

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
PRESCRIBED GRAZING**

(Ac.)
CODE 528

DEFINITION

Managing the harvest of vegetation with grazing and/or browsing animals.

PURPOSE

This practice may be applied as a part of conservation management system to achieve one or more of the following:

1. Improve or maintain desired species composition and vigor of plant communities.
2. Improve or maintain quantity and quality of forage for grazing and browsing animals' health and productivity.
3. Improve or maintain surface and/or subsurface water quality and quantity.
4. Improve or maintain riparian and watershed function.
5. Reduce accelerated soil erosion, and maintain or improve soil condition.
6. Improve or maintain the quantity and quality of food and/or cover available for wildlife.
7. Manage fine fuel loads to achieve desired conditions.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all lands where grazing and/or browsing animals are managed.

CRITERIA

General Criteria Applicable to All Purposes

Removal of herbage will be in accordance with site production limitations, rate of plant growth the physiological needs of forage plants, the nutritional needs of the animals and management goals using the Pennsylvania Field Office Technical Guide, USDA-NRCS National Range and Pasture Handbook and other references as guidance.

Adequate quantity and quality drinking water will be supplied at all times during period of occupancy. Watering facilities should be

constructed to provide safe access to wildlife species, especially birds.

Adjust intensity, frequency, timing and duration of grazing and/or browsing to meet the desired objectives for the plant communities and the associated resources, including the grazing and/or browsing animal.

Grazing use, for sustainable management of browse (woody) species will not remove more than the specified portion of the current year's growth of the designated browse species.

Manage kind of animal, animal number, grazing distribution, length of grazing and/or browsing periods and timing of use to provide grazed plants sufficient recovery time to meet planned objectives. The recovery period of non-grazing can be provided for the entire year or during the growing season of key plants. Severely degraded grazing lands can benefit from a grazing deferment during the growing season. Deferment should be for a minimum of three consecutive months during the growing season. The minimum deferment period for cool season plant communities should be from April 1 to June 30 and for warm season plant communities from June 1 to August 31.

When two or more pastures/paddocks are planned to be grazed only one time during the growing season, plan the rest period so that introduced grasses and/or legumes, receive a minimum of 30 consecutive days of rest during the growing season. Native grass pastures need a minimum of 45 consecutive days of rest during the growing season. If the system is a simple rotation (3 pastures/paddocks or less) grazing of native warm-season grasses should end by August 15th.

Where three or more pastures/paddocks are planned to be grazed and rested multiple times during a growing season, plan the rest periods so introduced grasses receive a minimum of 20 consecutive days of rest. Legumes, with or without grass, need a minimum of 25 continuous days of rest, and native grasses a minimum of 30 days of continual rest during a grazing rest sequence. Forage plants should have at least 75 total days of rest during a growing season.

Provide deferment or rest from grazing or browsing to ensure the success of prescribed fire, brush management, seeding or other conservation practices that cause stress or damage to key plants.

Manage grazing and/or browsing animals to maintain adequate vegetative cover on sensitive areas (i.e. riparian, wetland, habitats of concern, karst areas).

Manage livestock movements based on rate of plant growth, available forage, and allowable utilization target.

Develop contingency plans to deal with expected episodic disturbance events e.g. insect infestation, drought, wildfire, etc.

ADDITIONAL CRITERIA: The following additional criteria apply depending on which of the 7 purposes are being addressed.

1. Additional Criteria to Improve or Maintain the Health and Vigor of Desirable Plant Communities.

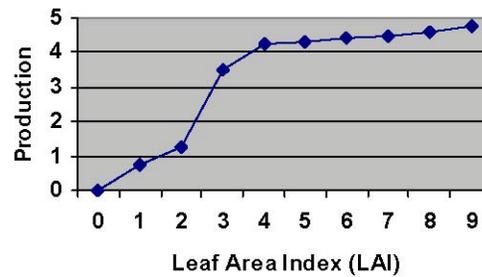
Duration and intensity of grazing and/or browsing will be based on desired plant health and expected productivity of key forage species to meet management objectives.

Use Table 1 (Grazing Management Guidelines) as a guide to determine percent utilization as well as the frequency and duration of grazing that a pasture (paddock) can safely withstand while maintaining or improving the forage resource.

Livestock should be moved based on rate of plant growth and utilization rate, not calendar dates.

Plant growth (production) is influenced by a number of factors including; rainfall, soil fertility, temperature, plant efficiency, carbon dioxide, light intensity, and leaf surface area. Of these, leaf surface area or **Leaf Area Index (LAI)** is the one factor that the grazing manager can control without requiring substantial outside inputs.

(LAI) Leaf Area Index, is the direct relationship of leaf area that occurs over a given ground surface area. Increasing height of forage in inches is directly related to the increase number of leaves thus increasing the LAI.



When stored carbohydrates needed for initial growth have been replaced and the Leaf Area Index exceeds that needed for suitable production, pastures are ready for grazing. This occurs with LAIs of 2-4. Guidance is provided in inches of growth, in Table 1 (Grazing Management Guidelines).

End grazing when photosynthetic material beyond that needed to support satisfactory regrowth has been utilized. This point is reached when the "active" Leaf Area Index approaches 1. Guidance is given in inches of residual remaining; see Table 1 (Grazing Management Guidelines).

When available, crop aftermath can be included in the grazing system to allow time for forage growth before a frost or as a forage supply to extend the grazing period.

To prevent grazing the same pasture/paddock at the same time each year, the grazing sequence should start in a different pasture each year.

The grazing manager should initiate a monitoring program to document actual grazing dates, livestock performance, climatic conditions, vegetation utilization, and changes in plant communities over time. The results of these analyses will be useful in developing future grazing schedules and strategies.

The *intensity, frequency* and *duration* of grazing determine the stability of the forage resource. The producer's wants and the pasture suitability group determine pasture kind. Using guidance given in Table 1 (Grazing Management Guidelines), with the producer, develop a grazing prescription showing; Begin/End Grazing Guide (inches), Min-Max Rest/Grazing Periods (days) and Minimum Pastures Needed (number) needed to improve, or maintain, the condition and trend of the grazing resource and provide a stable and desired plant community.

Plan periodic deferment from grazing and/or browsing to maintain or restore the desired plant community following episodic events, such as wildfire or severe drought.

Where appropriate, soil test periodically for nutrient status and soil reaction and apply fertilizer and/or soil amendments according to soil test to improve or maintain plant vigor.

2. Additional Criteria to Improve or Maintain Quantity and Quality of Forage for Animal Health and Productivity

Plan grazing and/or browsing to match forage quantity and quality goals of the producer within the capability of the resource to respond to management. (See Table 2 for growth curve/quality information)

Enhance diversity of pasture plants to optimize delivery of nutrients to the animals by planning intensity, frequency, timing and duration of grazing and/or browsing.

Plan intensity, frequency, timing and duration of grazing and/or browsing reduce animal stress and mortality from toxic and poisonous plants.

Supplemental feed and/or minerals will be balanced with the forage consumption to meet the desired nutritional level for the kind and class of grazing and/or browsing livestock.

Dietary needs of livestock will be based on the National Research Council's Nutrient Requirements of Domestic Animals or similar scientific sources with appropriate adjustments made for increased energy demand required by browsing or grazing animals foraging for food including travel to and from pasture site.

Biosecurity safeguards will be in place to prevent the spread of disease between on-farm or ranch classes of livestock and between livestock farm or ranch units.

Movement of animals will be scheduled to promote animal health and performance and to reduce or prevent the spread of disease, parasites, and contact with harmful insects and toxic plants. For example, avoid planning and locating lanes, feeding and watering facilities at sites where chronic wetness may contribute to foot rot problems.

Shelter in the form of windbreaks, sheds, shade structures, and other protective features will be

used where conditions warrant protecting livestock from severe weather, intense heat/humidity, and predators.

3. Additional Criteria to Improve or Maintain Surface and/or Subsurface Water Quality and Quantity.

Minimize concentrated livestock areas to enhance nutrient distribution and improve or maintain ground cover.

Appropriate levels of residue and forage residual enhance the water cycle by slowing overland flow, reducing sedimentation from sheet, rill, gully and streambank erosion. Slowing overland flow permits more water to percolate through the soil profile watering deep rooted plants and recharging aquifers.

Plan intensity, frequency, timing and duration of grazing and/or browsing to:

- Minimize deposition or flow of animal wastes into water bodies,
- Minimize animal impacts on stream bank or shoreline stability.
- Provide adequate ground cover and plant density to maintain or improve infiltration capacity and reduce runoff.
- Provide adequate ground cover and plant density to maintain or improve filtering capacity of the vegetation.
- Enhance nutrient cycling by providing more uniform manure distribution and an increased rate of decomposition.

Locate livestock watering and supplemental feeding areas as far from water bodies and water courses as possible to reduce the potential for movement of sediment and nutrients into water courses and water bodies.

Where livestock drink directly from a stream or other natural water bodies, care should be taken to protect water quality and the riparian zone from pollution of manure, sediments, e-coli, pathogens, etc.

4. Additional Criteria to Improve or Maintain Riparian and Watershed Function.

Minimize concentrated livestock areas to enhance nutrient distribution and improve or maintain ground cover and riparian/floodplain plant community structure and functions.

Plan intensity, frequency, timing and duration of grazing and/or browsing to:

- Provide adequate ground cover and plant density to maintain or improve infiltration capacity and reduce runoff.
- Provide adequate ground cover and plant density to maintain or improve filtering capacity of the vegetation.
- Maintain adequate riparian community structure and function to sustain associated riparian, wetland, floodplain and stream species.

5. Additional Criteria to Reduce Soil Erosion and Maintain Soil Condition

Minimize concentrated livestock areas, trailing, and trampling to reduce soil compaction, excess runoff and erosion.

Plan intensity, frequency, timing and duration of grazing and/or browsing to provide adequate ground cover, litter and canopy to maintain or improve infiltration and soil condition.

6. Additional Criteria to Improve or Maintain Food and/or Cover for Fish and Wildlife Species of Concern

Identify species of concern in the objectives of the prescribed grazing plan.

Plan intensity, frequency, timing and duration of grazing and/or browsing to provide for the development and maintenance of the plant structure, density and diversity needed for the desired fish and/or wildlife species of concern.

Prescribed grazing, when properly applied, results in diverse plant communities capable of meeting the needs of all domestic animals and wildlife species. Manage plant height (six inch minimum), structure and density for the desired plant diversity or wildlife species. Consider resting a portion of the grazing system during the critical nesting period (April 1 – July 15) to provide essential nesting habitat. Blocks of undisturbed nesting habitat are preferred over linear strips. Where applicable, consider using a patch-work/mosaic grazing system to increase plant diversity and enhance upland wildlife habitat.

Consider wildlife species present and develop grazing prescriptions that will provide adequate food, water, and cover. A Wildlife Habitat Evaluation Worksheet has been developed for pastures in Pennsylvania. When managing for wildlife, the evaluation must result in a habitat suitability index of at least 0.5 for the field, community or farm. Refer to Upland Wildlife Habitat (645) for guidance when writing grazing prescriptions on land where wildlife management is an additional concern.

7. Additional Criteria for Management of Fine Fuel Load

Plan intensity, frequency, timing and duration of grazing and/or browsing to reduce hazardous fuel loads.

Plan intensity, frequency, timing and duration of grazing and/or browsing to manage fuel continuity, load and other conditions to facilitate prescribed burns.

Additional criterion for PURPOSES 4, 5, 6, & 7: The grazing prescription chosen for PURPOSES 4, 5, 6, & 7 may be as simple as continuous grazing where stubble heights are used as the monitoring tool, or as complex as a very management intensive grazing system where grazing and rest periods are based on growth rate and are closely monitored. The difference depends on the complexity of the resource problems, the goals of the producer and their ability to implement goals. Use Table 1 (Grazing Management Guidelines) as a guide for proper beginning and ending grazing heights.

CONSIDERATIONS

Protect soil, water, air, plant and animal resources when locating livestock feeding, (including winter feeding areas located within pasture systems) supplementing, handling and watering facilities.

Livestock feeding, handling, and watering facilities will be designed and installed in a manner to improve and/or maintain animal distribution. These facilities will also be designed and installed to minimize stress, the spread of disease, parasites, contact with harmful organisms and toxic plants.

Utilization or stubble height target levels are tools that can be used in conjunction with monitoring to help ensure that resource conservation and producer objectives are met.

Where practical and beneficial, start the grazing sequence in a different management unit each growing season.

When weeds are a significant problem prescribed grazing and/or browsing should be implemented in conjunction with other pest management practices to promote plant community resistance to invasive species and protect desired plant communities. Targeted Grazing may be an option, reference the Targeted Grazing Handbook published by the American Sheep Industry.

Prescribed grazing should consider the needs of other enterprises utilizing the same land, such as wildlife and recreational uses.

Consider improving carbon sequestration in biomass and soils through management of grazing and/or browsing to produce the desired results.

If nutrients are being applied to the grazed areas, Nutrient Management (590) will be applied.

PLANS AND SPECIFICATIONS

The prescribed grazing plan shall conform to all applicable federal, state and local laws. Seek measures to avoid adverse affects to endangered, threatened, and candidate species of wildlife and their habitats.

Prepare a prescribed grazing plan for all planned management units where grazing and/or browsing will occur.

Prescribed Grazing Plans will include:

- Goals and Objectives clearly stated.
- Resource Inventory that identifies:
 - o existing resource conditions and concerns
 - o ecological site, forage suitability group or suitable forage species for the planning site
 - o identifies opportunities to enhance

resource conditions

o location and condition of structural improvements such as fences, water developments, etc, including seasonal availability and quality of watering sites.

- Forage Inventory of the expected forage quality, quantity and species in each management unit(s).
- Livestock inventory showing the number, kind and class of livestock and grazing/browsing wildlife species of concern and their estimated forage demand.
- Forage-Animal Balance developed for the grazing plan, which ensures forage produced or available meets forage demand of grazing livestock and/or wildlife.
- Grazing Plan developed for livestock that identifies periods of grazing and/or browsing, deferment, rest, stockpiling, and other treatment activities for each management unit.
- Contingency plan developed that details potential problems (i.e., severe drought, flooding, insects, wintering areas) and serves as a guide for adjusting the grazing prescription to ensure resource management, and economic feasibility without resource degradation.
- Monitoring plan developed with appropriate records to assist in determining whether the grazing strategy is resulting in a positive or upward trend and is meeting objectives. Identify the key areas and key plants that the manager should evaluate in making grazing management decisions. (The Pasture Condition Score Card should be used as a monitoring tool).

Stocking Rates

Appropriate stocking rates will be calculated and used as a guide to optimize utilization while sustaining or improving the forage resource. Adjust livestock numbers and/or grazing time to match forage demand to forage yield.

Use Global Spatial Analysis Tool (GSAT) or the following formulas to estimate stocking rates, acres needed, and/or grazing days available:

Ac. = $\frac{\text{Days} \times \text{A.N.} \times \text{A.W.} \times \text{I.R.}}{\text{F.P.} \times \text{A.F.} \times \text{U.R.}}$

A.N. = Animal Number
Ac = Acre

Lbs Available Forage = Total pounds of Forage measured above stubble height

U.R. = % utilization

A.W. = Animal weight (pounds)

I.R. = Intake Rate in % body weight

F.P. = Forage Production/acre inch

A.F. = Inches of Available Forage

Days = Days of grazing planned

Grazing Rates/% Utilization

Grazing rate or percent utilization is a factor used to calculate the amount of forage harvested in a pasture/paddock area during a specific period of time. This rate of use is based on the stocking rate and livestock occupation time in a pasture/paddock area. The more time livestock spend in a pasture the lower the percent utilization.

To calculate the amount of forage harvested, multiply the pounds of available forage in a pasture/paddock area per grazing, times the % utilization rate (selected from Table 3 Harvest Rates/% Utilization). The Harvest Rates/% Utilization is based on days of occupation for the pasture/paddock area.

Harvest Rates/% Utilization cannot exceed 80 percent for the occupation period and will often be less than 80 % when calculating the % Utilization rate for the whole growing season.

Paddock Numbers/Grazing Periods/Rest Periods

The number of paddocks needed is determined by the length of the rest period needed for recovery of the forage resource following grazing and the length of the grazing period desired. Shorter grazing periods reduces second bite opportunities during any one grazing event. Rest period needs change throughout the year as plant growth rates change. During rapid growth, short (Minimum) rest periods are needed; as growth slows, the recovery period is longer and rest periods should be lengthened. During times of extremely slow growth or dormancy, long (Maximum) rest periods should be provided. (See Table 1 Grazing Management Guidelines)

Days = $\frac{\text{Ac.} \times \text{Lbs Available Forage} \times \% \text{ U.R.}}{\text{A.W.} \times \text{I.R.} \times \text{A.N.}}$

The formula for determining paddock or pasture numbers is:

Paddock # = $\frac{\text{Rest period} + \# \text{ of herds}}{\text{Grazing period}}$

All livestock should be removed from pastures being rested. Pastures used for wintering areas should be identified and rotated from one year to the next.

OPERATION AND MAINTENANCE

Operation. Prescribed Grazing will be applied on a continuing basis throughout the occupation period of all planned grazing units.

Adjustments will be made as needed to ensure that the goals and objectives of the prescribed grazing strategy are met.

Close grazing during the growing season reduces total forage production.

Maintenance. Monitoring data and grazing records will be used on a regular basis within the prescribed grazing plan to insure that objectives are being met, or to make necessary changes in the prescribed grazing plan to meet objectives.

All facilitating and accelerating practices (e.g. Fence (382), Pest Management (595), Brush Management (314), Pasture Planting (512) (etc.) that are needed to effect adequate grazing and/or browsing distribution as planned by this practice standard will be maintained in good working order and are being operated as intended.

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TABLE 1

GRAZING MANAGEMENT GUIDELINES

Pasture type (select an option that most closely reflects the one being planned)	(inches) Begin Grazing All Mgt types *1	(inches) End Grazing Height Continuous*2	(inches) End Grazing Height Rotational*3	(days) Min – Max Rest Period*4	(days) Min-Max Grazing Periods*5	(Number) Minimum Pastures Needed*6
Single Species (pastures containing only 1 species)						
Introduced grasses	6 – 8**	4 – 5	3 – 4**	20 - 45	10 - 22	3
Introduced legumes	8 – 10**	4 – 5	3 – 4**	25-35 (45***)	5-7 (9)***	6
Native grasses	12 - 18	****	6 – 8	30 – 50	10 – 17	4
Simple Mixtures (2-4 like species or grass + legume)						
Introduced Grasses/legume	6 – 8	4 – 5	3 – 4	25 – 45	8 – 15	4
Native grass mix	12 – 18	****	6 – 8	30 – 50	8 – 12	5
Complex Mixtures (5+ species)						
Introduced grasses/ legumes/forbs	6 – 8	****	3 – 4	25 – 45	5 – 9	6
Native grass/legume/forbs	12 – 18	****	6 – 8	30 – 50	4 – 7	8

^{*1} Begin grazing when carbohydrates used for initial growth and regrowth have been replenished and the Leaf Area Index exceeds that needed for suitable production. With 7 or more paddocks grazed in a single system, begin grazing before the lowest suggested height range is reached in the first rotation of the season to prevent later grazed paddocks from becoming too mature.

^{*2} Minimum grazing heights when continuously grazed or with a minimal rotation (1 – 3 pastures). Heights given are those needed to maintain adequate ground cover to maintain the stand and provide enough ground cover to meet the objectives for purposes 4, 5, 6 & 7.

^{*3} End grazing when forage beyond that needed to maintain adequate carbohydrate reserves has been utilized. When a grazing period ends there should be enough photosynthetic leaf surface remaining to allow vigorous regrowth. With 7 or more paddocks grazed in a single system, grazing can end at the lower range. Lower grazing heights may require longer rest periods. No more than 20% of the field should be spot grazed below the minimum grazing height.

^{*4} Min – Max Rest Periods provide a time period for plants to recover from grazing. The plant's growth rate and current growing conditions regulates the length of rest period needed. Fast growth means fast rotations and short (Min) rest. Slow growth requires slower rotations and longer (Max) rest. The Minimum rest period may be reduced by 1/3 if less than 20% of current growth was removed during the last grazing period or during the first rotation of the grazing season.

^{*5} Min – Max Grazing Periods are determined by the Min – Max Rest Periods necessary for adequate recovery following grazing. Properly planned grazing management limits second bite opportunities.

^{*6} Minimum Pastures/Paddocks Needed is a relationship between necessary rest periods and appropriate grazing periods. Increase pasture numbers to: reduce length of grazing period; increase length of rest period; enhance grazing harvest; improve manure distribution; improve water quality and provide higher quality forage (Purposes 1 – 3).

**For low growing species such as Bermudagrass, Old World bluestem, White clover, and Kentucky bluegrass begin grazing at 4 – 6 inches and end grazing at 2 – 3 inches.

***Once flowering begins, 40 – 45 days of rest are needed for the production of viable legume seed.

****These species/mixes not recommended for continuous grazing.

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Table 2

GROWTH CURVES

Percent of Total Growth by Month

Month/Species	April	May	June	July	August	Sept	Oct	Nov	Dec
KY Bluegrass	5	30	30	10	5	10	10	-	-
Smooth Bromegrass	-	30	45	5	5	10	5	-	-
Tall Fescue	5	30	30	10	5	10	10	-	-
Tall Fescue Stockpiled	(5)	(25)	(25)	(5)	(-)	(-)	(10)	(15)	(15)
Orchardgrass	5	25	30	10	10	15	5	-	-
Perennial Ryegrass	5	30	30	10	5	10	10	-	-
Reed Canarygrass	5	25	25	15	10	15	5	-	-
Purple Top	-	-	25	35	30	10	-	-	-
Timothy	-	30	45	5	5	10	5	-	-
Bermudagrass	0	10	28	28	23	11	-	-	-
Big Bluestem	0	5	43	38	14	-	-	-	-
Indiangrass	0	5	25	30	28	12	-	-	-
Little Bluestem	0	7	30	32	26	5	-	-	-
Switchgrass	0	5	25	35	35	-	-	-	-
Eastern Gamagrass	0	5	25	35	35	-	-	-	-
Alfalfa	-	25	35	15	10	10	5	-	-
Clover	5	30	30	10	5	10	10	-	-
Birdsfoot Trefoil	-	20	30	25	10	10	5	-	-
Crownvetch	-	15	30	30	15	10	-	-	-
Sorghum/Sudangrass	-	-	-	45	55	-	-	-	-

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Month/Species	April	May	June	July	August	Sept	Oct	Nov	Dec
Winter Rye	60	20	-	-	-	-	-	15	5
Oats	-	-	-	-	-	20	55	25	-
Brassicas (spring seeded)	-	-	-	20	40	40	(15)	(45)	(40)
Brassicas (summer seeded)	-	-	-	25	40	35	(20)	(45)	(35)

The best forage quality occurs in the early part of the growth curve and when present the re-growth curve. Quality declines later in the growth cycle when reproductive parts become a major component of growth.

**Table 3
Harvest Rates/% Utilization**

Grazing Days	Maximum % Utilization
1	80
2	75
3	75
4	70
5	65
6 +	60
Continuous	35

**Table 4
Pasture Intake as % of Body Weight per day**

Beef Animals	2.5%
Stockers	3.0%
Ewes - Lactating	3.5% - 4.0%
Ewes - Maintenance	1.8% - 2.0%
Horses	2.0%
Goats – Lactating	5.0%
Goats – Maintenance	1.8% - 2.0%
Dairy Cows – Lactating Pasture Only	3.0%
Dairy Heifers	2.3%
Dairy Cows – TMR	2.0 – 4.0%*

*Dependent on amount of supplemental feed, hay, grain, TMR, etc. that is fed.