

AG-FO-0443--1983

MANAGEMENT OF CROPS AND SOILS
IN NORTH CENTRAL
AND NORTHEASTERN MINNESOTA
CORRESPONDENCE COURSE

UNIVERSITY OF MINNESOTA
LIBRARIES

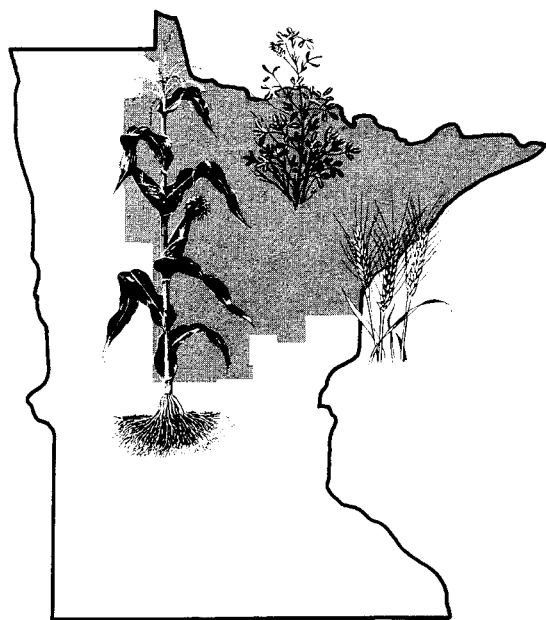
JUL 20 1987

ST. PAUL CAMPUS
LIBRARIES

Unit 6— Managing Pastures for Productivity

Purposes

- Recognize the management principles that influence pasture productivity.
- Determine the pasture species best suited for your grazing program.
- Determine the pasture management practices best suited to your needs and situation.



PASTURE CATEGORIES

Approximately 15 percent of Minnesota's farmland is classified as some type of pasture. The north central and northeastern regions consist of a significant portion of pasture acreage. Forage crops grown for consumption by grazing livestock provide highly digestible nutrients for 5 to 6 months, supplying a cheap, homegrown feed for a significant portion of the year. A typical grazing season in this region should last from May 20 until October 15, or 148 days. Fall grazing can be extended beyond October 15 during years of late snow cover if a pasture management program has been designed for grass growth to accumulate for October and November grazing.

Grazing pasture land with livestock minimizes annual labor and harvest costs. It also allows for use of lands not suited to continuous row cropping due to severe hazard of soil erosion. Pasture can be broadly classified into three categories: permanent pasture, cropland pasture, and emergency pasture.

Permanent Pasture

Permanent pasture is composed of perennial grasses and legumes that are maintained indefinitely for grazing. These pastures are naturally seeded, are established by man, or are a result of the occupation of abandoned, cultivated fields by forage plants. Many permanent pastures in northern Minnesota contain cool season grass species such as Kentucky bluegrass, red top, and quackgrass.

Permanent pastures are best suited for steep, erodible soils, subirrigated lands, rocky lands, soils with low productivity potential, and partially wooded land. Some grazing lands in northern Minnesota designated as rangeland fit this definition of permanent pasture.

Cropland Pasture

Cropland pasture is composed of legume-grass, all-grass, and all-legume pastures of improved species grown at varying intervals and for varying lengths of time on land suitable for continuous or intermittent crop production. Much of the cropland pasture in northern Minnesota is composed of thinned out, grass-legume hay fields or legume-grass or all-grass regrowth after one cutting of hay. Cropland pasture often is managed with more intensity than is permanent pasture.

Emergency Pasture

Emergency pastures are used to a limited extent in northern Minnesota. Such pastures are seeded to annual crops to provide supplemental forage during drought periods or under other emergency conditions. Hybrid sudangrass, sorghum-sudangrass, small grain crops, or annual forages such as annual sudangrass or rape have been used for emergency pastures. Annual seeding costs often result in high pasture costs, thus limiting or eliminating the profitability of these alternatives.

PASTURE PROBLEMS

Pastures in northern Minnesota are producing at 30 percent of potential at best. Cooperators on the Northern Minnesota Beef Demonstration Project improved carrying capacity and beef production per acre threefold. Limited productivity is associated with at least four problems: 1) moisture deficiencies during midsummer, 2) low soil fertility, 3) weed, insect, and disease infestations, and 4) overgrazing and grazing at the improper time.

PASTURE IMPROVEMENT

Pastures should be managed to provide the best use of soil, plant, and animal resources. Pasture management is the use of one or more of the following five principles: 1) evaluating pasture acreage to determine yield improvement potential, 2) eliminating or restricting grazing of undesirable plants, 3) improving soil fertility, 4) selecting adapted and high yielding plant species, and 5) managing grazing appropriately.

Determining Yield Improvement Potential

Good pasture management involves being able to feed livestock with forage species grown in a pasture, plus maintaining the desirable forage plants over several seasons to protect the soil from loss by wind or water erosion. All categories of pasture (permanent, cropland, or emergency) should be evaluated for yield potential. Consider soil type, land capability, fertility level, and potential moisture supply. Do not attempt to improve "poor risk" pasture acreages that are too wet, too droughty, too rocky, or otherwise unsuitable. *Pastures with little potential for yield improvement should be grazed with fewer animals, fertilized to maintain dominant perennial species, and selectively sprayed to control undesirable weeds.*

Restricting Grazing of Undesirable Plants

Undesirable forage plants are those not palatable to livestock (not eaten when animals are offered a choice of several species) or poisonous plants. The most common poisonous plants in the north central and northeastern region include bracken fern, field horsetail, water hemlock, buttercups, and orange hawkweed. These perennial weeds often occur in fields previously cleared or partially cleared of trees. They reduce animal performance when consumed or may even cause death if consumed in large enough quantities. Animals eat bracken fern when other pasture plants are short or exhausted. Many animals have been killed when forced to eat large quantities of bracken fern.

These undesirable plants should be eradicated by spraying herbicides, or they should be fenced away from grazing livestock. Because the species are perennial, control with herbicides requires spraying twice per year in combination with fertilizer to encourage growth of desirable plants. *Spraying and fertilization treatments must be repeated for several years to be effective.*

Improving Soil Fertility

Pastures often have a low fertility level. Lime, nitrogen, phosphorus, potassium, and sometimes sulfur are needed to support growth of improved forage plants. A soil test should be taken so you know which nutrients are needed and whether lime is required. *Remember:* lime should be applied only if you can work it into the soil. Cool season grasses, which dominate many permanent pastures, respond dramatically to nitrogen and also to phosphorus and potassium fertilizers if they are needed. Nitrogen can be used to encourage seasonal production; early spring applications improve growth in June; midsummer application encourages fall growth.

Fertilization should be used to maintain desirable grass and legume species in permanent pastures. It also is used in cropland pastures to maintain seeded species and support additional productivity. Legume-grass mixtures that contain greater than 35 percent legume should be fertilized for maintenance and productivity of the dominant legume.

Important: Don't just lime and add fertilizer to your pasture. Soil test first so you will know whether lime, phosphorus, potassium, or sulfur are needed. There is no soil test for nitrogen, so the following amounts are recommended for predominantly grass pastures:

- under rotational grazing: 100 to 150 pounds actual N per acre (300 to 400 pounds of 33-0-0).
- under continuous grazing: 75 to 100 pounds actual N per acre (200 to 300 pounds of 33-0-0).
- on sandy soils, steep slopes, or droughty soils: 30 to 50 pounds actual N per acre (100 to 150 pounds of 33-0-0).
- on organic soils: 50 pounds actual N per acre (150 pounds of 33-0-0).

For best utilization by the plant and more uniform growth throughout the season, it is better to split the nitrogen applications.

Selecting High Yielding Species

Adapted high yielding species should be selected to fill production shortages of permanent pastures, particularly in July and August. Selection should be based on soil drainage, soil capability, soil fertility, grazing management used, and desired length of stand life. The fast growth rates associated with these species will result in the problem of not being able to graze all forage with a constant herd size. Forage species of this type include orchardgrass, smooth brome grass, reed canarygrass, and tall fescue. The excess growth can be harvested for hay. These species require renovation for establishment and may require periodic harvest. We suggest their use on land capable of supporting cropland pasture.

Managing Grazing Appropriately

Animal performance, plant persistence, forage yield, and feed waste are all influenced by grazing management. Grazing management involves two grazing methods—continuous and rotational grazing. With continuous grazing, animals remain on a pasture throughout the grazing

season; rotational grazing provides for animals alternating among two or more pastures throughout the season. This method allows plants periodic rests during the season.

The advantages of rotational grazing over continuous grazing depend on grazing pressure. Grazing pressure is the amount of forage an animal consumes per day. Stocking rate (number of animals per acre) and plant growth rate influence grazing pressure.

During the early spring when forage growth is rapid, a constant stocking rate allows pressure to be low. Grazing pressure increases later in the season as plant growth rate slows.

Researchers often add or remove cattle from pastures during a grazing experiment based on plant growth rate. *Farmers can regulate grazing pressure by varying the pasture size or mechanically harvesting forage during periods of excessive growth.*

Animal Performance. Grazing pressure influences animal performance. A low grazing pressure produces high daily animal gains, but low gain per unit of land area. Thus, for cows milking or for finishing yearlings, a low grazing pressure is preferred because high animal performance is needed. When cows have been bred later in the season and milk production is low, a high grazing pressure is preferred.

Plant Persistence. The kind of legume and grass in your pasture is influenced greatly by grazing management. Tall growing species may become dominant under light grazing when considerable vegetative growth is allowed to accumulate. They may be eliminated under heavy continuous grazing. Heavy continuous grazing favors growth of low growing species such as Kentucky bluegrass or white clover. The effect of grazing is less harmful to plants when they are allowed to reach their normal growth before being grazed.

Grass species best suited to rotational grazing with light grazing pressure are orchardgrass, tall fescue, smooth bromegrass, and reed canarygrass; the best suited legumes are alfalfa and red clover. Birdsfoot trefoil is an intermediate legume that is suited to rotational or particularly to later grazing because it remains palatable at advanced stages. It also will tolerate more continuous grazing than alfalfa or red clover if some top growth remains during grazing.

Rotational grazing provides plants a rest during the season. *Alfalfa and red clover require periodic 30- to 35-day rests during the grazing season for maximum persistence in a mixture with grass.* Various rotational grazing methods have been researched. Use of one of the following methods should be based on the species in your pasture and your desired carrying capacity:

- one group of animals rotates between pastures.
- two groups of animals rotate through a pasture.
- forward creep (calves or lambs graze ahead of mothers to select best forage).
- strip (rotate strips each day).
- stockpile (graze forage that has been allowed to grow longer than normal).

Forage Yield. Yields of forage plants from pasture are affected by excessive and untimely grazing. Palatability (acceptability) is an important consideration when grazing. Palatability often results in rejection by animals of certain grass species such as orchardgrass and reed canarygrass when they reach advanced stages of maturity before being grazed. Selectivity by animals results in some grasses being grazed short and others growing to full maturity. Selectivity by animals can be reduced by starting grazing of these grasses at early, immature stages and stocking the pasture with enough animals to consume forage close to its growth rate. Grazing at earlier stages of maturity results in more frequent removal than under hay cutting management, thus reducing yields. With tall growing grasses the yield reduction usually is only about 20 percent of hay yields if periodic rests are allowed.

Grazing at the wrong time can reduce yield more than a lack of periodic rests between grazing. *Grazing too early in the spring, before substantial leaf area develops, severely reduces yield. It may result in plant death if done continuously.*

THE BEST SPECIES

The preceding discussion describes what pasture management involves and provides background for managing plants, soils, and animals. The next step is to decide which pasture species is best suited for your farm. The grazing management you intend to use and the carrying capacity (animals per acre) you want to have determine which species is best.

Most unimproved permanent pastures in this region will carry one animal unit (a mature 1,000-pound animal at maintenance) on 3 to 5 acres. This depends on soil capability, rainfall, and the amount of open pasture (pasture without tree cover). Improved pasture systems (those with two or more pastures containing two or more adapted high yielding species) can support an animal unit on 1.2 to 2.0 acres.

If you have enough acres to support your livestock with one animal unit on 3 to 5 acres, *no species change is needed.* If you want to improve your carrying capacity, you must follow these four steps to develop a pasture system plan: 1) determine seasonal animal needs, 2) determine carrying capacity of each pasture, 3) match animal needs to plant supply, and 4) select species, fertilization, and grazing methods to fill shortages.

Management Options to Fill Shortages

Several options can be used to fill seasonal production gaps or extend the grazing season. These options are: 1) fertilizing, particularly with nitrogen, existing grass pastures, 2) utilizing regrowth from legume-grass hay fields, 3) establishing a species with drought tolerance, particularly alfalfa, or a species with similar peak production to fill midsummer slumps, 4) establishing another species to extend the grazing season, or 5) utilizing a grazing pro-

gram in which you can accumulate growth for summer or fall grazing. You can use any cool season grass except timothy that is harvested for first cutting hay and then fertilized with 50 to 75 pounds per acre of N so regrowth accumulates. With orchardgrass in high rainfall portions of the region, two early cuts of hay can be taken before allowing for full accumulation.

Glossary of Terms

Animal unit month: A standardized unit of feed required to maintain the body weight of a mature animal weighing 1,000 pounds.

Carrying capacity: The number of animals that a given area of pasture can support with feed.

Continuous grazing: A grazing method in which livestock remain on a given pasture acreage continuously throughout a grazing season.

Cropland pasture: Land that has average or above soil fertility and can be plowed continuously or intermittently without loss of soil from water erosion.

Emergency pasture: Land that is planted to an annual crop for grazing the same year after an emergency such as drought, hail damage, or winterkill.

Forward creep grazing: A grazing method that allows animals requiring high performance such as calves or lambs to graze immature, succulent plants before mature mothers graze.

Grazing pressure: The amount of forage plant an animal consumes while grazing each day. (The more animals the more pressure there is.)

Legumes: Plants with the characteristic of forming nitrogen-fixing nodules on their roots, which enables them to use atmospheric nitrogen.

Palatability: The degree to which livestock select or accept plants when given a choice of several plants. (How much they like what they're eating.)

Permanent pasture: Land that is used by grazing livestock for many years and is not suitable for intermittent tillage or cropping. Acreages of this type of pasture should be confined to soils of least productivity on a farm.

Persistence: The ability of a perennial plant species to maintain itself in a mixture for more than three years.

Rotational grazing: Grazing a given acreage at different times, allowing periodic rest periods for plant recovery growth. The term applies to grazing between two or more pastures or moving cattle within two or more parts of one pasture.

Stocking rate: The number of animals grazing within a unit of land area.

Strip grazing: A grazing method that allows strips or small areas within a pasture to feed livestock for short periods of 1 to 5 days.

Subirrigated soils: Soils with a high water table during most of the growing season. These soils often are referred to as bogs.

Authors: N. P. Martin, extension agronomist; W. E. Fenster, extension soils specialist; G. R. Chambers, county extension director, Aitkin County; and J. D. Radford, area extension agent, Small Farm Programs.

Issued in furtherance of cooperative extension work in agriculture and home economics acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Patrick J. Borich, Dean and Director of Minnesota Extension Service, University of Minnesota, St. Paul, Minnesota 55108. The University of Minnesota, including the Minnesota Extension Service, is committed to the policy that all persons shall have equal access to its programs, facilities, and employment, without regard to race, religion, color, sex, national origin, handicap, age, veteran status, or sexual orientation.

Managing Pastures for Productivity

Please fill out and return

Name _____

Address _____ County _____

1. List the acreage and forage species you use for grazing livestock on:

permanent pasture

cropland pasture

emergency pasture

2. Do you spread fertilizer or manure on your pastures? ____ Yes ____ No.

If yes, list the pounds of plant food spread per acre on each pasture that is fertilized or has manure spread on it.

3. Describe your grazing management program by explaining your grazing method, carrying capacity, and grazing time by pasture category.

4. Are you satisfied with your animal performance while grazing your pastures? ____Yes ____No. If no, list the number and type of animals grazing and estimate their size. Then describe your dissatisfaction (for example, too many open cows, poor milk production, or low average daily gain of cows, calves, ewes, or lambs).

5. Are you satisfied with your pasture management skills? ____Yes ____No. If no, describe the changes you want to make. If yes, describe those principles you are using that are effective for you.

6. Please list any questions you have about managing your pastures to meet your productivity goals.

The following material also is available on request. Please check those you would like to receive.

- Broadleaf Weed Control in Grass Pastures*, AG-FO-0923
- "Maximizing Animal Performance on Pastures," *Proceedings of Minnesota Forage Day—Growing and Conserving Energy*, 1981, pages 39-44, Minnesota Forage and Grassland Council
- "Management for Maximum Carrying Capacity," *Minnesota Forage UPDATE*, Vol. VII, No. 2, page 3