benefit productivity and/or environment.
15–25	2	Needs immediate management changes, high return likely.
10–15	1	Major effort required in time, management, and expense.

Step 7—When an individual indicator's score falls below a 5, determine its worth to your operation. Then, decide whether to correct the cause or causes for the low rating. If you choose to correct, apply the most suitable management options for your area and operation.

Authors: **Dennis Cosgrove** is associate professor of agronomy, University of Wisconsin-River Falls and University of Wisconsin-Extension, Cooperative Extension. **Dan Undersander** is professor of agronomy, College of Agricultural and Life Sciences, University of Wisconsin-Madison and University of Wisconsin-Extension, Cooperative Extension. **James Cropper** is forage management specialist, USDA-Natural Resources Conservation Service, Grazing Lands Technology Institute. Authors extend their thanks to Extension and NRCS reviewers for their input on technical content.

Pasture Condition Score Sheet

Indicator	Score 1	2	3	4	5
Percent desirable plants	Desirable species < 20% of stand. Annual weeds and/or woody species dominant.	Desirable species 20–40% of stand. Mostly weedy an-nuals and/or woody species present and expanding. Shade a factor.	40–60% desirable forage species. Undesirable broad-leaf weeds and annual weedy grasses invading. Some woodies.	60–80% of plant community are desirable species. Remainder mostly intermediates and a few undesirables present.	Desirable species exceed 80% of plant community. Scattered inter-mediates.
Plant cover (Live stems and green leaf cover of all desirable and intermediate species.)	Canopy: < 50%Basal area: < 15% Photosynthetic area very low. Very little plant cover to slow or stop runoff.	Canopy: 50–70% Basal area: 15–25% Photosynthetic area low. Vegetal retardance to runoff low.	Canopy: 70–90% Basal area: 25–35% Most forages grazed close, little leaf area to intercept sun-light. Moderate vegetal retardance.	Canopy: 90–95% Basal area: 35–50% Spot grazed low and high so some loss of photo-synthetic potential. Vegetal retardance still high.	Canopy: 95–100% Basal area: >50% Forages maintained in leafy condition for best photosynthetic activity. Very thick stand, slow or no runoff flows.
Plant diversity	One dominant (> 75% of DM wt.) forage species. Or, over 5 forage species (all <20%) from one dominant functional group, not evenly grazed - poorly distributed.	Two to five forage species from one dominant functional (>75% of DM wt.) group. At least one avoided by livestock permitting presence of mature seed stalks. Species in patches.	Three forage species (each ≥ 20% of DM wt.) from one function-al group. None avoided. Or, one forage species each from two functional groups, both supply 25–50% of DM wt.	Three to four forage species (each ≥ 20% of DM wt.) with at least one being a legume. Well inter-mixed, compatible growth habit, and comparable palata-bility.	Four to five forage species representing three functional groups (each ≥ 20% of DM wt.) with at least one being a legume. Intermixed well, compatible growth habit, and compa-rable palatability.
Plant residue (Rate ground cover and standing dead forage separately and average score.)	**Ground cover:** No identifiable residue present on soil surface. Or, heavy thatch evident (> 1 inch). **Standing dead forage:** >25% of air dry weight.	**Ground cover:** 1–10% covered with dead leaves or stems. Or, thatch 0.5 inch to 1 inch thick. **Standing dead forage:** 15–25% of air dry weight.	**Ground cover:** 10–20% covered with dead resi-due. Or, slight thatch buildup but < 0.5 inch. **Standing dead forage:** 5–15% of air dry weight.	**Ground cover:** 20–30% covered with dead resi-due. No thatch present. **Standing dead forage:** some, but < 5% of air dry weight.	**Ground cover:** 30–70% covered with dead residue, but no thatch build-up. **Standing dead forage:** none avail-able to grazing animal.
Plant vigor *If plant vigor rating is less than 4, determine cause by rating 6 possi-ble causes listed on page 5.*	No recovery after grazing or pale yellow or brown, or permanent wilting, or plant loss due to insects or disease, exercise lot only. Or, lodged, dark green overly lush forage. Often avoided by grazers.	Recovery after grazing takes 2 or more weeks longer than normal, or yellow-ish green leaves, or major insect or disease yield loss, or plants wilted most of day. Pro-ductivity very low.	Recovery after grazing takes 1 week longer than normal, or urine/dung patches dark green in contrast to rest of plants, or minor insect or disease loss or mid-day plant wilting. Yields regu-larly below site potential.	Recovery after grazing takes 1 to 2 days longer than normal, or light green plants among greener urine and dung patches, or minor insect or disease damage. No plant wilting. Yields near site potential.	Rapid recovery after grazing. Healthy green color. No signs of insect or disease damage. No leaf wilting. Yields at site potential for the species adapted to the site's soil and climate.
Percent legume (Cool season stands. See foonote 3 of score sheet for warm season)	< 10% by wt. Or, greater than 60% of bloating legumes.	10–19% legumes. Or, losing grass, 40–60% spreading legume.	20–29% legumes.	30–39% legumes.	40–60% legumes. No grass loss; grass may be increasing.
Uniformity of use	Little-grazed patches cover over 50% of the pasture. Mosaic pattern throughout or identifiable areas of pasture avoided.	Little-grazed patches cover 25–50% of the pasture either in a mosaic pattern or obvious portion is not frequented.	Little-grazed patches cover 10–25% of the pasture either in a mosaic pattern or obvious portion is not frequented.	Little-grazed patches minor spots where isolated forage species is rejected. Urine and dung patches avoided.	Rejected areas only at urine and dung patches. No forage species rejection.

Pasture Condition Score Sheet

Indicator	Score 1	2	3	4	5
Livestock concentration areas	Cover >10% of the pasture; or all convey contami-nated runoff directly into water channels.	Livestock conc. areas and trails cover 5–10% of pasture; most close to water channels and drain into them unbuffered.	Isolated livestock conc. areas and trails <5% of area; one close to water channel and drains into it unbuffered.	Some livestock trails and one or two small concentration areas. Buffer areas between them and water channels.	No presence of live-stock concentration areas or heavy use areas sited or treated to minimize contami-nated runoff.
Soil compaction	Infiltration capacity and surface runoff severely affected by heavy compaction. Excessive livestock traffic killing plants over wide areas. Very hard to push probe into soil without dam-aging the probe.	Infiltration capacity lowered and surface runoff increased due to large areas of bare ground and dense compaction layer at surface. Livestock trails common throughout. Off-trail hoof prints common. Hard to push probe past compacted layers.	Infiltration capacity lowered and surface runoff increased due to plant cover loss and soil compaction by livestock hooves. Soil resistant to soil probe entry at one or more depths within plow depth.	Infiltration capacity lowered and surface runoff increased due to reduced vegetal cover/retardance. Probe enters soil eas-ily except at rocks. Scattered signs of livestock trails and hoof prints, confined to lanes or small, wet areas.	Infiltration capacity and surface runoff are equal to that expected for an ungrazed meadow; not affected by livestock traffic.
Erosion Sheet and rill	Sheet and rill erosion is active throughout pasture; rills 3–8 inches deep at close intervals and/or graz-ing terracettes are close-spaced with some slope slippage.	Most sheet and rill erosion confined to steepest terrain of unit; well defined rills 0.5–3 inches deep at close inter-vals and/or grazing terracettes present.	Most sheet and rill erosion confined to heavy use areas, especially in loafing areas and water sites; rills 0.5–3 inches deep. Debris fans at down-slope edge.	No current forma-tion of rills; some evidence of past rill formation, but are grassed. Scattered debris dams of litter present occasionally.	No evidence of current or past formation of sheet flow or rills.
Rate additional erosion categories below only if present					
Wind	Blowouts or dunes forming or present.	Soil swept from the established pasture being rated causing plant death by burial or abrasion.	Soil swept from ad-jacent fields or past-ure during seedbed prep. and seedling growth to cause pasture plant death by burial or abrasion.	Some vegetative debris windrowed. Some dust depo-sition from offsite source. Minor wind damage to foliage.	No visible signs of windblown soil or trash. No wind related leaf damage.
Streambank or shoreline	Banks mostly bare and sloughing. No native streambank or shoreline vegetation remaining.	Banks are heavily grazed and trampled all over. Many are actively eroding lat-erally. Little native streambank or shore-line vegetation. Bank sloughing common.	Banks are close grazed, but few are unstable. Some native streambank or shoreline vegetation remaining. Livestock enter only at specific points, but use heavy. Remote alternative water site present.	Banks are grazed but stable. Mix of pasture plants and native water's edge species. Muddy live-stock stream cross-ing(s) or pond entrance(s) not used heavily. Alternative water sites present.	Banks ungrazed or grazed infrequently. Abundant streambank or shore loving vege-tation. Gravelly or constructed stable livestock stream crossing(s) or water-ing ramp(s). Or, alter-native water sources present and close-by.
Gully	Mass movement of soil, rock, plants, and other debris; occur-rence of landslides, debris avalanches, slumps and earthflow, creep and debris tor-rents. Found in moun-tainous or very hilly terrain.	Gully(s) advancing upslope cutting long-er channel(s). Reveg-etation difficult with-out using constructed structures & livestock exclusion; continuous gully(s) with many finger-like extensions into the hillside.	Gully(s) present with scattered active ero-sion, vegetation missing at heavy use slopes and/or on bed below overfalls. New eroding channels present and new overfalls appear-ing along sides and bed of main channel.	One or more exist-ing stable gullies pres-ent, vegetation covers gully bottom and slopes well; no visual signs of active cutting at gully head or sides. Some soil moved in channel bottom.	No gullies; natural drainageways are stable grassed chan-nels. Spring or seep fed bare channels are small and stable, often covered with overhanging vege-tation.

Plant Vigor Causative Factors

Factor	Score 1	2	3	4	5
Soil fertility (P & K status) 1/	Very low P & K, or very high P & K.	Low P and K; or low P, very high K; low K, very high P; opt. P, very high K; very high P, opt. K.	Low P, optimum K; or low P, high K; or optimum P, low K; high P, low K; or high P, high K.	Optimum P, high K; or high P, optimum K.	Optimum P and K
(Nitrogen status) 2/	N deficient or excessive.		N marginal or high.		Adequate N.
Upper 4-inch root zone pH 3/	< 4.5 or > 9.0	4.5-5.0 or, 8.5-9.0	5.1-5.5 or, 7.9-8.4	5.6-6.0 or, 7.4-7.8	6.0 to 7.3
Severity of use	All desirable species grazed out. Or no grazing, resulting in thatch and/or standing dead accumulation and woody invasion.	All edible plants grazed to lowest level feasible by the livestock type (mown lawn look). Or, undergrazed - mostly stemmy overgrowth and much dead leaf .	Spot grazing common. Equal amount of close-grazed and little-grazed areas. Close grazed areas are grazed as low as livestock can graze (mown lawn look.)	Some spot grazing, avoided areas primarily at dung and urine spots. Closer grazed areas are not grazed below proper height needed for plant vigor.	Forage species grazed within height ranges that promote dense sward and near maximum production.
Site adaptation of desired species	Properly planted and established (desired) species are no longer present.	Properly planted and established (desired) species are nearly gone. Volunteer unwanted species dominate.	One or more properly planted and established, or recruited desired species are missing. Unwanted species invading.	Properly planted and established, or recruited desired species still represented, but not in the desired proportions.	Properly planted and established, or recruited desired species are present in the desired proportions.
Climatic stresses	Brownout from drought. Or, frost heaved plants, most with severed roots and dying. Or, major loss due to submergence or ice sheets.	Wilted plants, little recovery during night. Or, some frost heaved plants, recovery slow. Some spotty stand loss due to submergence or ice sheets.	Wilting during heat of the day. Or, weak plants from winter damage or short-term submergence. Or, freezing damage to foliage.	Dry conditions, but no wilting. Or, above or below normal temperatures slowing growth. Or, slight leaf yellowing due to cold, wet conditions.	No climatic stress.
Insect and/or disease pressure	Severe insect attack, mortality high. Or, disease caused mortality high.	Insect or disease outbreak at eco-nomic threshold, treat now.	Insect or disease outbreak near economic threshold, continue watch and weigh options for treatment.	Some insect and/or disease present, but little impact on forage quality or quantity.	No visible damage.

1/ Names used to describe P & K levels not consistent nationwide; Very high referred to as excessive, and optimum as moderate or medium. Determined by approved soil testing procedures and comparing soil test results for exchangeable P and K with this table.

2/ Determined using chlorophyll meter or plant tissue test and comparing those results with this table.

3/ pH ratings may need to be regionalized to account for soil chemistry differences that influence range of acceptability as soils become more highly weathered or excess salts, exchangeable aluminum, or sodium begin to interfere with forage production. Establish exchangeable aluminum, electrical conductivity, and sodium absorption ratio criteria where their levels in the soil interfere with forage production.

Pasture Condition Score Sheet

Farm or ranch site:_____ Date_____

	Pasture Unit Description									
Indicators										
Percent desirable plants 1/ Percent plant cover by weight that is desirable forage: **1** <20 **2** 20-40 **3** 40-60 **4** 60-8 **5** >80										
Plant cover 1/ 2/ Percent live, leafy canopy cover of desirables and intermediates is: **1** <50 **2** 50-70 **3** 70-90 **4** 90-95 **5** 95-100 Percent live basal area cover of desirables and intermediates is: <15 15-25 25-35 35-50 >50										
Plant diversity 1/ The diversity of well-represented forage species is: **1** **2** **3** **4** **5** (Read criteria and select appropriate number)										
Plant residue 1/ Ground cover, standing dead forage, or thatch is: **1** **2** **3** **4** **5** (Read criteria and select appropriate number)										
Plant vigor (Read criteria and select appropriate number) Degree of stress of plant community is: **1** **2** **3** **4** **5** (If less than 4, see Causative factors table. Rate those factors)										
Percent legume 1/ 3/ Percentage of legume present as total air dry weight: **1** <10, or >60 bloating legum **2** 10-19, or 40-60 spreading legume **3** 20-29 **4** 30-39 **5** 40-60 no grass loss										
Uniformity of use Degree of spot grazing is: **1** >50% ungrazed **2** 25-50% ungrazed **3** 10-25% ungrazed **4** Minor species rejection **5** Urine and dung spots ungrazed										
Livestock concentration areas Presence of livestock conc. areas and proximity to surface water: **1** **2** **3** **4** **5** (Read criteria and select appropriate number)										
Soil compaction Degree of soil compaction is: **1** **2** **3** **4** **5** (Read criteria and select appropriate number)										
Erosion (Always rate sheet and rill; others only if present) Sheet and rill, and gully, streambank, shoreline, or wind erosion is: **1** Very severe **2** Severe **3** Moderate **4** Slight **5** No visible										
Pasture condition score										

1/ Pastureland inventory worksheet helpful.
2/ Choose one proper, practical cover type estimation procedure to rate plant cover. The two procedures are not directly comparable.
3/ For warm season grass (C4)-legume stands, use the following criteria: 5, 30-40%; 4, 20-29%; 3, 10-19%; 2, 5-9%, and 1 <4%.

Pasture Condition Score Sheet

	Pasture Unit Description									
Causative Factors Affecting Plant Vigor										
Soil fertility (P & K status)* Phosphorus and potassium status of the soil are: 1 2 3 4 5 (Read criteria and select appropriate number)										
Soil fertility (N status)* Nitrogen status of the grasses is: 1 3 5 (Read criteria and select appropriate number)										
Soil pH* pH status of the soil for the upper 4-inch root zone best fits: 1 ≤ 4.5, or > 9.0; 2 4.5-5.0, or 8.5-9.0; 3 5.1-5.5, or 7.9-8.4; 4 5.6-6.0 or 7.4-7.8; 5 6.0-7.3										
Severity of use Degree of forage removal is: 1 2 3 4 5 (Read criteria and select appropriate number)										
Site adaptation of desired species Presence of planted or desired forage species is: 1 2 3 4 5 (Read criteria and select appropriate number)										
Climatic stresses Degree of plant stress due to recent weather events is: 1 2 3 4 5 (Read criteria and select appropriate number)										
Insects and disease pressure Degree of plant stress due to insect or disease pressure is: 1 2 3 4 5 (Read criteria and select appropriate number)										

* Rate electrical conductivity and sodium adsorption ratios in regions where appropriate. Where excess salts, exchangeable sodium, or exchangeable aluminum hinder plant growth they are the controlling factor rather than soil pH conditions. Use appropriate criteria for them as found in the National Range and Pasture Handbook under Evaluating and rating pastures, Pasture Condition Scoring. See pH criteria below for highly weathered soils.

Soil pH Criteria for Major Landuse Resource Areas with Oxisols and Ultisols
pH status of the soil for the upper 4" rooting zone best fits:

1	2	3	4	5
< 4.0, or > 9.0	4.0-4.5 or, 7.0-9.0	4.5-5.0 or, 6.5-7.0	5.1-5.5 or, 6.2-6.5	5.6-6.2

Authors: Dennis Cosgrove is associate professor of agronomy, University of Wisconsin-River Falls and University of Wisconsin-Extension, Cooperative Extension. Dan Undersander is professor of agronomy, College of Agricultural and Life Sciences, University of Wisconsin-Madison and University of Wisconsin-Extension, Cooperative Extension. James Cropper is forage management specialist, USDA-Natural Resources Conservation Service, Grazing Lands Technology Institute. Authors extend their thanks to Extension and NRCS reviewers for their input on technical content.

Grazing Agronomy Guide

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