

South Dakota State University

# Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange

---

SDSU Extension Circulars

SDSU Extension

---

9-1979

## South Dakota Range and Pasture Judging Handbook

James R. Johnson

Charles M. Schumacher

Gilbert G. Bierwagen

Follow this and additional works at: [https://openprairie.sdstate.edu/extension\\_circ](https://openprairie.sdstate.edu/extension_circ)

---

### Recommended Citation

Johnson, James R.; Schumacher, Charles M.; and Bierwagen, Gilbert G., "South Dakota Range and Pasture Judging Handbook" (1979). *SDSU Extension Circulars*. 889.

[https://openprairie.sdstate.edu/extension\\_circ/889](https://openprairie.sdstate.edu/extension_circ/889)

This Circular is brought to you for free and open access by the SDSU Extension at Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. It has been accepted for inclusion in SDSU Extension Circulars by an authorized administrator of Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. For more information, please contact [michael.biondo@sdstate.edu](mailto:michael.biondo@sdstate.edu).

# Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.



For current policies and practices, contact SDSU Extension

Website: [extension.sdstate.edu](http://extension.sdstate.edu)

Phone: 605-688-4792

Email: [sdsu.extension@sdstate.edu](mailto:sdsu.extension@sdstate.edu)

SDSU Extension is an equal opportunity provider and employer in accordance with the nondiscrimination policies of South Dakota State University, the South Dakota Board of Regents and the United States Department of Agriculture.

South Dakota



# Range and Pasture Judging Handbook



SDSU LIBRARY  
JUN 24 1980  
STATE DOCUMENT

30.732  
5087.17  
C#731

## Contents

Range and pasture judging .....	3
Judging schools .....	3
Judging contests .....	3
Judging scorecards .....	4
Range judging contest guidelines .....	4
Part I. Kinds of rangeland (range sites) .....	4
Part II. Range condition .....	13
Determining range condition .....	15
Example computations .....	15
Part III. Degree of use .....	16
Part IV. Possible treatments .....	16
For proper range use .....	16
For range improvement .....	17
Example possible treatments .....	18
Part V. Master range plant list .....	18
Pasture judging contest guidelines .....	20
Part I. Land factors .....	20
Part II. Recommended treatments .....	20
A. Physical improvements .....	20
B. Pasture species needed .....	21
C. Seeding methods .....	22
D. Management practices .....	23
Example situations .....	24
Additional references .....	25

Published with funding support from the Old West Regional Commission through the Society for Range Management, Old West Regional Range Program.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the USDA, Hollis D. Hall, Director of Cooperative Extension Service, SDSU, Brookings. Educational programs and materials offered without regard to age, race, color, religion, sex, handicap or national origin. An Equal Opportunity Employer.

File: 1.4, 3.1, H6.23-12—2M —9-79mb—4608A

# South Dakota

# Range and Pasture Judging

# Handbook

James R. Johnson, Charles M. Schumacher, and  
Gilbert G. Bierwagen

## Range and Pasture Judging

Range and pasture judging schools and contests are designed to teach principles and practices necessary for good grassland conservation and management. Rangeland and pasture require different management.

**Rangeland**, according to a glossary of terms published by the Society for Range Management, is land on which native vegetation is predominantly grasses, grass-like plants, forbs, or shrubs suitable for grazing or browsing use. They also include lands revegetated naturally or artificially to provide a forage cover that is managed like native vegetation. Many of the plant species present on range make up the forage base which we want to maintain in high production for grazing animals.

**Pasture** is grazing land that is intended for more intensive management than is used on rangeland. Pastures are usually seeded to selected strains of introduced forage but may be seeded to improved strains of native species. Pastures generally receive periodic renovation or cultural treatments such as tillage, fertilization, mowing or weed control.

**Range judging** is learning to "read" the range to make good decisions about grazing management. Contestants include students, ranchers, and farmers who are interested in recognizing different kinds of range (sites), telling how healthy (condition) or productive range is, and deciding whether it is properly grazed. An important part of range judging is recognition of key range plants and knowing their importance. Once familiar with these characteristics the contestant is equipped to make recommendations about future grazing use of the range judging site.

**Pasture judging** requires the combined knowledge of land capability and those agronomic practices that are recommended for pasture establishment and management. It also requires an understanding of which forages are best suited to each type of pasture and their season of use. With conditions that are specified at the pasture judging location, the contestant should be prepared to determine which type of pasture will complement the ranch or farm forage base.

## Judging Schools

Range and pasture judging schools are often held in conjunction with land judging schools. Schools can be held in the morning, before afternoon contests. At the morning school all contestants receive instruction from specialists in range, pasture, and land capability (soils). Instruction in land capability is necessary for **both** pasture and land judging.

When leaders want students to judge in both range-pasture and land, it may be necessary to hold one contest in the morning and the other contest in the afternoon. Participants who judge in both contests would miss the morning school.

Schools are most effective when contestants have had some prior instruction. Instruction in an indoor classroom setting can be expected to cover more material than in an outdoor classroom. However, topics such as soil profile examination and plant identification are more effectively taught in the field.

Instructors should present information that is specific to the contest by following the sections on judging cards. Additional study materials are listed at the end of this publication.

## Judging Contests

Judging contests are held after participants have had the opportunity to study and learn principles

---

James Johnson is SDSU associate professor and Extension range management specialist, based at Rapid City; Charles Schumacher is range conservationist with the Soil Conservation Service, Huron; and Gilbert Bierwagen is conservation agronomist, Soil Conservation Service, Brookings. Appreciation is extended to the Oklahoma Cooperative Extension Service and to F. Robert Gartner, associate professor of range science, SDSU, for providing ideas and materials from previous judging guides. Appreciation is also expressed to Ralph Cline, former SDSU Extension agronomist, and Ralph Cole, former SCS range conservationist, for their early work in range judging.

#6112876

that apply in both range judging and pasture judging. Range-pasture contests can be held in the immediate vicinity of land judging contests so that students may participate in both, to facilitate transportation, and to use common machine dug soil pits (necessary for pasture and land judging).

Generally, four judging stations will be selected for the contest. Depending on the desires of the instructors, the stations may be any combination of judging for range sites, range plant identification, and pasture suitability. South Dakota range judging cards are designed so that plant identification can be accomplished at the range judging stations, if desired.

Judging stations should be located far enough apart to prevent group interference between stations, yet close enough for participant groups to walk from one station to the next in about 5 minutes. Participants should be divided into equal numbered groups at each judging station. About 20 minutes is required for judging at each station and walking to the next.

**Range judging stations** should be selected to represent a variety of range sites and range conditions. Borderline situations should be avoided. Each station should be roughly circular, 25-50 feet in diameter, and marked with colored wire flags or circled with a string (Fig 1). A spade-dug pit deep enough to inspect soil characteristics is required at each station, outside the circle. Plants used for identification or degree of use should be clearly marked. All these should be outside the circle. Traffic within the circle should be avoided to prevent trampling. Trampling will mask range condition, determined within the circle.

**Plant identification stations** are established to take advantage of a concentration of many species. When a plant identification station is used, plants would not normally be identified at the range judging stations. About 10 plants can be identified and recorded in the same time that it takes to judge a range or pasture station. Therefore, in order to identify 20 plants it is desirable to use two stations, although only one card is needed.

**Pasture judging stations** require preparation identical to that for land judging. For example, a deep soil pit (with backhoe) and slope stakes are required. Often it is possible to use land judging stations for pasture judging. Pasture judging requires knowledge of land capability judging as discussed in FS 563, "Land Judging in South Dakota." Pasture stations should be located on lands suited for pasture use.

### Judging Scorecards

Three judging scorecards (Fig 2, 3, & 4) are available for practice as well as for contests. Cards are color coded for ease of grading. Supplies can be obtained from the Cooperative Extension Service through local county agents.

## Range Judging Contest Guidelines

### Part I: Kinds of Rangeland (Range Sites)

Different kinds of rangeland are called **range sites**. They are the ecological subdivisions into which rangeland is divided for study, evaluation, and management. The criteria used to separate range sites are differences in kind or proportion of plant species, or in total production of natural vegetation.

A range site is the product of all the environmental factors responsible for its development. Differences in kind, proportion, and production of plants are, in large measure, the result of differences in environmental factors. In South Dakota the most important of these factors are climate and soil. Climatic difference, especially annual precipitation, is the criterion used to divide the state into six climatic areas. These areas are shown in Fig 5, with corresponding average annual precipitation values.

Within climatic areas, soils that have similar combinations of plant species are grouped. These groups of similar soils are given names such as Silty or Clayey. In South Dakota there are a total of 27 different names given to groups of soils that differ in soil-plant relationships. Some of these groups are very minor in extent or may be found in only a few places in the state.

Only 10 range sites are described in this handbook. These 10 groups make up over 90% of the rangeland in South Dakota. Their relative positions on the landscape are shown in Fig 6. Examples can be found in most of the climatic areas.

To give the full name of a range site, and thus identify its natural plant potential, the name of the soil group must be combined with the name of the climatic area. Examples of complete range site names are **Silty Western** and **Clayey Eastern**.

The 10 range sites that will be used in range judging in South Dakota are briefly described:

#### Subirrigated

This site occurs on level or nearly level bottomland. Soils are characterized by a beneficial water table that is within 3 to 5 feet of the surface during most of the growing season. The water table may reach the surface during the spring, but only for a very short period. Soils have textures that vary from loamy sand to silty clay. These soils are not saline. They are well enough aerated to grow big bluestem, or corn and alfalfa.

Potential natural plant cover consists chiefly of big bluestem and other tall grasses such as Indiangrass and switchgrass. Because of the beneficial water table, tall grasses are predominant on this site even in the drier climatic areas. Other grasses that occur are little bluestem, Canada wildrye, green muhly and Kentucky bluegrass. Prairie cordgrass may occur on inclusions that have a higher water table. Sedges occur in the understory. Forbs that often occur are Missouri

goldenrod, maximilian sunflower, American licorice and showy milkweed.

The subirrigated site is often used as native hayland. It is noted for its high production of excellent quality bluestem hay.

### Overflow

This site occurs on nearly level to gently sloping lands which receive stream water overflow or run-in from higher lands. Soils are deep, well aerated, and the texture in surface and subsoil varies from sandy loam to clay. Available water capacity is high. The general fertility level and organic content of these soils are high. The water table, generally, is 5 feet or more below the surface.

Potential plant cover is an excellent stand of tall grasses. Big bluestem is the major dominant except in the driest climate areas. Western wheatgrass is more common in the Western and West Central areas, especially on heavy clay soils. Other grasses that occur are green needlegrass, switchgrass, slender wheatgrass, sideoats grama, and an understory of bluegrass and sedges in the wetter areas and blue grama and buffalograss in the drier areas. The shrubs, leadplant and wild rose, may occur throughout the site. Scattered stands of shrubs (such as chokecherry and buffaloberry) and trees (such as green ash and cottonwood) may occur adjacent to streams. These natural stands of trees and shrubs provide valuable but very limited cover and food for both wildlife and livestock.

### Sands

This site occurs on nearly level to hummocky or hilly uplands. Soils are deep, loose, excessively drained loamy fine sands or sand. Precipitation, except in extreme cases, does not run off. This causes this site to have more tall grasses than other upland sites in the drier climatic areas. In eastern South Dakota this site and finer textured upland soils produce about equal amounts.

The potential natural plant cover consists of sand bluestem, little bluestem, prairie sandreed, and switchgrass. Grasses such as needleandthread, sand dropseed, and blue or hairy grama occur in lesser amounts. Shrubs such as leadplant, wild rose, and sandcherry may occur throughout. Yucca is more common on the steeper, less stable, inclusions.

Proper grazing use and management are essential to maintain a suitable soil cover that will prevent wind erosion and the formation of blowouts.

### Sandy

This site occurs on nearly level to rolling upland. Soils are deep and well drained with a sandy loam or fine sandy loam surface texture that grades into sandy loam to sand in the subsoil. Water intake rate is moderate to rapid, and available water capacity is moderately high.

The potential natural plant cover consists chiefly of prairie sandreed, little bluestem, sand or big bluestem, and the cool-season grass, needleand-

thread. Other plants that occur are sideoats grama, blue grama, and threadleaf sedge. Common forbs on this site are the sageworts, heath aster, and in places legumes such as prairieclover. Shrubs such as leadplant and wild rose may occur throughout, but sand sagebrush occurs only in the southwestern part of the state.

With continued season-long overuse the bluestems and prairie sandreed are replaced by needleandthread, sideoats grama, blue grama, and threadleaf sedge in the western areas or Kentucky bluegrass and sedges in the east.

### Silty

This site occurs on nearly level to rolling upland. Soils are deep or moderately well drained soils with a moderate or high available water capacity and favorable soil-water-plant relationships.

The potential natural plant cover consists of tall and mid grasses characteristic of the true prairie in the Eastern climatic area. This grades to less tall grasses and more mid and short grasses characteristic of the mixed prairie in the Western climatic area. Big and little bluestem predominate in the Eastern area. Western wheatgrass and green needlegrass are the predominant species in the Western area; needleandthread is characteristic although not always abundant. Understory species are principally bluegrass and sedges in the Eastern area and blue grama, buffalograss and sedges in the Western area. Forbs occur in small amounts but on overused ranges weedy species such as curlycup gumweed may be abundant. Shrubs like leadplant and wild rose occur on this site in all climatic areas providing the range is well managed.

### Clayey

This site occurs on nearly level to rolling upland. Soils are deep and have silt loam to clay surfaces and silty clay to clay subsoils. If dense restrictive

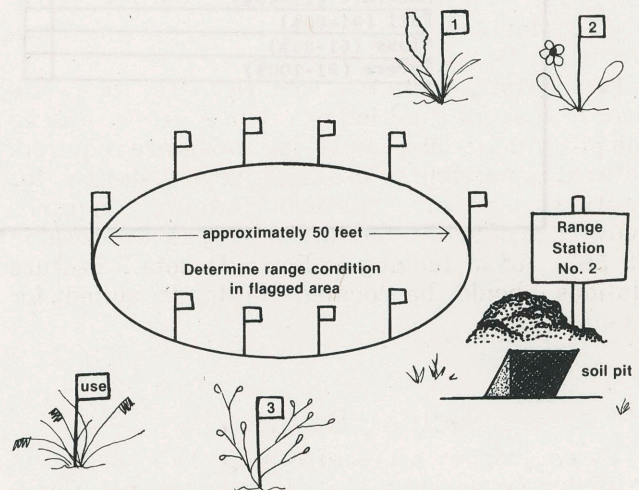


Fig 1. A range judging station with flagged circle, soil pit, and plants for identification.

Station No. \_\_\_\_\_

Contestant No. \_\_\_\_\_

### SOUTH DAKOTA RANGE JUDGING

Contestant Name \_\_\_\_\_

County or School \_\_\_\_\_

Indicate answers by placing an "X" following the correct word or statement in Parts I, II, III, IV. In Part V enter common plant name and check appropriate characteristics.

**PART I. Kind of Range Site**  
(check one)

Subirrigated	
Overflow	
Sands	
Sandy	
Silty	
Clayey	
Dense Clay	
Thin Upland	
Shallow	
Claypan	

**PART II. Range Condition**  
(check one)

Excellent (76-100%)	
Good (51-75%)	
Fair (26-50%)	
Poor (0-25%)	

**PART III. Degree of Use**  
(check one)

Unused	
Slight (1-20%)	
Moderate (21-40%)	
Full (41-60%)	
Close (61-80%)	
Severe (81-100%)	

**PART IV. Possible Treatments**

**A. For Proper Range Use**

Decrease stocking rate	
Increase stocking rate	
Keep rate same	
Provide livestock water and fence	

**B. For Range Improvement**

Defer early part of growing season	
Defer one entire growing season	
Defer two or more conservative growing seasons	
Moderately graze during dormant season	
Seed to adapted native grasses	
Mechanically renovate	

Score I \_\_\_\_\_  
 Score II \_\_\_\_\_  
 Score III \_\_\_\_\_  
 Score IV \_\_\_\_\_  
 Score V \_\_\_\_\_

TOTAL SCORE \_\_\_\_\_



Part V. Plant Identification and Evaluation

(Check One in Each Division)

(Print Name of Plant)	Life Span			Season of Growth		Grazing Response		
	Per.	Bien.	Ann.	Cool	Warm	Dec.	Inc.	Inv.
1								
2								
3								
4								
5								
6								

GUIDELINE TERMS: PART I - Subirrigated: Water table within 36 to 60" of surface during much of growing season; sometimes flooded for short periods in spring. Overflow: Benefits from stream overflow or run-in from higher slopes. Sands: Includes deep, loose, loamy fine sands to sands on nearly level to hilly uplands. Sandy: Deep, well-drained sandy loam to fine sandy loam surface soils grading into loamy sand to sand subsoil on nearly level to gently rolling uplands. Silty: Deep to moderately deep loams to silty clay loams on nearly level to rolling uplands. Clayey: Deep soils with silt loam to clay surfaces and silty clay to clay subsoils occurring on nearly level to rolling upland. Dense Clay: Soils with a weak or nearly structureless clay surface underlain at 14", or less, by a dense, weak structured clay on nearly level to rolling uplands. Thin Upland: Weakly developed sandy loam to clay loam with limy surface, mostly on

steep uplands, parent material is soft. Shallow: Shallow soils with a fine sandy loam to clay surface, but underlain at depths of 10 to 20" by impervious material and occurring on gently to steeply sloping upland. Claypan: Nearly level fine sandy loam to clay loams that have a very dense claypan layer at a depth of 4 to 8 inches.

PART II - Based on percentage of original or climax vegetation for the site, e.g. Excellent = 76-100%; Good = 51-75%; Fair = 26-50%; Poor = 0-25%.

PART III - Unused: No livestock use. Slight: Practically undisturbed. Moderate: Most of the range being grazed. Little or no use of low value plants. Full: All of the range being grazed. Little or no use of low value plants. Close: All of the range shows use and major sections are closely grazed. Some use of low value plants. Severe: Low value plants carrying the grazing load. Soil erosion may be evident.

Fig 2. Range judging scorecards can be used either front side only (a) or both sides. Up to six plants can be identified at each station.

Contestant Name \_\_\_\_\_  
 Contestant No. \_\_\_\_\_  
 County or School \_\_\_\_\_

RANGE PLANT IDENTIFICATION AND EVALUATION

(Print Plant Name)	Growth Form				Life Span			Season of Growth		Grazing Response		
	Grass/ Grass-like	Forbs	Shrubs	Tree	Per.	Bien.	Ann.	Cool	Warm	Dec.	Inc.	Inv.
	1											
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Fig 3. Range plant identification cards can be used in conjunction with range judging contests. When done as part of judging, two plant identification stations are usually established with plants 1-10 at one station and 11-20 at the other. The reverse side of the card (b) defines plant characteristics for the "evaluation" portion.

Definitions of Range Plant Characteristics

GRASS - A plant of the grass family, with reduced, non-showy flowers, grain type fruit, and narrow, usually long leaves; e.g. wheat, blue grama.

FORB - A herbaceous plant that is not a grass or grass-like plant; e.g. black samspon.

SHRUB - A perennial woody plant having several stems arising near the base; e.g. chokecherry.

TREE - A perennial woody plant, usually with a single stem; e.g. box elder.

PERENNIAL - Plants which can live for 3 years or more.

BIENNIAL - Plants which live for two growing seasons, normally flowering only in the second season.

ANNUAL - Plants which complete entire life cycle in one year or less. Also includes winter annuals which commence growth late one growing season and complete the life cycle the next growing season.

COOL SEASON - A plant that makes most of its growth and flowers during spring, slows growth or becomes dormant during the hot part of the summer.

WARM SEASON - A plant that makes most or all of its growth during the spring and summer, flowering in the summer or autumn.

DECREASEER - Plants of the original vegetation that decrease in relative abundance with grazing pressure.

INCREASEER - Plants that are present as part of the original vegetation and increase in relative abundance with grazing pressure.

INVADER - Plants that were not present in undisturbed original vegetation and became established with depletion by grazing pressure or disturbance.

## SOUTH DAKOTA PASTURE JUDGING

Contestant Name \_\_\_\_\_ Station No. \_\_\_\_\_  
 County or School \_\_\_\_\_ Contestant No. \_\_\_\_\_

### PART I. LAND FACTORS

A. Surface texture

Sandy	
Loamy	
Clayey	

B. Movement of air and water in sub-soil (permeability)

Slow	
Moderate	
Rapid	

C. Depth favorable to plant roots

Deep (36" or more)	
Moderate (20"-36")	
Shallow (10"-20")	
Very shallow (less than 10")	

D. Slope

Nearly level (0-3%)	
Undulating (3-6%)	
Sloping (6-10%)	
Rolling (10-20%)	
Steep (20% or more)	

E. Surface runoff (drainage)

Poor (very slow)	
Fair (slow)	
Good (moderate)	
Excessive (rapid)	

F. Erosion - wind & water

None to slight	
Moderate	
Severe	

G. Stoniness

None to slight	
Moderate	
Excessive	

H. Factors that keep area out of Class I (check one or more)

Texture	Drainage	
Permeability	Erosion	
Depth	Stoniness	
Slope		

I. Land capability class

Class I		Class V	
Class II		Class VI	
Class III		Class VII	
Class IV		Class VIII	

### PART II. RECOMMENDED TREATMENTS

A. Physical improvement

Treat gullies	
Construct diversion structure	
Seed adapted species	
Control brush	
Provide livestock water	
Fence or cross-fence	

B. Pasture species needed

Crested wheatgrass	
Russian wildrye	
Kentucky bluegrass	
Smooth bromegrass	
Intermediate wheatgrass	
Native cool-season grasses	
Reed canarygrass or creeping foxtail	
Tall wheatgrass	
Native warm-season grasses	
Sudan or sudan - sorghum hybrids	
Pasture alfalfa	
Other legumes	

C. Seeding methods

Seed on fully prepared seedbed	
Seed in undisturbed stubble	
Interseed with legume	
Seed with companion crop	
Seed in early spring	
Seed in fall	
Seed in dormant season	
Seed in early summer	
Inoculate seed	
Fertilize for seedling vigor	

D. Management practices

Apply nitrogen (N)	
Apply phosphate (P <sub>2</sub> O <sub>5</sub> )	
Apply potash (K <sub>2</sub> O)	
Control weeds	
Graze in proper season	
Install rotation grazing system	
Allow flexible stocking	

SCORE  
 PART I \_\_\_\_\_  
 PART II \_\_\_\_\_  
 TOTAL \_\_\_\_\_

CONDITIONS FOR PASTURE JUDGING

1. Thickness of original top soil was \_\_\_\_\_ inches.
2. Size of pasture is \_\_\_\_\_ acres.
3. Seasonal requirements for forage:  
(Jan., Feb., Mar., Apr., May, June, July, Aug., Sept.,  
Oct., Nov., Dec.,)
4. Year needed: this year, next year, year after next
5. \_\_\_\_\_ Climatic area
6. Soil test shows:
 

(Deficiency in) (___lbs.)	nitrogen (per acre)
(Deficiency in) (___lbs.)	phosphate - P <sub>2</sub> O <sub>5</sub> (per acre)
(Deficiency in) (___lbs)	potash - K <sub>2</sub> O (per acre)
7. Other conditions \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Fig 4. Pasture judging requires a knowledge of land capability factors to complete Part I. "Conditions" for pasture judging must be given at each pasture judging station before contestants complete Part II. "Conditions" at the station can be posted or read by the station monitor.

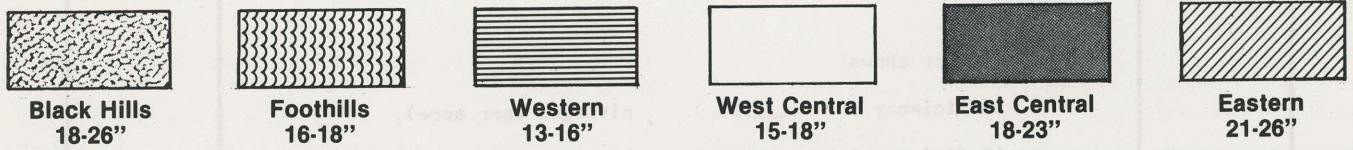
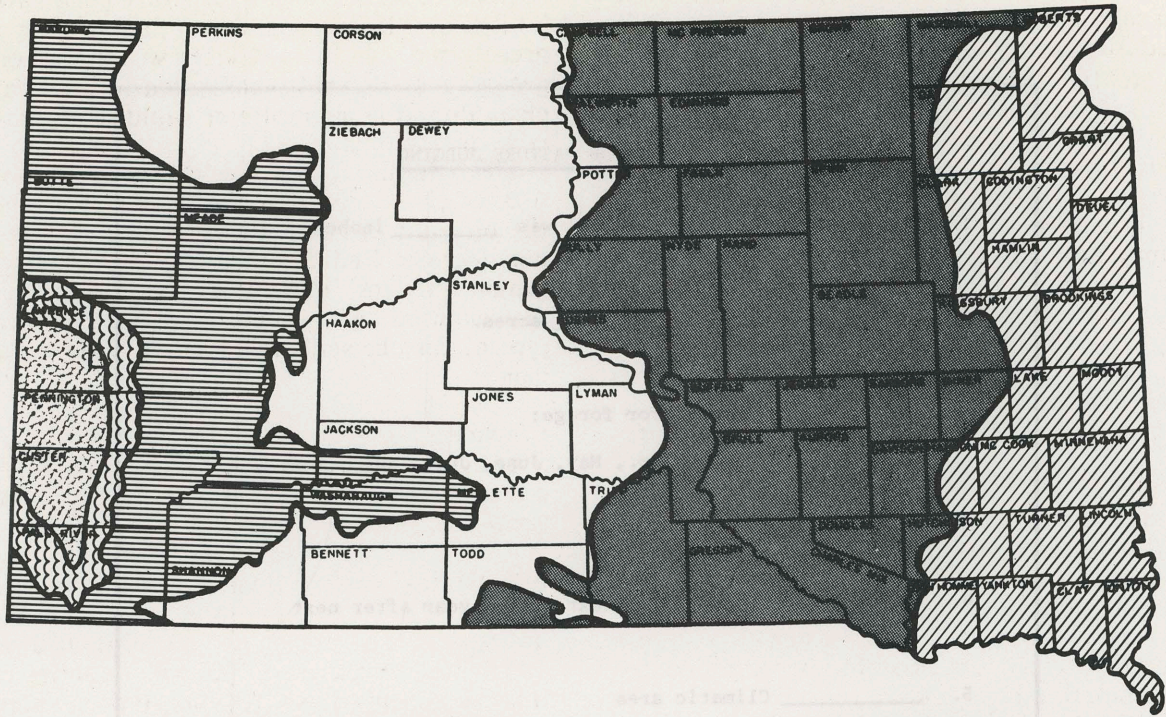


Fig 5. Climatic areas used for range judging in South Dakota.

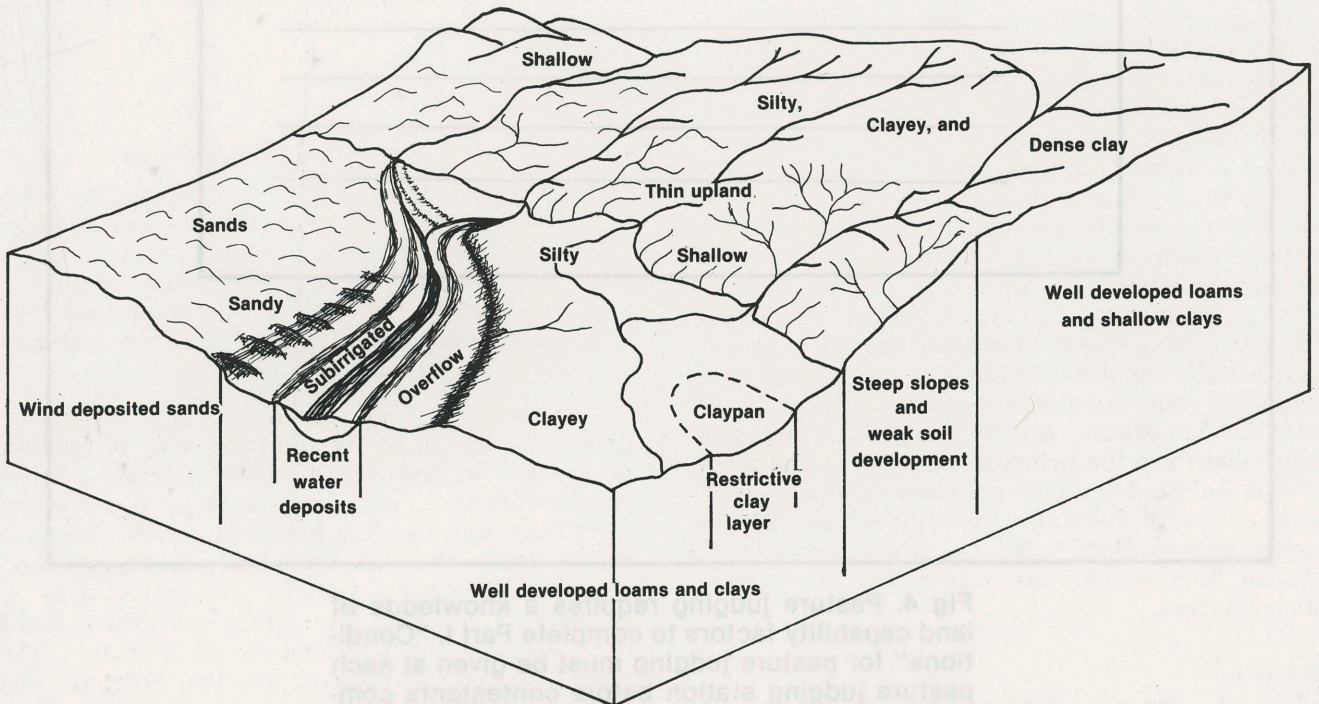


Fig 6. Range sites as they typically occur on the landscape.

clay horizons occur, they are at depths of more than 14 inches. Runoff is medium or slow and permeability is moderately slow or slow.

The potential natural plant cover is a mixture of tall and mid grasses characteristic of the northern true prairie in the east and mixed prairie in the west. Principal grasses in the Eastern area are about equal amounts of the warm-season grasses, big and little bluestem, and the cool-season grasses, porcupinegrass, green needlegrass and western wheatgrass. In the Western area the principal grasses are western wheatgrass and green needlegrass. Understory plants consist of the grammas, Kentucky bluegrass, and sedges in the east and blue grama, buffalograss, and sedges in the west. Forbs and shrubs are usually not abundant.

#### **Dense Clay**

This site occurs on nearly level to gently rolling uplands. It occurs principally in the Western and West Central climatic areas. Soils are moderately deep to deep and have a nearly structureless clay surface underlain at 14 inches, or less, by a dense clay. Runoff is rapid. Permeability is very slow.

The potential natural plant cover is chiefly a mixture of western wheatgrass (thickspike wheatgrass may occur in the Western area) and green needlegrass. This site does not have an understory of short grasses. Forbs such as American vetch, wild parsley, and wild onion are common. Woody plants are not common but some Nuttall saltbush and sagebrush and pricklypear may occur in the Western area. This site, when it is overgrazed, is nearly bare during very dry years. The erosion hazard, from wind and water, is high.

#### **Thin Upland**

This site occurs mostly on steep uplands. Soils are weakly (thinly) developed with a limy surface layer. Surface textures range from fine sandy loam to clay loam. The unweathered parent material is limy and so soft that it is easy to dig with a spade. If bedrock exists it is deeper than 20 inches. Surface runoff is medium or rapid and permeability is moderate or moderately rapid. This results in less vegetative production, less organic matter in the surface, and over time, a thinly developed soil.

The potential natural plant cover consists of the tall and mid grasses characteristic of the true prairie in the Eastern area. This grades to a mixture of mid and short grasses in the Western area. In the east the bluestems, prairie dropseed, and porcupinegrass are the principal species. In the west, needleandthread and blue grama are major grasses. Sedges occur in the understory; and in the west the increaser, threadleaf sedge, becomes abundant with overuse. Forbs and shrubs make up from 5 to 10% of the vegetation.

#### **Shallow**

This site occurs on gently sloping to steeply sloping uplands. The soils are shallow, 10 to 20 inches deep to bedrock. Bedrock may be solid and rock like or it may be unconsolidated as in the case of strongly

compacted shale. If solid, moisture penetration is inhibited and if unconsolidated the bedrock material greatly reduces the available water capacity. Both greatly restrict root penetration to less than 20 inches. Runoff is moderate or rapid and permeability is moderate to slow.

The potential natural plant cover is chiefly a mixture of bluestems, sideoats grama, and needleandthread with some western wheatgrass and green needlegrass. Understory plants are blue and hairy grama, sedges and bluegrass. Forbs such as blacksamson and dotted gayfeather are quite typical. Shrubs such as leadplant and rose are common.

#### **Claypan**

This site occurs on nearly level to gently sloping uplands and occasionally on nearly level bottomlands. Soils may have a fine sandy loam to clay loam surface. The identifying site characteristic is that the texture changes abruptly, between depths of 4 and 8 inches, to an extremely hard clayey horizon. This hard clay has round-topped columnar or prismatic structure. The soil scientist refers to this abrupt layer as "biscuit tops" when he uncovers it with a spade. Salt accumulations can usually be seen in the lower part of the clay layer. Runoff is slow or medium and permeability is very slow or slow.

The potential natural plant cover is chiefly a mixture of mid and short grasses. Western wheatgrass is the major dominant. In the Eastern area some tall decreaser grasses may occur. Blue grama and Kentucky bluegrass are the principal understory plants in the east while blue grama and buffalograss fill this niche in the west. Forbs and shrubs are not common but some big or silver sagebrush may occur in the Western area.

## **Part II: Range Condition**

Range condition is the state of health of the range site. It is determined by comparing the kinds, proportions, and amounts of vegetation presently on the site with the native vegetation that was there originally. Condition is a yardstick for measuring the departure from what the range site is naturally capable of producing.

Changes in range condition are influenced primarily by intensity and season of grazing pressure. Overuse for extended periods of time results in most desirable plants losing vigor and density. They may then be replaced by less desirable plants and the condition of the range will deteriorate. Overuse for a single season does not necessarily result in lower range condition, but it does indicate the potential to deteriorate if continued. Range management and improvement practices should be applied to prevent continued overuse. Other factors that may influence range condition are climatic cycles, fire, insects, and kind of grazing animal.

Plant species respond differently to various classes of animals. Since cattle are the most common grazers in South Dakota, the decreaser-increaser-invader concept is described here as it relates to cattle use. Native plants that respond quickly to grazing misuse by decreasing are called **decreasers**. Generally the decreasers are the most palatable and most desirable forage plants. Plants that respond to grazing misuse, at least for some time, by increasing in relation to the other plants are called **increasers**. Generally the increasers are less palatable than decreasers or are so short that grazing animals seldom remove over half of the herbage produced.

When plants are not considered a part of the native plant community, they are called **invaders**. Generally invaders are the least desirable and least dependable plants. Introduced plants, for the purpose of determining range condition, are considered as invaders with one exception. Kentucky bluegrass is an introduced grass that has become so well naturalized that it is now regarded as an increaser. Many introduced grasses and legumes are high quality forage plants but they are best managed as pastureland or hayland. All annuals are invaders.

Four range condition classes are used to express the degree of change between the present plant community and the original (natural potential) plant community. A site on which the present vegetation is made up of decreasers and no more than the allowable percentage of increasers is in the highest range condition class. As the amounts of decreasers go down and amounts of increasers or invaders go

up the site shows a lower condition class and need for improvement (Fig 7).

The four range condition classes:

### Excellent Condition

Seventy-six to 100 percent of present vegetation is mixture of original native vegetation consisting of desirable perennial decreasers and allowable increasers. Native legumes and other desirable forbs are usually present.

### Good Condition

Fifty-one to 75 percent of present vegetation is mixture of original native vegetation consisting of desirable perennial decreasers and allowable increasers. Some legumes and forbs may be present.

### Fair Condition

Twenty-six to 50 percent of present vegetation is mixture of original native vegetation consisting of desirable perennial decreasers and allowable increasers. Some legumes may occur, but most forbs that occur are increasers or invaders. Overall vegetation appearance is shorter and amount of bare ground generally is increasing.

### Poor Condition

Less than 25% of present vegetation is composed of highly palatable, desirable perennial decreasers and allowable increasers. Invader plants and increasers comprise majority of vegetation.

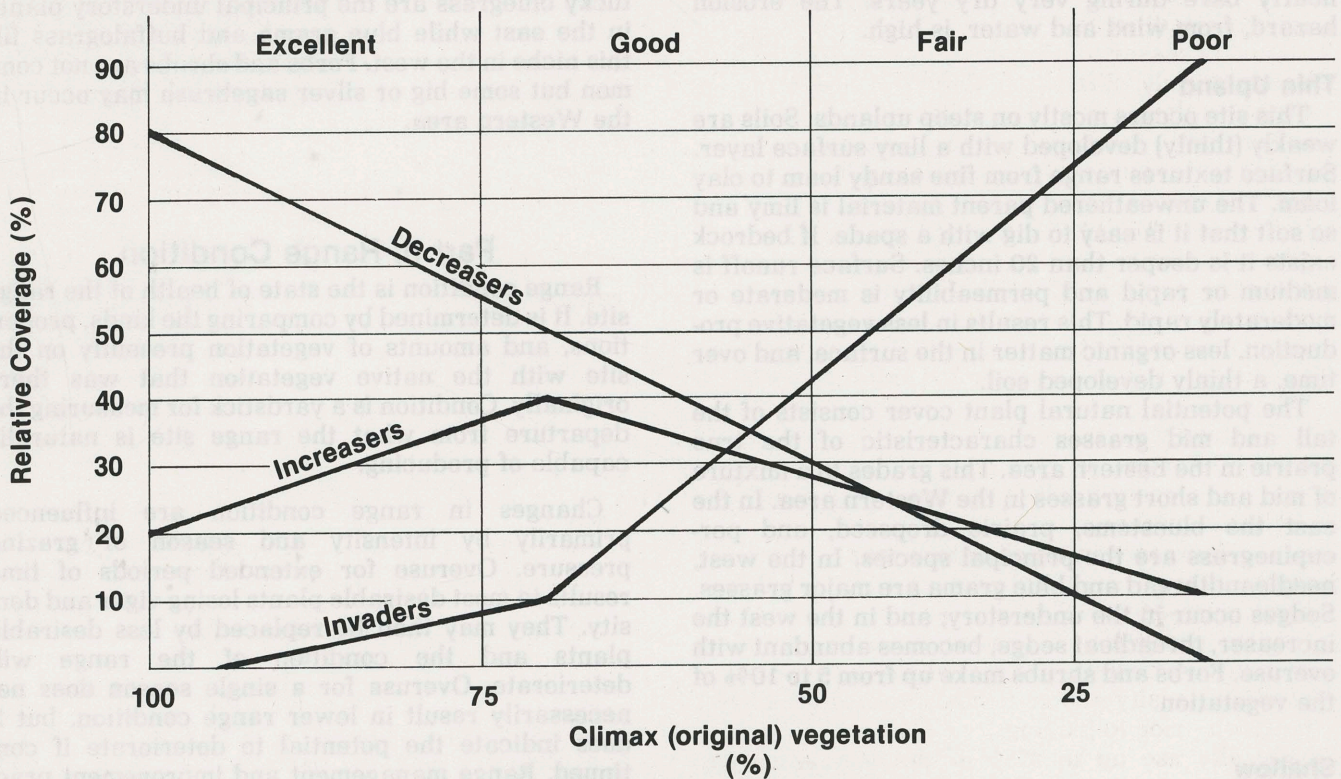


Fig 7. Range condition classes as determined by grazing responses of climax vegetation.



## Determining Range Condition

To determine range condition at the judging station, estimate total dry weight production of all above ground growth at end of growing season. If season is not complete this would be projected production. Production is expressed as percentages of the total for combined decreaseers, increaseers, and invaders in the flagged circle. The percentages are used for determining range condition class.

The following contest rules apply unless otherwise instructed.

1. Within the flagged circle, use all vegetation to estimate range condition.

**All of the decreaseers** count toward the percentage which expresses range condition.

**None of the invaders** count.

**Only a specific portion** of the **increaseers** count as discussed below.

2. **Subirrigated** and **Overflow**: These range sites are benefited by additional water from overflow, run-in, or beneficial watertable. They have a better than normal soil-water-plant relationship. **Use up to 15% of the increaseers as the maximum allowable for computing range condition. Any increaseers in excess of 15% of the total vegetation on the site cannot be counted as part of the original vegetation.** On these sites the following plants are listed as decreaseers or increaseers as shown below:

Western wheatgrass

**Decreaser** in Western and West Central

**Increaseer** in other climatic areas

Needleandthread

**Increaseer** in all climatic areas

3. **Sands, Sandy, Silty, and Clayey**: These are the normal upland range sites. They have good soil-water-plant relationships but neither receive added water nor lose excessive amounts if properly managed.

**Use up to 30% of the increaseers as the maximum allowable for computing range condition. Any increaseers in excess of 30% of the total vegetation on the site cannot be counted as part of the original vegetation.** On these sites the following plants are listed as decreaseers or increaseers as shown below:

Western wheatgrass

**Decreaser** in Western and Central

**Increaseer** in all other climatic areas

Needleandthread

**Increaseer** in all climatic areas

4. **Dense Clay**: This is an unusual site in that few increaseers occur. This site occurs in the West Central and Western climatic areas. When used in a judging contest, instruction on the evaluation of plant density and soil erosion potential should be given prior to judging.

**Normally use up to 45% of the increaseers for computing range condition** as discussed in 5 below.

Western wheatgrass is a **decreaseer** on this site.

5. **Thin Upland, Shallow, and Claypan**: These range sites are more droughty than normal because water runs off or the subsoil inhibits water and root penetration.

**Use up to 45% of the increaseers as the maximum allowable for computing range condition. Any increaseers in excess of 45% of the total vegetation on the site cannot be counted as part of the original vegetation.**

On these sites the following plants are listed as decreaseers or increaseers as shown below:

Western wheatgrass

**Decreaser** in all climatic areas

Needleandthread

**Increaseer** on Shallow site in all climatic areas

**Decreaser** on Claypan site in all climatic areas

**Decreaser** on Thin Upland site in Western and Western Central

**Increaseer** on Thin Upland site in all other climatic areas

## Example Computations

To give examples of how range condition percentage is computed, a simple form has been used. Contestants can make a mental picture of the form as a reminder of the essential computations. Once familiar with judging, learn that it is not necessary to identify each species separately, as long as decreaseers, increaseers and invaders are identified.

### Example No. 1

Range Site: Overflow		Climatic Area: Western	
Principal Species Now Present	% of Composition	Max % Allowable Toward Condition	% of Present Vegetation That is Allowable
<b>Decreasers:</b>			
Western wheatgrass	40	All decreaseers count toward condition percentage	40
Big bluestem	10		10
Leadplant } Wildrose }	5		5
<b>Increaseers:</b>			
Blue grama	25	Up to 15% increaseers allowable on Overflow	15
Sedges	10		
Heath aster	5		
<b>Invaders:</b>			
Annual brome	5	No invaders are allowable	—
Total	100%		70%

Range condition percentage is 70.

Range condition class is good.

In the contest, estimate the peak combined weight of all decreaseers (55%), then invaders (5%). The remainder must be increaseers, but on overflow sites we are only allowed 15% increaseers. So, 55 plus 15 is 70%, or good condition.

### Example No. 2

Range Site: Silty		Climatic Area: East Central	
Principal Species Now Present	% of Composition	Max. % Allowable Toward Condition	% of Present Vegetation That is Allowable
<b>Decreasers:</b>			
Little bluestem	5	All decreaseers	5
Big bluestem	5	count toward	5
Porcupine-grass	5	condition per-centage	5
<b>Increases:</b>			
Sideoats grama	15	Up to 30% increaseers allowable on Silty	30
Western wheat-grass	20		
Blue grama	20		
Kentucky blue-grass	10		
Stiff goldenrod	10		
<b>Invaders:</b>			
Annual brome	10	No invaders are allowable	—
<b>Total</b>	<b>100%</b>		<b>45%</b>

Range condition percentage is 45.  
Range condition class is fair.

In this case during the contest, estimate all decreaseers (15 %) and invaders (10%), leaving the rest as increaseers. But we can use only 30% of the increaseers, so we add 15 plus 30 for 45, or fair condition.

### Example No. 3

Range Site: Thin Upland		Climatic Area: West Central	
Principal Species Now Present	% of Composition	Max. % Allowable Toward Condition	% of Present Vegetation That is Allowable
<b>Decreasers:</b>			
Needleandthread	25	All decreaseers	25
Western wheatgrass	25	count toward	25
Little bluestem	15	condition per-centage	15
<b>Increases:</b>			
Blue grama	10	Up to 45% of increaseers allowable on Thin Upland, but only 30% are present	30
Fringed sagewort	10		
Threadleaf sedge	10		
<b>Invaders:</b>			
Prairie threeawn	5	No invaders are allowable	—
<b>Total</b>	<b>100%</b>		<b>95%</b>

Range condition percentage is 95.  
Range condition class is excellent.

In the contest estimate decreaseers first (65%), realizing there needs to be only 10% increaseers to qualify for excellent condition. Once confident at least 75% of the vegetation is allowable for the site, it is rapidly rated in excellent condition.

### Example No. 4

If an overflow site is 80% big and little bluestem, switchgrass, and high quality legumes (such as leadplant and purple prairieclover), it is in "excellent" condition because all are decreaseers and

the total percentage (80%) is counted toward determining condition of the site.

### Example No. 5

A Western climatic area clayey range site has 30% western wheatgrass, 5% green needlegrass (both decreaseers), 50% blue grama and buf-falgrass, and 15% forb increaseers. To compute range condition, count all the decreaseers (35%), but only 30% of the increaseers. Thus, the condition of the site is "good" (65%).

## Part III: Degree of Use

**Degree of use** is the proportion of current year's forage production that is consumed and/or destroyed by grazing animals. This may refer either to a single species or to the vegetation as a whole. Proper grazing use is defined as the degree of use that will maintain or improve range condition. This practice is the one most commonly used when the management goal is to improve range condition. Other range management practices applied without proper use will fail to improve range "health." It is necessary to determine in advance the degree of use that will meet the improvement objective. It is also essential that the grazing land manager be able to recognize various degrees of use when seen on rangeland.

The final rating of degree of use is made in late autumn, or near the end of the grazing season. However, it is then too late to make stocking adjustments, so it is advisable to make a tentative check early while there is time to make necessary adjustments.

There are many research methods used to determine degree of use, but an acceptable estimate can be made by carefully observing range and relating what is seen to the table of use (Table 1).

Full use (taking half and leaving half of the key grazing species) will maintain or very slowly improve range condition. For faster improvement, use at the end of the growing season should be less than full. For most rapid improvement, the range should be unused until late autumn, after which it may be used for winter grazing. This is often the most economical way to improve deteriorated range and may need to be continued for more than one year.

**For contest purposes**, degree of use is either determined for a single flagged plant, or designated key forage species in the station area. Use the categories in Table 1.

## Part IV: Possible Treatments

### For Proper Range Use

Range condition (Part II) for the station and degree of use (Part III) both must be determined before considering proper range use. For the sake of judging uniformity, assume the grazing season is

completed. Stocking rates are adjusted to get the best long-term forage production and resource stability that is possible for range. Generally speaking, with better range conditions, amount or degree of use can be increased. Likewise with poorer range conditions, it is important to decrease use. **For contest purposes**, proper range use is determined from the information in Table 2.

### Decrease Stocking Rate

Stocking rates should be decreased whenever they exceed full use. Thus, always decrease for close and severe use. On good condition range also decrease for full use. On fair condition range, rates should also be decreased for full and moderate use. On poor condition decrease for full, moderate, or slight use.

### Increase Stocking Rate

Except on poor condition range, rates should be increased whenever unused. For excellent range they should also be increased for slight or moderate use. Degree of use should be increased on good range that is slightly used.

### Keep Rate the Same

Rates should be unchanged whenever excellent condition range is fully utilized, when good range is moderately used, when fair range is slightly used, and when poor range is unused.

Table 1. Use rating categories commonly applied in range management.

Use rating*	Description
Unused	No livestock use.
Slight (1-20% used)	Appears practically undisturbed when viewed obliquely. Only favored areas near water, trails, or shade and choice plants are grazed.
Moderate (21-40% used)	Most of accessible range shows grazing. Little or no use of poor forage. Little evidence of trailing to grazing.
Full (This or less use is proper use) (41-60% used)	All fully accessible areas are grazed. The major sites have key forage species properly utilized (about 1/2 taken and 1/2 left). Points of concentration with overuse limited to between 5% and 10% of accessible area.
Close (61-80% used)	All accessible range plainly shows use and major sections are closely cropped. Livestock forced to use much poor, dry, and stemmy forage considering seasonal preference.
Severe (81-100% used)	Key forage species almost completely used. Low-value forage carrying grazing load. Trampling damage is widespread in accessible areas.

\* Based on weight removed.

Table 2. Stocking rate changes for proper use as affected by degree of use and range condition.

Degree of use	Range Condition				
	Excellent	Good	Fair	Poor	
Unused*	Increase	Increase	Increase	Same	} Can be proper use
Slight	Increase	Increase	Same	Decrease	
Moderate	Increase	Same	Decrease	Decrease	
Full	Same	Decrease	Decrease	Decrease	} Never proper use
Close	Decrease	Decrease	Decrease	Decrease	
Severe	Decrease	Decrease	Decrease	Decrease	

\*Unused during growing season or slight dormant season use.

### Provide Livestock Water and Fence

Good distribution of livestock and proper use of range forage depends on these practices. Water sources may include developed springs or seeps, wells, dams or dugouts, or rural water systems. Fencing may be temporary or permanent. When used properly, watering facilities and fences help insure that different range sites on the ranch are grazed during the best season. They are also necessary for most range improvement practices. Regardless of what is seen at the judging station, this practice should be checked.

### For Range Improvement

Range improvements are often accomplished by controlling livestock through stocking rate adjustments, deferments, season of use changes, or improved grazing distribution.

The period of most critical use for forage species is during the time that they are making their primary growth. For cool-season species this is in early spring. For warm-season species it is summer. Deferred grazing or reduced stocking during these times greatly aids recovery of plant vigor and production.

The seriousness of range deterioration is the guide for how much deferment is necessary to accomplish the desired range improvement. Often dormant season grazing can be practiced on ranges that are deferred during the growing season. Dormant season use is the least damaging season to graze. In some situations it is necessary to apply agronomic practices in order to rapidly improve range production.

In judging, participants may be instructed as to the number of practices to check.

### Defer Early Part of Growing Season

Early season deferment is practiced when ranges are in good condition and the primary forage species are cool-season.

### Defer One Entire Growing Season

When ranges are in fair condition, deferment for one entire growing season is practiced.

### Defer Two or More Consecutive Growing Seasons

Ranges in poor condition should be deferred for at least two consecutive growing seasons, if there are enough desirable species left to respond to rest. Also, when ranges have to be reseeded, this item would be checked.

### Moderately Graze During Dormant Season

Ranges in fair or poor condition that are deferred during the growing season may be lightly grazed in late autumn to provide some grazing use.

### Seed to Adapted Native Grasses

Poor condition ranges that have only remnants of desirable native forage species left are often reseeded. These ranges will not respond rapidly to deferment or reductions in stocking rates and require reseeding.

Reseeded ranges generally require 3 years (1 year fallow plus 2 years for seedling establishment) to regain production and resumption of use. When this practice is checked, also check "defer two or more consecutive growing seasons."

### Mechanically Renovate

Mechanical renovation includes a number of practices that are designed for specific purposes. Mechanical renovations can be used with deferred grazing practices. Check "mechanically renovate" whenever the following situations occur.

On **claypan** sites, deep rip when in fair or good condition. Deep ripping breaks the pan and permits better moisture infiltration and better plant growth. Should be used with deferment for one entire growing season.

On **silty** sites in fair condition, contour furrow or pit to retard moisture runoff. Should be accompanied with deferment for one entire growing season.

On **clayey** sites in fair condition chisel or disc to destroy the shortgrass sod and encourage more productive mid grasses, especially western wheatgrass. Should be accompanied with deferment for one entire growing season.

### Example Possible Treatments

#### Example No. 1

The range site is silty in excellent condition with moderate use. Treatments needed:

- \*Provide livestock water and fence
- \*Increase stocking rate

#### Example No. 2

The site is clayey in poor condition, with close use, and little evidence of desirable native vegetation.

Treatments needed:

- \*Provide livestock water and fence
- \*Decrease stocking rate
- \*Seed to adapted native grasses
- \*Defer two or more consecutive growing seasons

#### Example No. 3

The site is sandy in fair condition with close use. Treatments needed:

- \*Provide livestock water and fence
- \*Decrease stocking rate
- \*Defer two or more consecutive growing seasons
- \*Moderately graze during dormant season.

#### Example No. 4

The site is shallow in fair condition with moderate use. Treatments needed:

- \*Provide livestock water and fence
- \*Decrease stocking rate
- \*Defer one entire growing season
- \*Moderately graze during dormant season

### Part V: Master Range Plant List

The plants listed in Table 3 are the ones that may appear in a range judging or plant identification contest. Relatively few species will occur in a contest area. The entire common name must be used and spelled correctly to receive full credit. Scientific names are not used; they are listed for clarity only.

Table 3. Master range plant list.

		Life Span			Season of Growth		Response to Grazing by cattle		
		Per.	Bien.	Ann.	Cool	Warm	Dec.	Inc.	Inv.
<b>Grasses</b>									
Annual brome or cheatgrass	<i>Bromus</i> spp.			X	X				X
Bearded wheatgrass	<i>Agropyron subsecundum</i>	X			X		X		
Big bluestem	<i>Andropogon gerardi</i>	X				X	X		
Blue grama	<i>Bouteloua gracilis</i>	X				X		X	
Bluegrass	<i>Poa</i> spp.	X			X			X	
Buffalograss	<i>Buchloe dactyloides</i>	X				X		X	
Canada wildrye	<i>Elymus canadensis</i>	X			X		X		
Foxtail barley	<i>Hordeum jubatum</i>	X			X				X
Green muhly	<i>Muhlenbergia racemosa</i>	X				X	X		
Green needlegrass	<i>Stipa viridula</i>	X			X		X		
Hairy grama	<i>Bouteloua hirsuta</i>	X				X		X	

		Life Span			Season of Growth		Response to Grazing by cattle		
		Per.	Bien.	Ann.	Cool	Warm	Dec.	Inc.	Inv.
Indiangrass	<i>Sorghastrum nutans</i>	X				X	X		
Indian ricegrass	<i>Oryzopsis hymenoides</i>	X			X		X		
Inland saltgrass	<i>Distichlis stricta</i>	X				X		X	
Little barley	<i>Hordeum pusillum</i>			X	X				X
Little bluestem	<i>Andropogon scoparius</i>	X				X	X		
Needleandthread	<i>Stipa comata</i>	X			X		X	X	
Perennial threeawn	<i>Aristida</i> spp.	X				X		X	
Plains muhly	<i>Muhlenbergia cuspidata</i>	X				X	X		
Porcupinegrass	<i>Stipa spartea</i>	X			X		X		
Prairie cordgrass	<i>Spartina pectinata</i>	X				X	X		
Prairie dropseed	<i>Sporobolus heterolepis</i>	X				X	X		
Prairie junegrass	<i>Koeleria cristata</i>	X			X		X		
Prairie sandreed	<i>Calamovilfa longifolia</i>	X				X	X		
Reed canarygrass	<i>Phalaris arundinacea</i>	X			X		X		
Redgrass	<i>Calamagrostis</i> spp.	X			X		X		
Sand bluestem	<i>Andropogon hallii</i>	X				X	X		
Sandbur	<i>Cenchrus pauciflorus</i>			X		X			X
Sand dropseed	<i>Sporobolus cryptandrus</i>	X				X		X	
Scribner panicum	<i>Panicum scribnerianum</i>	X				X		X	
Sideoats grama	<i>Bouteloua curtipendula</i>	X				X		X	
Sixweeks fescue	<i>Festuca octoflora</i>			X	X				X
Slender wheatgrass	<i>Agropyron trachycaulum</i>	X			X		X		
Switchgrass	<i>Panicum virgatum</i>	X				X	X		
Tall dropseed	<i>Sporobolus asper</i>	X				X		X	
Thickspike wheatgrass	<i>Agropyron dasystachyum</i>	X			X		X	X	
Tumblegrass	<i>Schedonnardus paniculatus</i>	X				X			X
Western wheatgrass	<i>Agropyron smithii</i>	X			X		X	X	
Witchgrass	<i>Panicum capillare</i>			X		X			X
<b>Grasslike Plants</b>									
Rush	<i>Juncus</i> spp.	X				X		X	
Sedge	<i>Carex</i> spp.	X			X		X	X	
<b>Forbs</b>									
American licorice*	<i>Glycyrrhiza lepidota</i>	X				X	X		
American vetch*	<i>Vicia americana</i>	X			X		X		
Annual sunflower	<i>Helianthus</i> spp.			X		X			X
Bigtop dalea*	<i>Dalea enneandra</i>	X				X	X		
Black samson	<i>Echinacea angustifolia</i>	X				X	X		
Broom snakeweed	<i>Gutierrezia sarothrae</i>	X				X			X
Bush morningglory	<i>Ipomoea leptophylla</i>	X				X		X	
Canada thistle	<i>Cirsium arvense</i>	X				X			X
Cocklebur(P)	<i>Xanthium</i> spp.			X		X			X
Crazyweed*(P)	<i>Oxytropis</i> spp.	X			X			X	
Cudweed sagewort	<i>Artemisia ludoviciana</i>	X				X		X	
Curlycup gumweed	<i>Grindelia squarrosa</i>		X			X			X
Deathcamas(P)	<i>Zygadenus</i> spp.	X			X			X	
Dotted gayfeather	<i>Liatris punctata</i>	X				X	X		
False boneset	<i>Kuhnia eupatorioides</i>	X				X	X		
Fringed sagewort	<i>Artemisia frigida</i>	X				X		X	
Goatsbeard or salsify	<i>Tragopogon dubius</i>		X			X			X
Green sagewort	<i>Artemisia dracuncululus</i>	X				X		X	
Groundplum milkvetch*	<i>Astragalus crassicaarpus</i>	X				X	X		
Hairy goldaster	<i>Chrysopsis villosa</i>	X				X		X	
Heath aster	<i>Aster ericoides</i>	X				X		X	
Hemlock(P)	<i>Cicuta &amp; Conium</i> spp.	X	X			X		X	X
Hoods phlox	<i>Phlox hoodii</i>	X			X			X	
Horsetail(P)	<i>Equisetum</i> spp.	X			X			X	
Indian breadroot*	<i>Psoralea esculenta</i>	X				X	X		
Indianwheat	<i>Plantago</i> spp.			X		X			X

		Life Span			Season of Growth		Response to Grazing by cattle		
		Per.	Bien.	Ann.	Cool	Warm	Dec.	Inc.	Inv.
Larkspur(P)	<i>Delphinium</i> spp.	X			X			X	
Leafy spurge	<i>Euphorbia podperae</i>	X				X			X
Maximilian sunflower	<i>Helianthus maximiliani</i>	X				X	X		
Milkvetch*	<i>Astragalus</i> spp.	X			X		X		
Milkweed(P)	<i>Asclepias</i> spp.	X				X		X	
Missouri goldenrod	<i>Solidago missouriensis</i>	X				X	X		
Pasqueflower	<i>Anemone patens</i>	X			X		X		
Penstemon	<i>Penstemon</i> spp.	X			X			X	
Poisonvetch* (P)	<i>Astragalus</i> spp.	X			X			X	
Prairie coneflower	<i>Ratibida columnifera</i>	X				X		X	
Prairie goldenpea*	<i>Thermopsis rhombifolia</i>	X			X			X	
Purple prairieclover*	<i>Petalostemon purpureum</i>	X				X	X		
Rush skeletonplant	<i>Lygodesmia juncea</i>	X				X		X	
Scarlet guara	<i>Guara coccinea</i>	X				X		X	
Scarlet globemallow	<i>Sphaeralcea coccinea</i>	X				X		X	
Silverleaf scurfpea*	<i>Psoralea argophylla</i>	X				X		X	
Slimflower scurfpea*	<i>Psoralea tenuiflora</i>	X				X		X	
Snow-on-the-mountain (P)	<i>Euphorbia marginata</i>			X		X			X
Stiff goldenrod	<i>Solidago rigida</i>	X				X		X	
Stiff sunflower	<i>Helianthus rigidus</i>	X				X	X		
Sweetclover*	<i>Melilotus</i> spp.		X			X			X
Verbena	<i>Verbena</i> spp.	X				X		X	
Wavyleaf thistle	<i>Cirsium undulatum</i>		X			X		X	
Western ragweed	<i>Ambrosia psilostachya</i>	X				X			X
Western wallflower	<i>Erysimum asperum</i>		X			X		X	
Western yarrow	<i>Achillea millefolium</i>	X				X		X	
White prairieclover*	<i>Petalostemon candidum</i>	X				X	X		
Wormwood sagewort	<i>Artemisia absinthium</i>	X				X			X

\*Indicates plant is a legume

(P)Occasionally poisonous to livestock

## Pasture Judging Contest Guidelines

The scorecard is divided into two parts. Part I is land factors. Part II, recommended treatments with conditions for pasture judging, is on the reverse side (Fig 4). In grading, about 40% will come from Part I and 60% from Part II, which includes the major considerations for pasture judging.

### Part I: Land Factors

Land factors are identical to Part I of the land judging scorecard. Instructions and explanations for determining land factors are in Fact Sheet 563, "Land Judging in South Dakota." It is necessary to understand the land judging material of FS 563 to properly complete Part I in pasture judging.

### Part II: Recommended Treatments

Before a pasture program can be decided upon, the contestant must study the conditions specified

for the judging station. Conditions will be posted or read at the station by a station monitor. Proper completion of Part II will depend on contestant knowledge about pasture practices as given below and relating this knowledge to the conditions specified for the station.

#### A. Physical Improvements

Physical improvements are those mechanical or physical changes that are necessary to develop a productive pasture that is properly utilized by livestock.

##### Treat Gullies

Use when actively eroding gullies, uncrossable by farm machinery, are present. Treatment usually consists of the following steps: 1) shaping or sloping gully, 2) preparation of seedbed, 3) seeding or sodding rhizomatous grasses, and 4) managing established vegetation to prevent further erosion.

		Growth Form	Response to Grazing by Cattle		
			Dec.	Inc.	Inv.
<b>Woody Plants</b>					
American elm	<i>Ulmus americana</i>	Tall tree	X		
American plum	<i>Prunus americana</i>	Shrub	X		
Big sagebrush	<i>Artemisia tridentata</i>	Shrub		X	
Boxelder	<i>Acer negundo</i>	Med. tree	X		
Bur oak	<i>Quercus macrocarpa</i>	Med. tree	X		
Common chokecherry(P)	<i>Prunus virginiana</i>	Shrub	X		
Cottonwood	<i>Populus deltoides</i>	Tall tree	X		
Eastern redcedar	<i>Juniperus virginiana</i>	Sm. conifer		X	
Greasewood(P)	<i>Sarcobatus vermiculatus</i>	Shrub		X	
Green ash	<i>Fraxinus pennsylvanica</i>	Tall tree	X		
Hawthorn	<i>Crataegus</i> spp.	Sm. tree		X	
Indigobush *	<i>Amorpha fruticosa</i>	Shrub	X		
Leadplant *	<i>Amorpha canescens</i>	Shrub	X		
Nuttall saltbush	<i>Atriplex nuttallii</i>	Shrub	X		
Poisonivy	<i>Toxicodendron rydbergii</i>	Shrub/vine	X		
Ponderosa pine	<i>Pinus ponderosa</i>	Tall conifer		X	
Pricklypear	<i>Opuntia</i> spp.	Succulent		X	
Rocky Mountain juniper	<i>Juniperus scopulorum</i>	Sm. conifer		X	
Rubber rabbitbrush	<i>Chrysothamnus nauseosus</i>	Shrub		X	
Russianolive	<i>Elaeagnus angustifolia</i>	Sm. tree			X
Sandcherry	<i>Prunus besseyi</i>	Shrub	X		
Sand sagebrush	<i>Artemisia filifolia</i>	Shrub		X	
Silver buffaloberry	<i>Shepherdia argentea</i>	Shrub	X		
Silver sagebrush	<i>Artemisia cana</i>	Shrub		X	
Skunkbrush	<i>Rhus trilobata</i>	Shrub		X	
Western snowberry	<i>Symphoricarpos occidentalis</i>	Shrub		X	
Wild rose	<i>Rosa</i> spp.	Shrub	X		
Willow	<i>Salix</i> spp.	Shrub/tree	X		
Winterfat	<i>Eurotia lanata</i>	Shrub	X		
Yucca	<i>Yucca glauca</i>	Shrublike		X	

\* Indicates plant is a legume

(P) Occasionally poisonous to livestock

### Construct Diversion Structure

Use when troublesome outside or overhead water is contributing to erosion problems and it is possible to divert flow. A diversion structure is a gently sloping channel with supporting ridge on the lower side.

### Seed Adapted Pasture Species

When existing species are not the ones required, as determined by conditions set for the station, check this item.

### Control Brush

Use when brush is too large to be controlled with equipment normally used for seedbed preparation.

### Provide Livestock Water

Develop an adequate water supply as needed for proper livestock distribution. Sources of water may be springs, seeps, wells, rural water systems, or impounded runoff. As a matter of practicability, do not check if pasture is 10 acres or less in size.

### Fence or Cross-fence

Fencing is necessary for pasture establishment and/or grazing management. Cross-fencing is used to correct poor livestock distribution. Electric fences may be used temporarily when permanent fences are not practical. Should be checked regardless of pasture size.

### B. Pasture Species Needed

The adapted grasses and legumes in South Dakota have varied seasons of growth, thus they can be used selectively to extend the green grazing season. The pasture calendar (Fig 8) shows the periods of high forage production which are generally the seasons of best use. The conditions for using each species are listed below.

#### Crested Wheatgrass

Cool-season, drought tolerant bunchgrass introduced from eastern Russia. It provides early spring grazing, giving relief to native ranges and

providing high quality forage earlier than most other species. Check whenever producer indicates need for permanent early spring pasture, unless he specifically does not want it. Do not use in Eastern South Dakota climatic area unless specifically requested.

#### **Russian Wildrye**

Cool-season, drought tolerant, introduced bunchgrass. It provides early spring grazing, and can also provide excellent late autumn forage. Check only when producer indicates need and specifically does not want crested wheatgrass, or wants combination of early spring and late autumn permanent pasture.

#### **Kentucky Bluegrass**

Cool-season, sod forming grass, introduced from western Europe but naturalized throughout South Dakota, especially in mid to high precipitation areas or run-in sites. Generally not recommended for pasture seedings. However, if need is for summer-long, cool-season permanent pasture and Kentucky bluegrass is already the most common species at pasture station, bluegrass may be the most practical choice.

Condition card would have to indicate that producer wants to maintain existing stand, as he does not want to lose grazing that would result from reseeding.

#### **Smooth Bromegrass**

Cool-season, sod forming grass, introduced from Europe. Readily adapted to many South Dakota situations, it is the most common cultivated grass in East Central and Eastern climatic areas. Check when need is indicated for permanent pasture from late spring through summer. In West Central climatic area limit use to land capability Class IV or better; Western area to Class III or better; otherwise no restrictions.

#### **Intermediate Wheatgrass**

Cool-season, bunchy sod former, introduced from Russia. It is well adapted in South Dakota. Check when producer wants permanent pasture from late spring through summer, and specifically does not want smooth bromegrass. Also use in mixture with smooth bromegrass for same season of use. Do not use in Eastern climatic area. May be used on all land suitable for cultivation in Western or West Central areas.

#### **Native Cool-season Grasses**

Perennial grasses native to the area that make primary growth in cooler spring and fall seasons. Main species are western wheatgrass and green needlegrass, used extensively in Western and West Central areas to revegetate former cropland. Check when conditions indicate producer wants native mixture for grazing from late spring (May) through autumn (mid-October).

#### **Reed Canarygrass or Creeping Foxtail**

Cool-season, sod forming grasses suited primarily as hay or pasture on wet, low areas that are not salty. Check use only when for these situations or when station conditions specifically request these species.

#### **Tall Wheatgrass**

Cool-season bunchgrass suited for wet and salty conditions. Check only when this situation exists.

#### **Native Warm-season Grasses**

Perennial grasses native to the area and which grow during the summer months. The main species are sod formers (switchgrass, Indiangrass, and big bluestem) and bunchgrasses (little bluestem and sideoats grama). Because these species are difficult to establish, check only when conditions specifically call for a native warm-season pasture or when one of the species is requested. Use would be more common in East and East Central climatic areas.

#### **Sudangrass or Sudan-sorghum Hybrids**

These annual grasses grow during the heat of summer and, where adapted, provide considerable forage from mid to late summer. As they are annuals, need for temporary pasture would have to be indicated in conditions.

#### **Pasture Alfalfa**

Varieties of alfalfa with low growing and spreading tendencies that make them quite resistant to grazing and trampling. May be used with any of the cool-season grass pastures. Will provide more forage of better quality than grass alone. Will also help supply nitrogen to associated grasses. Check when planting any of the cool-season grasses unless producer does not want alfalfa.

#### **Other Legumes**

May include several less commonly used species seeded with cool-season grasses. Includes birdsfoot trefoil, a perennial, non-bloating legume adapted to the most eastern portion and possibly to irrigation; and red or alsike clover, which are perennials that do best where summer temperatures are moderately cool and moisture is adequate. Check only if high producing pasture is needed and producer does not want alfalfa. Do not use in West or West Central climatic areas.

### **C. Seeding Methods**

There is no single method of seeding that is best for all situations. However, some are better than others so it is important to be aware of the various methods that have been demonstrated to be successful. Described below are the methods that may be used in pasture judging.



### Seed on Fully Prepared Seedbed

Consists of tillage to remove competitive vegetation. Seedbeds must be firm but not so compact as to prevent seed coverage. Full seedbed preparation is always required, except with interseeding, or when seeding in undisturbed stubble.

### Seed in Undisturbed Stubble

When stubble is available, seeding without additional seedbed preparation is advisable. Stubble will catch snow and provide wind protection for new seedlings. Use when station is in existing grain or stubble field, or if conditions suggest producer wants a grain crop before seeding pasture. It is better to seed in sorghum or spring grain stubble than in winter grain stubble; winter grains may deplete soil moisture. Would also be checked if wind or water erosion hazards appear high.

### Interseed with Legume

Consists of scalping out shallow furrow to remove competitive vegetation and seeding adapted legumes (chiefly pasture alfalfa) in furrows. Use as a method of renovating low producing pastures without destroying existing grass. Use when producer wants to add alfalfa or other legume to existing stand.

### Seed with Companion Crop

Although companion crops may depress early yields and delay stand establishment, they are permitted in the Black Hills, East Central, and Eastern climatic areas. Advantages are that companion crops suppress undesirable weeds, and reduce erosion hazard. Use only when weeds or erosion are expected to be a problem. Do not use companion crop in other climatic areas because normal moisture is less and companion crop competition often results in seeding failure.

### Seed in Early Spring

This is the best season to seed if alfalfa is seeded with cool-season grasses. Seed as early as possible after killing frost hazard, but not later than early May.

### Seed in Fall

This is the best season to seed straight cool-season grasses. Normal seeding dates are mid-August to mid-September. Do not fall seed alfalfa or warm-season grasses.

### Seed in Dormant Season

Pure cool-season grasses can be seeded in late fall (November). Check this practice only when station conditions indicate need.

### Seed in Early Summer

Warm-season grasses require warm soil temperatures to germinate; therefore, seeding is recommended from mid-May through June after ear-

ly germinating weeds have been destroyed. This is the same season for seeding sorghum or sudangrass.

### Inoculate Seed

Legume seeds, including alfalfa, should be inoculated to assure the presence of adequate nitrogen fixing bacteria.

### Fertilize for Seedling Vigor

In most cases fertilizer is not needed during establishment of grasses and legumes. Check this practice only if station conditions state that soil tests show less than 15 pounds nitrogen or 10 pounds phosphate per acre.

## D. Management Practices

Management practices are those applied to the pasture after establishment.

### Apply Nitrogen (N)

Use on straight cool-season grasses when conditions indicate deficiency or when soil test shows less nitrogen than indicated below for each climatic area:

Eastern	less than 75 lbs N/A
East Central, Black Hills or Foothills	less than 60 lbs N/A
West Central	less than 40 lbs N/A
West	less than 30 lbs N/A

Do not apply nitrogen to good grass-legume stands or to warm-season perennial grasses.

### Apply Phosphate ( $P_2O_5$ )

Phosphorus should be applied to straight grass stands when deficiency is indicated or when soil test shows less than 10 pounds phosphorus per acre. On grass-alfalfa mixtures check this practice when phosphorus is below 30 pounds per acre.

### Apply Potassium, Potash ( $K_2O$ )

Potash is generally adequate, thus applications are seldom necessary. Apply to pasture only when soil test shows less than 150 pounds  $K_2O$  per acre.

### Control Weeds

Weeds are poor in forage quality, they are serious moisture competitors, and they shade pasture species. They should be controlled by mowing, spraying, or burning. Weeds may be indicated as problem on condition card or may be present at the station in sufficient quantity to be a potential problem after seedling establishment.

### Graze in Proper Season

Manage livestock so that pasture is used during periods of optimum forage value as shown on the pasture calendar (Fig 8). This is standard practice.

**Install Rotation Grazing System**

System of pasture utilization with short periods of heavy stocking followed by periods of rest for plant recovery during the same season. Successful systems maintain high forage and livestock production. Check only when producer indicates desire to maintain peak production. Do not check for early spring pastures or temporary pastures.

**Allow Flexible Stocking**

Flexibility in stocking rates is an essential ingredient of successful pasture management. Flexibility in stocking recognizes that forage production varies from year to year and is, therefore, a standard practice necessary to maintain high production.

**Example Situations**

**Example No. 1**

Beef producer in Eastern climatic area needs a highly productive 40-acre pasture to graze cow-calves from mid-May to early September. Prefers grass mixture and wants to keep fertilizer costs at a minimum. Wants peak production. Soil test shows 30 lbs nitrogen, 20 lbs phosphorus and 300 lbs potassium. No fence is evident, but water supply is good. Field has had history of Canada thistle problem. Practices needed:

- \*Seed adapted pasture species
- \*Fence or cross-fence
- \*Smooth bromegrass
- \*Intermediate wheatgrass
- \*Pasture alfalfa
- \*Seed on fully prepared seedbed
- \*Seed with companion crop
- \*Seed in early spring
- \*Inoculate seed
- \*Apply phosphate
- \*Control weeds
- \*Graze in proper season
- \*Install rotation grazing system
- \*Allow flexible stocking

**Example No. 2**

West Central area producer wants to convert oats field to early spring pasture for calving and rapid growth on calves. Stubble is standing and appears weed free. Producer does not like crested wheatgrass and has had so many problems with bloat that he doesn't want to risk alfalfa. Field is 80 acres in size and has an uncrossable gully caused by runoff from above. Field is without water. Soils are too low in nitrogen and phosphorus for peak yields. Weeds are not expected to be a problem. Practices needed:

- \*Treat gullies
- \*Construct diversion structure
- \*Seed adapted pasture species
- \*Provide livestock water
- \*Fence or cross-fence
- \*Russian wildrye
- \*Seed in undisturbed stubble
- \*Seed in fall
- \*Apply nitrogen
- \*Apply phosphorus
- \*Graze in proper season
- \*Allow flexible stocking

**Example No. 3**

Producer in East Central climatic area wants to restore productiveness to existing bluegrass meadow, but needs to hold fertilizer costs down. Plans to get limited grazing during restoration. Soil test shows nitrogen at 15 lbs an acre, phosphorus at 60 lbs, and potassium at 175 lbs. Weeds are not a problem. Fencing and water supply are adequate. Practices needed:

- \*Seed adapted pasture species
- \*Pasture alfalfa
- \*Interseed with legume
- \*Seed in early spring
- \*Inoculate seed
- \*Graze in proper season
- \*Allow flexible stocking

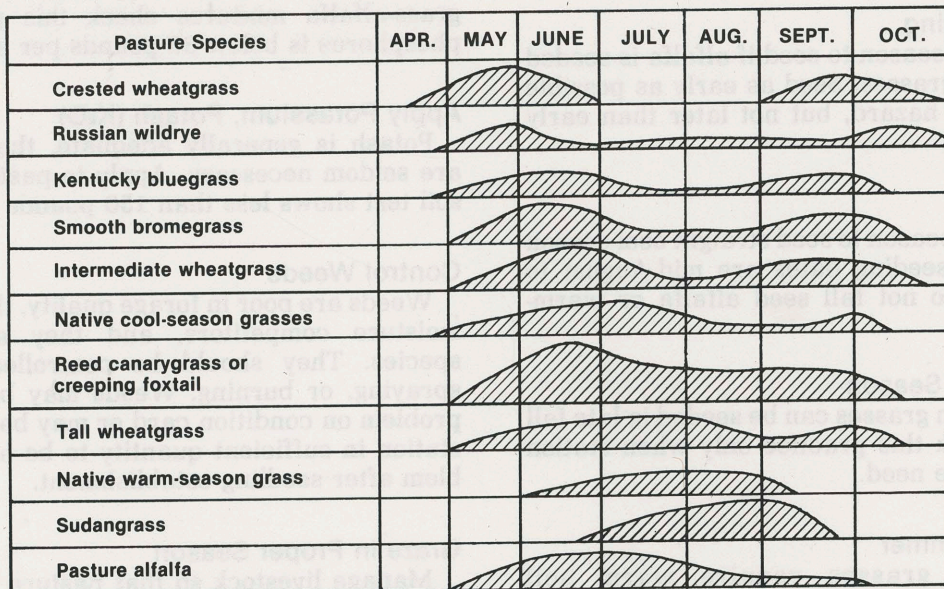


Fig 8. Pasture calendar showing periods of high forage production and corresponding best seasons for grazing use.

**Example No. 4**

Producer in southern part of Western climatic area has purchased some yearling steers he would like to put on temporary pasture before he sells in late October. Field is 120 acres of good farm ground; it is fenced, but water will have to be supplied. He needs peak production. Soil test shows deficiency in nitrogen. Weeds are not a problem. Practices needed:

- |                                      |                          |
|--------------------------------------|--------------------------|
| *Seed adapted pasture species        | *Apply nitrogen          |
| *Provide livestock water             | *Graze in proper season  |
| *Sudangrass or sudan sorghum hybrids | *Allow flexible stocking |
| *Seed on fully prepared seedbed      |                          |
| *Seed in early summer                |                          |

Range sites, and some key plants	Key to native grasses of South Dakota, slide-tape number 275	Audio-Visuals Section, Ag Information Office, SDSU, Brookings, SD 57007, Ph. 688-4187
Range plant identification	South Dakota grasslands-a photographic study, Bulletin 566 (\$3.00)	County Extension Offices or Bulletin Room, Ag Publications, SDSU, Brookings, SD 57007, Ph. 688-5628
Pasture & range plant identification and uses	Identification of 22 grasses common in SD, FS 600	Same
Same	Cool season grasses for early spring and fall, FS 546	Same

---

**Additional References**

Subject	Study Aid	Source		
Range sites	"South Dakota range sites," An SDSU/SCS color publication available by 1980	Conservation District Offices; county Extension Offices; and the Bulletin Room, Ag Publications, SDSU, Brookings, SD 57007, Ph. 688-5628	Same	Warm season grasses for July and August, FS 548
			Same	Grasses for special purposes, FS 549
			Land capability factors	Land judging in South Dakota, FS 563

EC 731  
September 1979

Cooperative Extension Service  
South Dakota State University  
U.S. Department of Agriculture

