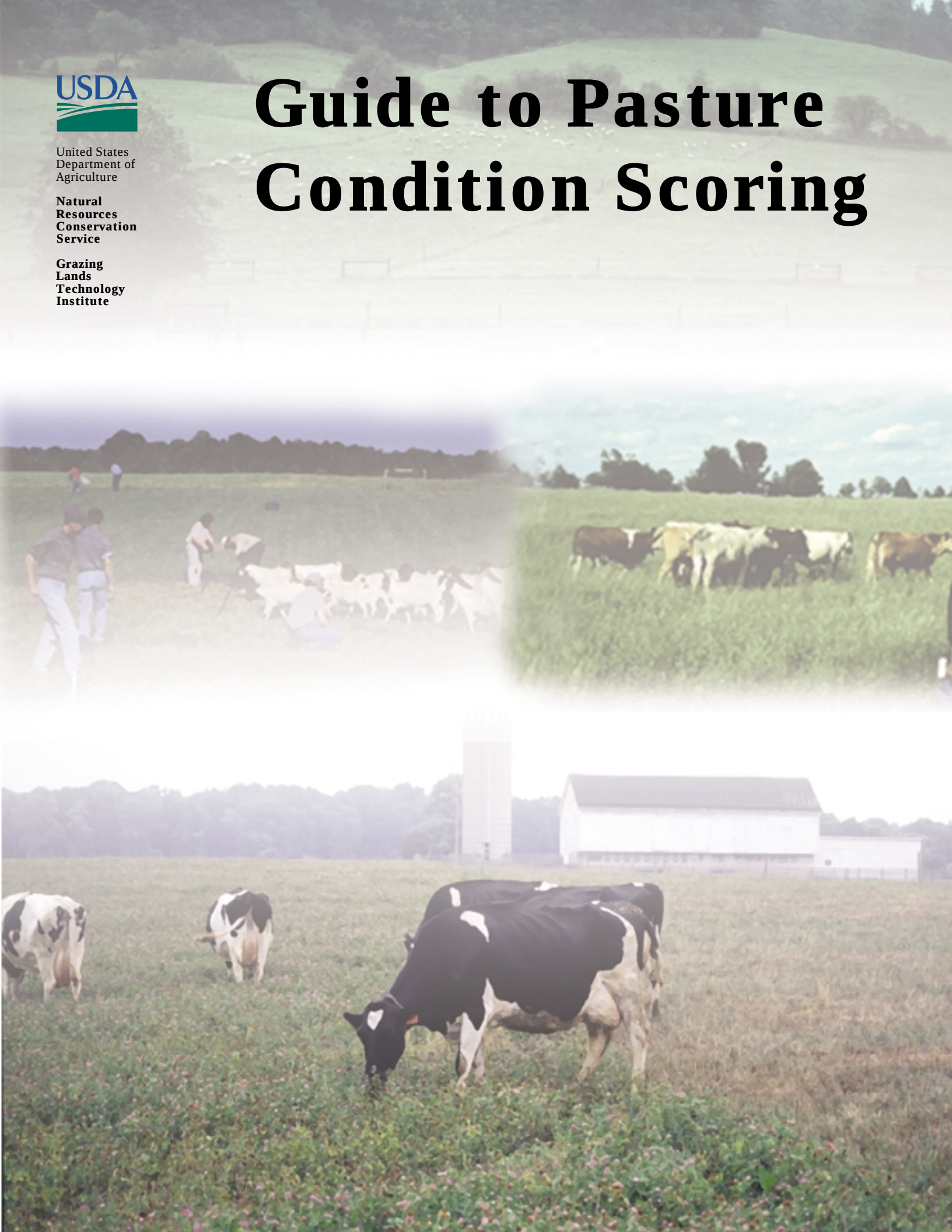
United States
Department of
Agriculture

**Natural
Resources
Conservation
Service**

**Grazing
Lands
Technology
Institute**

Guide to Pasture Condition Scoring



Introduction

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. Conditions that typically express themselves as pasture resource concerns are 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.

Pasture condition scoring involves the visual evaluation of 10 indicators, listed and described below, which rate pasture condition. In the *Pasture Condition Score Sheet*, each indicator or factor has five conditions described for it, ranging from very poor to excellent. This objectively ranks the extent of any problem(s) and helps sort out the likely cause(s). Evaluate each indicator separately. They may be combined into an overall score for the pasture unit or left as an individual score and compared with the other nine indicators. Indicators receiving the lowest scores can be targeted for corrective action as warranted. The plant vigor indicator is broken down further into six possible causes that affect plant vigor. As one or more erosion indicators may exist on a site, they are split into four types: sheet and rill, gully, streambank or shoreline, and wind.

Indicator Descriptions

Percent desirable plants

This indicator determines if the pasture has the kind of plants that the livestock on it will graze readily. A desirable species is readily consumed, persistent, and provides high tonnage and quality for a significant part of the growing season. Undesirable species, such as woody invaders, noxious weeds, and toxic plants, are those that typically are not eaten (rejected) by most livestock or cause undesirable side effects when eaten, and that crowd out more desirable species. A few forages for a time are undesirables during a specific growth stage when they produce toxins. Intermediate species are those which, while eaten, provide low tonnage or lose quality fast, and often have a short-lived grazing use period. Some examples are dandelions, wild plantains, and annual grasses, such as crabgrass. Estimate visually the proportion of desirable species present in the entire sward by weight, and score accordingly.

Plant cover

The percentage of the soil surface covered by plants is important for pasture production and soil and water protection. A dense stand (high stem count) ensures, when properly grazed, high animal intake and high sunlight interception for best forage growth. Bare, open spots allow for weed encroachment, increased water runoff during intense rains, and soil erosion. Visually estimate the total cover of all desirable and intermediate species. Assign a value based on either green leaf canopy or live vegetative basal area cover percentage. Use the most familiar method that provides a consistent, reliable estimate of plant cover for the pasture being rated.

Canopy cover works best on sod-forming pastures. It can be determined at any time on continuously grazed pastures provided stubble heights greater than 1 inch are present. On rotational pastures, estimate canopy cover of a paddock the day prior to livestock entry. This will represent the best possible condition. If it rates fair or lower at this growth stage, management changes are definitely in order.

Basal area works best on bunch grass pastures. It is hard to use on pastures where sod-forming grasses and broadleaf plants dominate. Estimate by eye or use either the step-point or the point-intercept methods. Basal area is measured by both methods by counting pin hits on live stems and plant crowns at ground level (within 1 inch above). Where it is most useful, basal area is more constant than canopy cover and thus is more reliable.

Plant residue

Plant residue, in various states of decay, provides additional surface cover and organic matter to the soil. However, too much standing dead material in the grass stand reduces the feed value of the forage consumed and animal intake, and inhibits new plant shoot growth. Excessive amounts of standing dead material may cause the forage to be rejected by the grazing animal. Less than 25 percent of the standing forage mass should be dead or dying leaves and stems. Buildup of thatch (mat of undecomposed residue) at the soil surface indicates retarded residue decay. Thatch promotes fungal diseases and retards or prevents shoot and seedling emergence. This results in forage stand decline.

Plant diversity

Plant diversity is the number of different forage plants that are well represented (20% or more of plant cover) in a pasture. Low species diversity causes season-long pastures, or a set of pastures grazed as a unit, to be less reliable suppliers of forage to livestock during the grazing season. Forage production varies more widely through the grazing season because of changing weather and light conditions and insect and disease pressure. Pastures that have high species diversity tend to be older, moderately grazed permanent pastures. Here planted and volunteer forages have adjusted to the management and the prevailing environmental stresses. No single forage species is so dominant as to crowd out others.

Having more than one functional plant group growing either in a pasture or in different, complementary pastures is highly important. This maintains the most consistent forage supply during the grazing season. Functional groups of forages are plant groupings that have similar growth habits and management needs. The four basic functional groups for improved pastures are cool-season grasses, warm-season grasses, legumes, and other grazable broadleaf plants (e.g., *Brassicas* and forage chicory). These basic functional groups can be split into more specific groups, such as upright versus prostrate and sod-formers versus bunch grasses. However, this extra detail is unwarranted in improved pasture condition evaluations.

Plants from different functional groups are most compatible when they can compete successfully together as managed. Mixed species pastures with at least two functional groups and three to four well-

Standing dead residue of mature plants reduce forage quality and cause livestock to selectively graze around them.

represented forage species are generally the most productive. Higher diversity (over six species) does not assure higher productivity. It may actually spur animals to avoid some species and graze others hard, as species differences in palatability and maturity are more likely. Potential forage is wasted. Less desirable species gain in area by outcompeting overgrazed desirable species. However, trying to prevent this selectivity by reducing forage on-offer and forcing animals to eat everything, reduces intake and gains. This also decreases productivity.

When plant diversity scores low, several courses of action are possible. The appropriate response depends on the region in which the pasture is located, its intended use period, and the species growing in it. Applying other treatment measures may be easier or more appropriate than trying to grow several plant species together within a single pasture. These measures include:

- Applying nitrogen fertilizer to a pasture with few or no legumes present
- Establishing a different forage functional group in a separate pasture
- Oversowing an annual forage crop into a perennial forage pasture going into dormancy

Always rate plant diversity even if you may ultimately not wish to change it in that pasture. Monocultures can be quite productive on seasonal and irrigated pastures. They can provide abundant production at times precisely when other pastures on the operating unit are unproductive. However, when plant diversity is rated low on an individual field, some alternative course of action must be in place or developed. Some, such as feeding hay or applying N fertilizer, are expensive alternatives.

Plant vigor

Desirable species should be healthy and growing at their potential for the season when rated. If not, they will be replaced by weeds and low quality forage plants. If plant growth conditions really suffer, bare soil will begin to appear. Some things to consider when rating plant vigor are color, size of plants, rate of regrowth following harvest, and productivity. Determine overall vigor of desirable and intermediate species, and record. If score is less than four, utilize the causative factors below to help determine what may be causing the lack of vigor.

Soil fertility

Adequate, but not excessive, fertility is critical for good plant vigor. Test soil or plant tissue to determine nutrient status. Excessive amounts of nutrients, particularly N, P, and K, can also cause animal health and/or water quality problems. Rank, often lodged, dark green to blue-green forages are a warning sign of excessive soil fertility. Maintain adequate nutrient balance to not exceed maximum economic yield of desirable forage species. In some areas of the United States, excess salts and sodium are often present in the soil at levels that reduce plant vigor. Test those soils for electrical conductivity and exchangeable sodium. Reduce their levels, or plant forage species tolerant of the levels found.

When urine and dung patches are noticeably greener than the rest of the pasture, nutrients are limiting production.

Severity of use

Grazing management is critical in maintaining productive pastures. Close, frequent grazing (mown lawn appearance) often causes loss of vigor reducing yields and ground cover. Low stocking rates promote selective grazing that causes excessive residue build-up (presence of mature seed stalks and dead leaves). This standing residue blocks sunlight, reduces overall forage quality, and favors the spread of less palatable and/or taller, grazing intolerant forages. Assign a value based on the proportion of the pasture grazed closest and the height at which it is grazed. Compare that height to minimum stubble heights recommended for maintaining desired forages.

Site adaptation of desired species

Climate and soil type play a major role in the vigor of a given species. Consider these items when evaluating adaptability:

- cold hardiness
- tolerance to aridness
- summer heat and humidity levels
- frost heave or soil cracking
- soil wetness
- flooding or ponding
- soil acidity or alkalinity
- toxic elements
- salinity
- sodicity
- low or high nutrient levels

Two other factors to consider are the desired species tolerance to existing grazing pressure and soil and water management. Plants that hold their growing point close to the ground can be grazed close provided they are allowed some time between grazing events to push out new leaf area. Others that elevate the growing point into the grazing zone need grazing events timed to release new shoot growth. The presence and balance of desired species are compared with those species present now and their balance. This verifies how well adapted the desired species were to the site, grazing pressure, and management.

Climatic stresses

Extremely wet, dry, hot, or cold weather may threaten plant vigor even when climatically adapted forage species are present. When rating the pasture, consider recent weather events and their role in the present health of a forage stand. Extremely cold and wet weather can cause temporary nitrogen deficiency symptoms (yellowish leaves). A hard winter may weaken the stand. A drought can cause the stand to go dormant. Check for frost or freeze damage to foliage.

Soil pH

Soil pH influences plant vigor primarily through its effect on nutrient availability. It also influences the amount of nitrogen-fixing nodules formed on legume roots. Determine the pH in the surface 3 to 4 inches through a soil test or reliable field methods. Adjust pH to provide optimum yield of desirable forage species.

Note: Reduced yields may continue if the pH in the subsoil is too low or high. Contact a soil fertility or forage management specialist for further management options.

Insect and disease pressure

Look for signs of leaf, stem, and root damage caused by insects and disease. Assess their impact on forage quality, quantity, and stand life. Some are chronic, occurring yearly, but with little consequence to the forage stand life. Others take the forage species under attack out of the stand. Corrective actions to take are numerous and specific to the insect or disease involved. Consult with a local, respected forage expert when unsure of proper course of action.

Livestock concentration areas

Concentration areas are places in pastures where livestock return frequently and linger to be near water, feed, mineral or salt, or shelter, or to be in shade. Typically, well-worn pathways lead to these preferred areas. Depending on the degree of usage, these areas are usually bare and receive extra animal waste. Depending on where they are on the landscape and flow paths, they can direct sediment, nutrients, and bacteria to nearby waterbodies.

Heavy use areas, such as around this feed bunk, often wash during heavy rains. Note missing hay residue at the bare spots in foreground.

These areas can direct contaminated runoff to surface waters unless there is an intervening grass buffer between them and open channels. Note reed canarygrass riparian area buffer below feed bunk.

Uniformity of use

Spot grazing often occurs where forage growth exceeds livestock intake at least seasonally. Once established, it stays in place unless pattern is destroyed seasonally.

Check uniformity of use by observing animal grazing patterns. Uniform grazing results in all desirable and intermediate species being grazed to a similar height. Spotty or patterned grazing appears uneven throughout a pasture with some plants or parts of paddocks grazed heavily and others lightly. Individual forage species are being selected for or against by the livestock based on their palatability and nutritional value. Selectivity is also affected by forage species stage of maturity differences, amount of forage offered to livestock, and their length of stay in the paddock. Zone grazing occurs

Areas that are grazed close contrasted with areas largely avoided. Several causes exist. The one shown is a deep, entrenched stream barrier and entry choice to pasture.

when one end of the pasture is heavily grazed and the other end is ungrazed or lightly grazed. It occurs on long and narrow pastures and ones that run lengthwise up and down steep slopes. Other pastures that have shady areas, windbreaks, or hay feeding, creep feeding, and watering sites whose location and duration of use at that location skew foraging to one end of a pasture are often zone grazed as well. Physical barriers, such as streams, cliffs, and obstructing fencelines, can confine livestock to one area of a pasture causing zone grazing.

When rating this factor keep in mind that while overgrazing may result in a uniform height (mown lawn appearance), it is to a height lower than that needed to maintain all desirable forage species.

Erosion

Sheet and rill

This erosion is soil loss caused by rain drop impact, drip splash from rainwater dropping off plant leaves and stems onto bare soil, and a thin sheet of runoff water flowing across the soil surface. Sheet and rill erosion increases as ground cover decreases. Evidence of sheet erosion in a pasture appears as small debris dams of plant residue that build up at obstructions or span between obstructions. Some soil aggregates or worm castings may also be washed into these debris dams. Rills are small, incised channels in the soil that run parallel to each other downslope. They join whenever the ground surface warps and deflects the direction of their flow. When rills appear, serious soil loss is occurring. This erosion type also includes most irrigation-induced erosion.

Streambank, shoreline, and gully

This erosion occurs in large, open drainage channels or around shorelines. When in pastures, these channels or shorelines can have heightened erosion problems and losses of vegetative cover that typically grows on them. These heightened damages result from grazing animal traffic in or on them. Open channels may be intermittent or perennial flowing streams or dry washes. The factors that affect the extent of disturbance livestock cause to gullies, streambanks, shorelines, and their associated vegetation are:

- Livestock traffic patterns
- Frequency of use
- Attractiveness of these channels or banks as sunning, dusting, travel lanes, watering, grazing, or rubbing areas
- Channel shape (depth, width, presence and frequency of meanders, and bank stability)
- Flow characteristics (frequency, depth, sediment carried, swiftness, and turbulence)

Wind

Erosion occurs when heavier, windblown soil particles abrade exposed soil and cause dust to become airborne. Deposition of the heavier soil particles occurs downwind of obstructions, such as fencelines, buildings, and vegetation. Often vegetative debris is windrowed against obstructions.

Percent legume

Legumes are important sources of nitrogen for pastures and improve the forage quality of a pasture mix when they comprise at least 20 percent of total air-dry weight of forage. Deep-rooted legumes also provide grazing during hot, dry periods in mid-summer. Visually estimate the percentage of legume present in the total forage mass. Rate this indicator even if site or grass species preclude successful legume establishment and reliable survival to have an effective legume component to fix nitrogen. Most pastures are nitrogen-limited since much of the nitrogen excreted by animals eludes plant uptake. Pastures with few or no legumes present need alternative means of supplying nitrogen for optimum forage production. When bloating legume content is greater than 60 percent of total forage dry weight; bloat incidence in livestock is likely without preventative steps.

Avoid grazing pastures too close that causes spreading, bloat-inducing legumes to become dominant (over 60 percent of stand by weight).

Cool-season grass pastures should have 30 percent legume by weight.

Warm-season grass pastures, like this rotationally grazed bermudagrass-white clover, should have 20 percent legume for good livestock performance and nitrogen self-sufficiency.

Soil compaction

Soil compaction impacts water infiltration rates and runoff. Lack of infiltration decreases water available for plant growth in the soil. Instead, water runs off, increasing channel erosion downstream, and conveys contaminants, such as nutrients, from the site, reducing water quality. Soil compaction is best determined by measuring the bulk density (weight per volume of soil) at 1-inch increments to plow depth. However, compaction can be detected in the field using a soil probe, metal rod, or knife. As these tools are pushed into the soil, compacted soil layers interrupt their ease of penetration. Compare in-field resistance to penetration with resistance found at a grazed fenceline where the livestock cannot stand or walk on the soil surface. The more noticeable the difference in resistance between the two areas is, the worse the compaction is in the pasture.

Wet soils are easily compressed and deformed by livestock hooves.

(Guide to Pasture Condition Scoring, May 2001)

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.

This publication and the Pasture Condition Score Sheet that accompanies it were adapted from A3667, Determining Pasture Condition, by Dennis Cosgrove, Dan Undersander, and Maurice Davis,