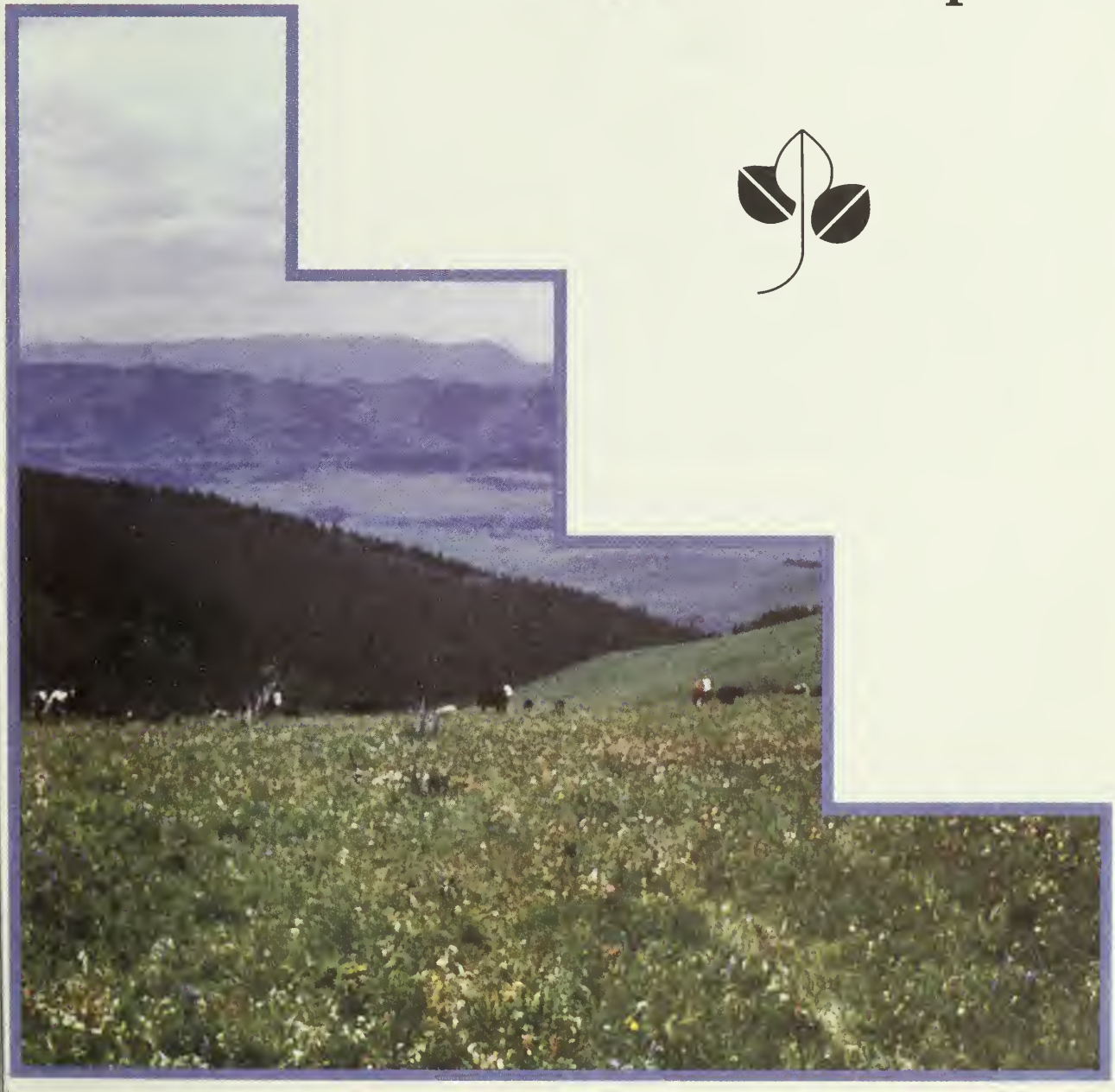
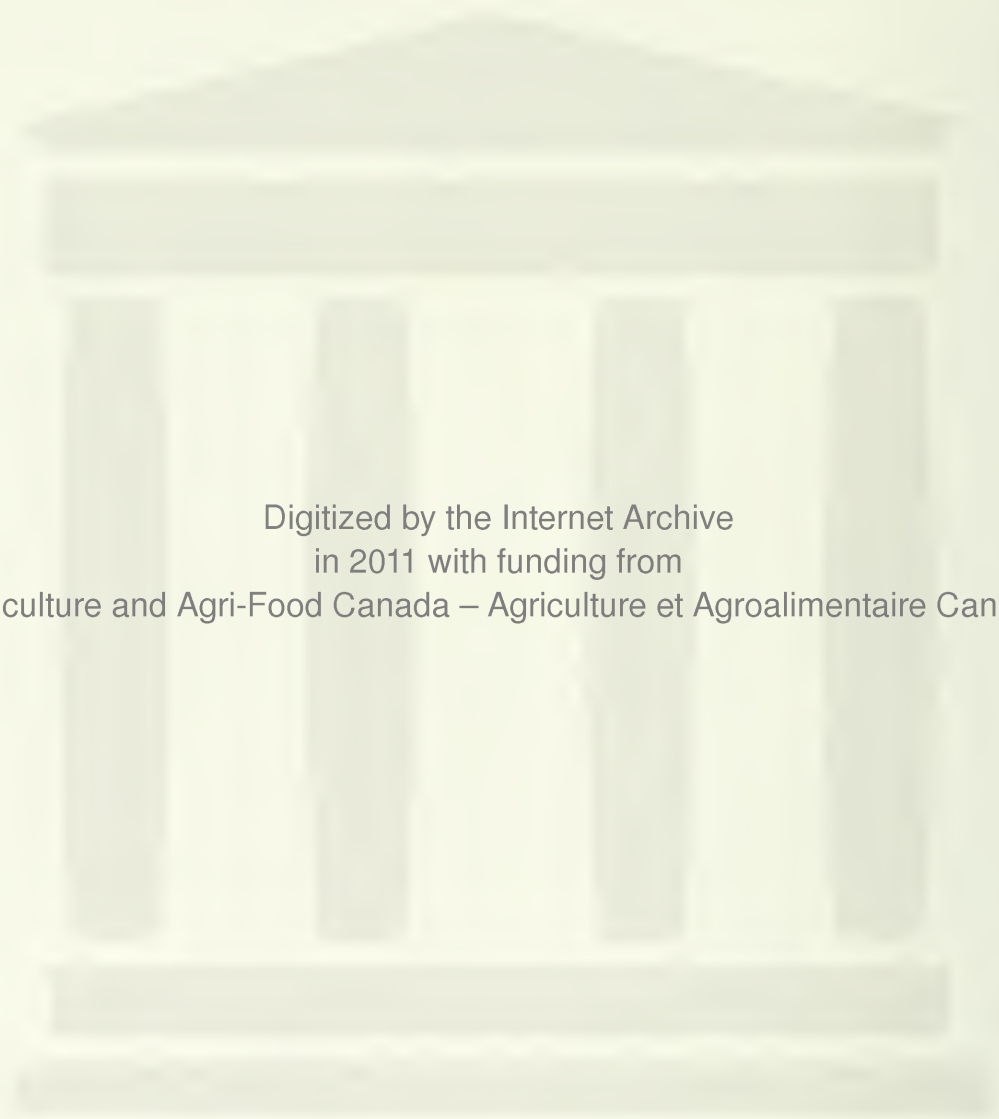
Agriculture
Canada

Publication 1883/E

Grazing management of native grasslands

Handbook 1
Foothills fescue prairie





Grazing management of native grasslands

Handbook 1
Foothills fescue prairie

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Agriculture Canada Publication 1883/E
available from
Communications Branch, Agriculture Canada
Ottawa, Ont. K1A 0C7

Cat. No. A53-1883/1992E ISBN 0-662-19816-6
Printed 1992 3.5M-11:92

Produced by Research Program Service

Également disponible en français sous le titre
Gestion du pâturage dans les herbages naturels
Manuel nº1 : Prairie à fétuque des avant-monts des Rocheuses

Contents

Foreword

Native grasslands occupy about 13.6 million hectares in the Prairie Provinces, including 6.5 million ha in Alberta, 5.4 million ha in Saskatchewan, and 1.7 million ha in Manitoba. Native grasslands are managed primarily for grazing by livestock, but they also provide a resource for recreation, wildlife, and watershed management. This publication is the first of a series intended to assist farmers and ranchers to better understand the characteristics and potential of native rangeland. The grasslands are easily damaged by abuse. Recovery of the vegetation can take 30 years or more, and eroded soils require several hundred years to recover. This series of publications describe the vegetation and soils of specific native grassland types and contain information that emphasizes management for conservation and for improved beef production.

Foothills fescue prairie
Elevation: 760+ m
Rainfall: 46–56 cm, most in June
Soil: Thin Black Chernozem
Production (good condition): 2800 kg/ha
Stocking rate (good condition): 0.61 ha per animal unit* per month

* One animal unit is the equivalent of a 454-kg cow, with or without a calf.

Introduction

The prairie consists of many species of grasses, forbs, and shrubs, each competing for space and survival. The ability of each species to compete varies according to its resource requirements, growth characteristics, and ability to avoid stress from drought or grazing. These conditions are not uniform across the prairies, which leads to differences in the competitive relationships among plant species and in species composition from site to site. Grazing can have a great effect on the competitive relationships among species and changes the composition of grasslands.

The foothills fescue prairie occupies the northwestern edge of the Northern Great Plains (Fig. 1) and sites with high elevations throughout the prairies, such as the Cypress Hills and Milk River Ridge, Alta. This prairie rangeland is named after rough fescue (Color fig. 1), the dominant grass and one of the most productive species on the prairies. The rough fescue species in the foothills is tufted with a fibrous root system, unlike the species in the parklands, which is tufted but has rhizomes.

The foothills fescue prairie exists because the region has enough water to support the large, deep-rooted, rough fescue plants but is usually too dry to support trees. In the past, grazing by large herbivores and burning the grasslands may have kept trees from encroaching. Aspen poplar now tends to invade the grassland, thereby reducing forage production. Selective burning, mowing, and dragging, the careful application of herbicides, and controlled grazing can keep aspen in

Fig. 1 Distribution of the foothills fescue prairie in Alberta and Saskatchewan.

check. However, as the climate changes, the areas occupied by trees also shift. In dry periods the trees may die back, and in wet years they can advance onto the grasslands.

Most of the foothills fescue prairie has not been cultivated because of hilly terrain or difficult access. Consequently, grazing by livestock is the primary agricultural activity on those areas. However, the fescue prairie is valuable also for nonagricultural uses that include recreation, wildlife production, and watershed management. Each of these uses depends on range that is in good condition.

The vegetation and soils have developed over hundreds of years to reach an equilibrium with the climate and the animals of the region. The soil is classified as thin Black Chernozem (Color fig. 2), but its depth varies considerably from site to site. The prairie is sustained by rainfall and by small quantities of nutrients from the atmosphere. It is not surprising, therefore, that the plant community is efficient at using the limited and uncertain supply of water, as well as recycling the limited nutrients with the help of a large root system. In fact, belowground plant matter is at least seven times more abundant than that above the ground on native prairie and about twice as abundant on seeded pasture. Although cultivated dryland crops may produce more, the prairie offers greater stability in annual forage production and requires no input other than careful planning of grazing activities. The value of native prairie to agriculture is in its low forage cost; the primary goal for managing native prairie should therefore be to conserve it.

The foothills fescue prairie offers good grazing in spring and summer, producing forage at a rate of about 2800 kg/ha. To maintain the range in good condition, only about half of that should be grazed. This does not mean that 1400 kg are available for livestock, because a significant proportion is lost to trampling, weathering, and other herbivores. On grassland that is grazed all season, about 40 kg of forage disappeared for each day per cow–calf pair, although the expected consumption was about 15 kg. The amount of forage disappearing, per cow–calf pair, decreased as grazing pressure or stocking density increased.

Although many species contribute to forage yield, on good range most forage comes from rough fescue, which dominates the grassland. Rough fescue is readily damaged by grazing during the growing season (Fig. 2) but resists damage when grazed after dormancy. As a result, it is more productive when grazed while dormant.

Fig. 2 Rough fescue plants clipped every 4 weeks at a decreasing height of stubble. (Reprinted with permission of the Canadian Journal of Plant Science. See A. Johnston, 1961, Can. J. Plant Sci. 41: 615–622.)

Plant species

Rough fescue

Rough fescue is the "queen of the grasses," an epithet that is deserved because of its high production, quality, and value as winter feed. Named for the rough texture of its leaves, rough fescue is a hard grass that cures well in the field, attaining a crude protein content of about 6% in September. It begins growth early in spring and usually is ready to graze by mid May. Most growth is completed by July. This species is the tallest grass on the foothills fescue prairie and has a deep root system that enables it to maintain good production during short-term water deficits. It has few flowering stems, which reduce palatability to livestock, but is less readily grazed during the growing season than some other grasses. Rough fescue grows best on well-drained sites with ample moisture and deep soils.

Parry oat grass

Parry oat grass is a soft grass with a higher crude protein content than rough fescue throughout the summer (Color fig. 3). By September the crude protein is about 7%. However, Parry oat grass starts growing and matures about 2 weeks later than rough fescue; it is a much shorter grass, the plants produce less than half the forage, and weathering losses are greater during fall and winter. Parry oat grass is utilized readily by cattle and is more resistant to grazing during the growing season than rough fescue. In fact, Parry oat grass yields more when grazed two or three times during the growing season than only once in late summer. It grows best on warm, well-drained soils with a southern exposure. Therefore, on dry sites or on sites having high grazing pressure, Parry oat grass is more abundant than rough fescue.

Other grasses and forbs also produce forage. With season-long grazing in summer, about 0.61 ha are required to support one animal unit for 1 month while maintaining the range in good condition. However, this stocking rate conserves the fescue prairie but results in patchy grazing and low grazing efficiency. Grazing efficiency can be increased by applying a suitable grazing system or by delaying grazing until fall or winter.

Grazing management is intended to conserve the prairie and produce beef profitably. Proper management of the fescue prairie requires careful consideration of the current condition of the range, stocking rates, time of grazing and rest, and grazing systems.

Range condition

Range condition is a useful indicator of range health and of the productive potential of the rangeland. Range condition is measured by comparing the present state of the vegetation with the climax or original vegetation at the range site to determine if any deterioration in the plant community has taken place. The climax stage is the characteristic plant community that develops under a specific climate and with a specific kind of soil without livestock grazing or other unnatural disturbances. Species composition is relatively stable because the plant community can perpetuate itself.

Range condition is ranked in four classes: excellent, good, fair, and poor (Color figs. 4–7). The closer a grassland resembles the climax stage, the better the range condition. Grazing animals affect range condition. Frequent, intense grazing that leaves too little carryover causes range condition to decline. Palatable forage plants experience heavier use than those that are less palatable, and the more productive tall plants are used proportionately more than the less productive short plants.

Range condition[1] is determined by estimating the composition of decreaser, increaser, and invader species. Only increaser and decreaser

[1] For a detailed analysis of range condition, consult the *Guide to Range Condition and Stocking Rates for Alberta Grasslands* (see "Suggested reading").

Table 1 Examples of range condition on the foothills fescue prairie

Forage production	Stocking rate	Species	Type
		Excellent	
2250–2700 kg/ha	0.51 ha/AUM*	rough fescue	decreaser
		Parry oat grass	increaser
		Idaho fescue	increaser
		Good	
2000–2800 kg/ha	0.61 ha/AUM	rough fescue	decreaser
		Parry oat grass	increaser
		Idaho fescue	increaser
		Fair	
1500–2800 kg/ha	0.73 ha/AUM	Parry oat grass	increaser
		Idaho fescue	increaser
		rough fescue	decreaser
		sedges	increaser
		forb increasers	increaser
		Poor	
600–2700 kg/ha	1.00 ha/AUM	sedges	increaser
		bluegrasses	invader
		dandelion	invader
		other invaders	invader

* AUM = animal unit month, i.e., per animal unit per month.

species contribute directly to range condition. Invader species contribute indirectly in that they make up part of the total composition, but their contribution is not added to the estimate. As such, range condition is based on native species, not those introduced.

Decreaser species

Decreaser species are dominant on rangeland whose condition is excellent or good. As the name suggests, decreasers decline as grazing pressure increases. They tend to be deep-rooted species, and are also the largest and most productive. They are likely to be overused by grazing animals because they are palatable and have a high forage value.

Increaser species

Increaser species are dominant on rangeland that is in fair condition. These species tend to be shallow-rooted and resistant to grazing because of their short stature and their efficient reproduction. They increase with grazing pressure but eventually decline with very heavy grazing.

Invader species

Invader species are introduced species that are often weedy; they might also include forage grasses. In each case, invaders are opportunists that are not native to the climax plant community. Because they often have little or no grazing value, and because prolonged heavy grazing pressure is required for their invasion, their presence indicates a decline in range condition.

Stocking rates

Stocking rates determine livestock demand on the forage resource. It is important not to graze everything but to leave carryover, or dead plant material, into the next year. The carryover consists of litter that protects the soil surface from extreme temperatures, conserves water by reducing evaporation, and provides emergency feed in years when production is low. Leaving a portion of the grass leaf and stem also ensures uninterrupted growth because the plant continues to capture energy and fix carbon during the growing season, thereby providing stored energy in the plant stems to help keep the plant healthy during the dormant season. Although beef production per hectare increases with higher stocking rates, gains per animal, forage production, stability, and soil quality all decrease. The foothills fescue prairie supports a higher stocking rate if grazed in fall or winter.

Grazing interval

Time of grazing and rest determine the stage of growth at which the plant is grazed and the opportunity for it to recover. Grazing the plant at any time during the growing season affects its energy balance. During dormancy, the plant is kept alive from stored energy. If the energy reserves are too low, the plant may die during winter or start growth from a weakened position in spring. Grazing should be delayed in spring to allow the new leaves to develop sufficiently so that new growth is not dependent on stored reserves but can continue from the energy captured only by the leaves. How much leaf is necessary for maintaining a healthy plant after grazing depends on the stage of plant growth and on how long the plant rests following grazing. The plant's

Color fig. 1 Rough fescue.
Color fig. 2 Black soil typical of foothills fescue prairie.
Color fig. 3 Parry oat grass.

Color fig. 4 Foothills rough fescue range in excellent condition.
Color fig. 5 Foothills rough fescue range in good condition.
Color fig. 6 Foothills rough fescue range in fair condition.
Color fig. 7 Foothills rough fescue range in poor condition.

greatest energy need is in the spring, before new leaves appear, and when seeds are developing. Many grasses are therefore particularly susceptible to heavy grazing in spring and again at flowering, in summer.

The buffalo bean (Color fig. 8) is an indicator of when to graze. A rule of thumb is that the range is ready to graze in spring when the buffalo bean is in bloom; coincidentally, blooming buffalo beans also indicated to native Indians when the buffalo were fat enough to kill.

Grazing systems

Grazing systems (Figs. 3–5) are tools for managing the time and distribution of livestock on range and for balancing livestock needs with those of the range vegetation. Controlled livestock grazing provides plants with periods of rest and the opportunity to recover after grazing. Grazing systems include one or more fenced pastures and a plan of when each should be grazed and rested.

Continuous grazing

One field is grazed for an entire season. Although this approach requires the minimum fencing and management, it contributes to serious problems in the foothills fescue prairie. Cattle graze selectively. They avoid certain plants or sites and prefer others, which are grazed and regrazed. In time, the range becomes "patch grazed," with some portions overgrazed and others undergrazed. Although careful attention can be given to the location of watering sites and the presence of salt, uniform use is impossible to achieve without resorting to heavy grazing pressure.

Deferred rotation grazing

Grazing is delayed on one or more fields until a critical growth stage of the plant is passed so that grazed plants regain vigor, set seed, store energy reserves, and allow new seedlings to become established. At least one field can be grazed at the normal start of grazing in spring. With two or more fields in a deferred rotation, the early grazing period is alternated among fields from year to year. It is usually best to have more than two fields in rotation so that in each rotation, grazing on any field is delayed for two consecutive years. This schedule allows 1 year for seed set and the next year for seedling establishment. Deferred rotation also improves grazing efficiency by controlling the distribution of cattle on rangeland with fences, by reducing the problem of regrazing regrowth by shortening the time that plants are exposed to grazing, and by forcing more uniform distribution of use within a field with increased animal density.

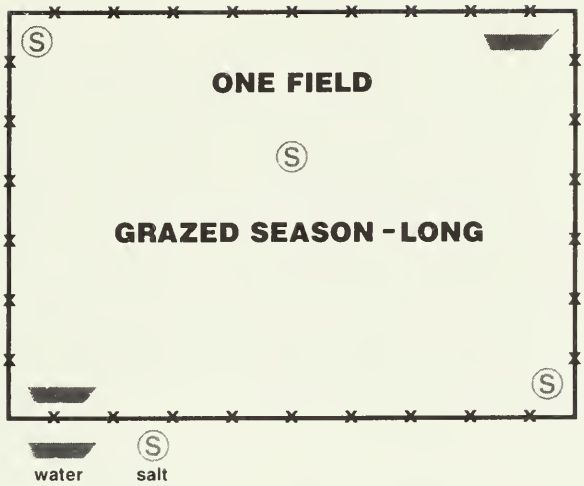

Fig. 3 Continuous grazing systems.

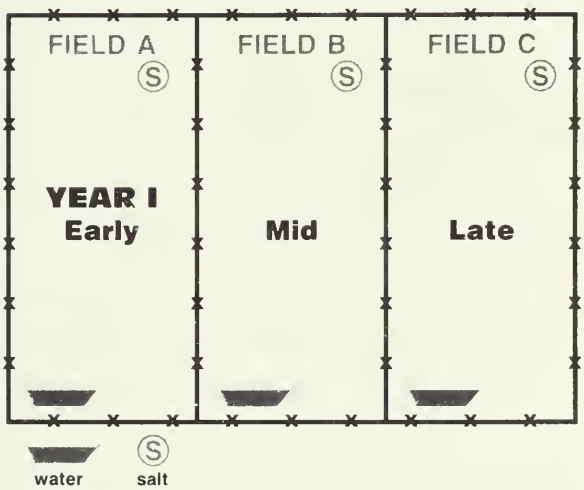

Fig. 4 Deferred-rotation grazing system.

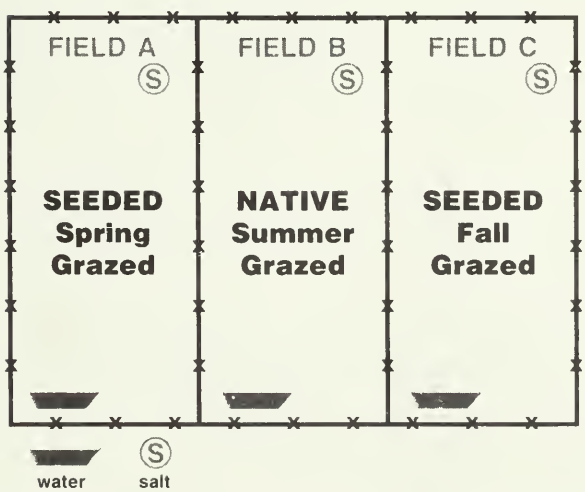

Fig. 5 Complementary grazing system.

Complementary grazing

Both seeded pasture and native range are grazed in a way that benefits both the livestock and the pastures. A seeded pasture might be used to defer grazing on native rangeland in spring, to provide supplementary grazing in summer, or to extend grazing on higher quality forage in fall. Complementary grazing for fescue prairie is best achieved by using seeded forages for spring and summer grazing, followed by native rangelands for fall and winter grazing. This approach builds in permanent deferral of grazing in spring and during flowering when plants are most vulnerable, promotes good range condition, and uses the full growth potential of fescue prairie.

Intensive-rotation grazing systems

A large number of fields (16 or more) are grazed in rotation, one at a time. How long livestock are kept in a field depends on the rate at which the plants are growing. During periods of rapid growth, the animals are kept in a field for as little as one day, whereas after the plants have matured, animals may graze in a field for about 10 days. The length of rest for each field is determined by the length of grazing allowed in each of the remaining fields. Consequently, for a 16-field grazing system, the period of rest is as short as 15 days in the first rotation, when the plants are growing rapidly, and as long as 150 days in the last rotation, after growth has stopped. In a 16-field system, three grazing rotations of 1, 4, and 7 days for each field provides grazing for about 6 months. Of course, the time each field is grazed is not fixed but must be kept flexible to allow for differences in growth.

This system causes high animal density and allows better control of when and where the animals are going to be in a given area. This approach can markedly improve grazing efficiency and even carrying capacity, but it exposes the rancher to greater financial and ecological risk because of the greater financial investment and the need for producing more livestock. It requires careful monitoring of range readiness and condition; failure to move livestock at the correct time can result in overuse, impaired livestock production, and damage to the forage and soil resources.

Overgrazed rangeland

Too many animals in an area cause overgrazing and reduce production from individual animals, although combined production from all animals may be high. In addition, forage production is reduced and unstable from year to year. As a result, the grazing period varies, depending on the availability of forage, and flexibility in management decision-making is lost.

In time, grazing is restricted to summer only because the species that replace rough fescue on poor rangeland grow late in spring and are not suitable for use in fall and winter.

Aside from reducing forage production, overgrazing severely diminishes the value of the range for watershed, wildlife, and recreation as the climax species, carryover, and soil cover are lost or reduced. As vegetative cover is lost, less organic matter is added to the soil, and topsoil is lost by wind and water erosion. The consequence is thinner soils and reduced potential for producing forage. In effect, drought is created by human activity.

Recovery of overgrazed land is costly. It may take more than 20 years of severely reduced stocking rates to bring the rangeland back to good condition, or expensive reseeding practices are needed to improve production.

Breaking and reseeding (Fig. 6) normally are not recommended because the soils become susceptible to erosion, the practice is costly, and the economic returns may not be favorable. However, where the range has severely deteriorated, reseeding might be the only acceptable practice. The management choices are as follows:

- destock and, if possible, rest the range
- control distribution and length of grazing with the use of a grazing system
- break and seed to tame species.

Species recommended for the foothills fescue prairie

Legumes

Alfalfa

- a medium-lived perennial that becomes established readily
- performs best on deep loam soils
- a deep root system makes it drought-tolerant
- numerous cultivars are available, all with associated bloat hazards
- some varieties have good winterhardiness
- produces excellent-quality forage

Alsike clover

- a short-lived perennial adapted for cool, wet areas
- tolerates flooding but not drought
- associated with bloat in cattle and sheep and cirrhosis of the liver in horses

Fig. 6 Truax rangeland seed drill suitable for seeding grasses and legumes.

Bird's-foot trefoil

- potentially long-lived and bloat-free
- not competitive and therefore weed control during establishment is important
- should be grown alone or with grasses that do not have creeping characteristics
- tolerates grazing and some flooding

Cicer milk-vetch

- potentially long-lived and bloat-free
- slow to germinate because many seeds have a hard coat
- requires 2 years to become established
- tolerates drought and grazing
- regrows well throughout the summer

Sainfoin

- potentially long-lived and bloat-free
- drought-tolerant but intolerant of flooding
- regrows poorly after grazing
- for pasture, should be seeded in pure stands and grazed early or together with grasses that do not creep

Grasses

Altai wild rye

- winter-hardy and drought-tolerant
- long-lived but requires 2 years to become established
- bunch type but with roots that are somewhat creeping

Creeping red fescue

- long-lived, winter-hardy, with a strongly creeping root system
- best adapted to wet areas and best used for pasture

Kentucky blue grass

- long-lived with shallow, creeping roots
- slow to become established but persistent when established
- best used for pasture

Smooth brome

- creeping roots
- early-growing and high-yielding
- good palatability
- poor regrowth
- somewhat tolerant of alkalinity, salinity, and acidity
- does not tolerate flooding

Meadow brome

- compared with smooth bromegrass, is slightly less hardy, more difficult to establish, has lower yields but better regrowth, has good potential for spring grazing in a complementary system, and is more palatable
- does not tolerate flooding

Meadow fescue

- a short-lived bunch grass, best suited to moist heavy soils
- low palatability

Orchard grass

- a medium-lived bunch grass
- new cultivars have good winterhardiness
- best adapted to well-drained sites with high moisture
- good regrowth after cutting for hay

Crested wheat grass

- a long-lived bunch grass
- very winter-hardy and drought-tolerant
- easy to establish and very productive early in the year
- does not tolerate flooding

Intermediate wheat grass

- easily established
- deep creeping roots
- high yielding, more drought tolerant than brome but less than crested wheat grass
- shorter lived than brome
- highest production in spring and early summer

Pubescent wheat grass

- similar to intermediate wheat grass but longer lived, more drought tolerant and winter-hardy, and has better seedling vigor
- high yielding

Slender wheat grass

- a native bunch grass
- easy to establish
- short-lived
- very tolerant of alkalinity and drought but does not tolerate waterlogged soils

Tall wheat grass

- an introduced bunchgrass
- late maturing, coarse
- low palatability
- tolerates salinity and alkalinity
- slow to establish
- lacks drought tolerance

Color fig. 8 Buffalo bean.
Color fig. 9 Rank cover discourages grazing.

Timothy

- an introduced bunchgrass
- easy to establish
- fair to good regrowth
- good palatability
- winter-hardy
- acid tolerant
- lacks tolerance for salt and alkalinity
- lacks drought tolerance

Reestablishing native prairie

Ranchers are increasingly interested in reestablishing native prairie on land that was once cultivated. The objective, in most cases, is to eliminate introduced, non-native species and to establish the dominant climax species. In the foothills fescue prairie that species is rough fescue.

Many native grasses establish themselves slowly and are not competitive during that time, giving weedy plants an opportunity to become established. If the weeds are annuals, they can be replaced eventually with the desired species. However, if an unwanted perennial grass becomes established, the seeding will be a failure. In the foothills fescue prairie, some unwanted grasses that are likely to invade are couch grass, timothy, and brome. Unwanted species come from seed reserves, or rhizomes, in the soil or from plants on adjacent areas. To eliminate reinfestation, control the problem species while the area is cultivated and seeded to an annual crop. This procedure may have to be repeated for several years until the risk of reinfestation is reduced. It is probably not possible, and certainly not feasible, to reduce the risk to zero. A herbicide such as Round-up provides early control on the site before seeding. Selective herbicides can be applied periodically during the establishment period. Check with your provincial agricultural representative for recommended types and amounts. Summerfallow cannot be recommended because of the high soil erosion potential.

Rank cover

Rank cover (Color fig. 9) is a problem caused by uneven livestock distribution and can be managed with winter grazing. Old growth builds up in areas avoided by livestock because of slope or lack of water. The buildup of litter further aggravates the distribution problem as the forage quality is reduced. Heavy grazing pressure in winter is a proven method for reducing rank cover and improving the distribution of use. In winter the forage quality is more uniform, and livestock are less selective in their feeding habits. They can be attracted to underused areas with supplements or contained on them with cross fences. This procedure can be repeated for several years until the desired reduction in old litter is achieved. Fescue prairie responds with a dense, more vigorous growth that is more acceptable to livestock.

Rotational grazing systems

- Rotational grazing systems are tools to improve range management.
- The specific system applied depends on the goals and unique character of each ranch unit.
- In the short term, a grazing system allows higher stocking rates through improved livestock distribution.
- In the long term, grazing systems permit higher stocking rates through improved range condition and productivity.
- Depending on the grazing system implemented, the foothills fescue prairie can be maintained at a stocking rate of 0.5 ha per animal unit per month.

Signs of overgrazing

Short term (one season)

- In the spring, leaves of rough fescue plants that were grazed the previous year are much shorter than leaves of ungrazed plants.
- Animals consume fallen grass litter.
- Most rough fescue plants are grazed at the end of the season.
- Large overgrazed patches that extend beyond the preferred areas indicate that grazing pressure was too heavy.
- Unpalatable species are grazed.

Long term (several seasons)

- Rough fescue and Parry oat grass plants have fewer stems and occupy less area.
- Ungrazed patches are hard to find.
- More than 1% of the grazing area has no ground cover (does not include animal disturbances).
- Less than a handful of litter can be gathered up.
- Do not be alarmed by a periodic increase in annual weeds found on gopher mounds.

Seeding hints

- Seed into a well-prepared seedbed that is firm and free of weeds.
- Use a herbicide such as Round-up to help kill deep-rooted grasses and forbs before cultivation. A herbicide alone does not produce a suitable seedbed.
- Space rows 15–20 cm apart.
- Plant seeds 1–2 cm deep for most forage species.
- In mixtures, seed only compatible species.
- Some recommended combinations, with their seeding rates (kilograms per hectare), are as follows:
  meadow brome grass (10) and alfalfa (1–3)
  orchard grass (6) and alfalfa (1–3)
  intermediate wheat grass (9) and alfalfa (1–3)
  smooth brome grass (8) and alfalfa (1–3)
  crested wheat grass (7) and alfalfa (1–3).

Undesirable plants

Poisonous plants

Plants of uplands

Death camas (deadly) (Fig. 7)

- lily family, with pale yellow flowers
- general distribution with local concentrations
- all parts toxic, especially the bulbs
- palatable
- livestock susceptible early in spring before other forages are available

Tall larkspur (deadly) (Fig. 8)

- buttercup family with blue purplish flowers on long stalk
- occurs on margins of aspen groves and requires deep soils and shade
- palatable
- cattle susceptible early in summer when plant forms major component of forage
- sheep are apparently immune

Low larkspur (deadly) (Fig. 9)

- buttercup family with blue purplish flowers on short stalk
- occurs on grasslands and between shrubs, and requires deep soils
- cattle susceptible early in summer and until the plants wither
- sheep are apparently immune

Timber milk-vetch (deadly)

- pea family with purple-pink flowers
- generally distributed on grasslands
- unpalatable
- cattle susceptible when other forages not abundant
- cattle seem to become addicted to it

Early yellow locoweed

- pea family with yellow flowers
- unpalatable
- may be a problem on overgrazed rangeland when other forage is not available
- cattle seem to become addicted to it and will seek it out
- horses more susceptible than cattle

Red choke cherry (deadly)

- rose family with small white flowers and red fruit in large clusters
- tall shrub
- leaves, buds, flowers, and twigs all potentially poisonous
- cattle susceptible when forage scarce

Saskatoon (deadly)

- rose family with showy white flowers in small clusters
- grows with choke cherries
- tall shrub
- leaves, buds, flowers, and twigs all potentially poisonous
- cattle susceptible when forage scarce

Fig. 7 Death camas.
Fig. 8 Tall larkspur.

(Alberta Agriculture photos)

Silky lupine (deadly) (Fig. 10)

- pea family with blue flowers on short stem and finger-like leaves with palm-shaped appearance
- general distribution with local concentrations
- unpalatable
- livestock susceptible when hungry and are put onto an area with high concentrations of the plant
- seeds and pods are most poisonous

Monk's-hood

- buttercup family
- resembles tall larkspur in appearance and distribution
- poisonous until fall but especially poisonous before flowering

Plants of wetlands

Seaside arrow-grass (deadly) (Fig. 11)

- rush family
- common in saline or alkaline sloughs
- starts growth earlier in spring than other grasses associated with it
- all plant parts are toxic

*Water-hemlock (*deadly) (Fig. 12)

- carrot family
- stems up to 1.8 m tall and may have purplish spots
- stem base and roots are chambered
- small white flowers arranged in a head such as dill or carrots
- common on slough margins and other watered areas
- produces forage early in spring before other palatable forage is available
- probably the most poisonous plant
- all parts are poisonous but particularly the roots

Fig. 9 Low larkspur (Alberta Agriculture photo).
Fig. 10 Silky lupine.

Poison hemlock (deadly)

- carrot family
- similar in appearance to water-hemlock but can grow to 3 m tall and has distinctive purple spots
- stems or roots not chambered
- fern-like leaves
- all parts of plant extremely poisonous and leaves increase in toxicity with age
- leaves can be confused with those of parsley

Other plants look like water-hemlock and poison hemlock but are not poisonous. Do not take chances; have an expert identify them and take the necessary precautions to avoid livestock losses.

The most effective precaution is knowledge. You should be familiar with which poisonous plants are present, when they are a problem, and how livestock respond to them. In most cases the solution is to provide ample forage, which allows animals to avoid grazing the poisonous plants or prevents them from eating an unhealthy dose. Livestock poisening can be prevented by avoiding heavy grazing pressure, by avoiding early-spring grazing, and by avoiding puting hungry animals onto range infested by these plants. Eradication is costly and is usually not warranted.

Noxious plants

Noxious weeds are unwanted plants that can invade and dominate native rangeland. They usually have little or no forage value, and although they may not be poisonous, they can substantially reduce the amount of forage produced. The following are weeds that may be found in the foothills fescue prairie.

Knapweed

Knapweed belongs to the thistle family and has many small white or purple flowers surrounded by spiny bracts (green scales around each flower). Three species occur in western Canada: diffuse, spotted, and Russian. Diffuse knapweed (Fig. 13) has reduced the forage value of large tracts of land in British Columbia; spotted knapweed has had a similar effect in northern Montana. At present, only spotted knapweed occurs in restricted areas in Alberta, but both species could expand because the environment is similar to that in infested areas. Forage production is reduced by up to 85% in areas invaded by knapweed. Knapweed increases on disturbed areas but can also invade range that is in good condition. It persists for more than 1 year, usually establishing itself in the first year and producing seed in the second. Its

Fig. 11 Seaside arrow-grass.
Fig. 12 Water-hemlock.

(Alberta Agriculture photos)

seeds are numerous and thistle-like. If found or suspected, knapweed should be reported to the local district agriculturist, who can help you eradicate this weed .

Leafy spurge

Leafy spurge (Fig. 14) belongs to the spurge family and has inconspicuous, greenish yellow flowers. Leafy spurge is a problem in pastures with sandy and marginal soils. It is deep rooted and long-lived, which makes it difficult to control. Sheep readily utilize it, which suggests a means of control.

Downy brome

A member of the grass family, this annual weed (Fig. 15) is usually not a problem in the foothills fescue prairie but has the potential to invade areas where the vegetation has been disturbed by overgrazing or by some other means. The seeds have a sharp point and rough awn, which can cause mechanical damage to the mouth, nose, and eyes of livestock. Downy brome is best controlled by keeping the range in good condition.

Recognizing and detecting poisonous or noxious species on prairie grasslands is critical for managing livestock grazing in a way that avoids serious economic losses. Many of the plants are deadly for livestock and humans. Because some plants have the appearance of edible vegetables, they are often consumed, with serious consequences. The poisonous species named here are the most troublesome, but they are not the only ones that might be encountered on grasslands. The noxious species are listed because of their serious economic impact in parts of the country.

Other disturbances

Industrial disturbances

Oil and gas exploration and development may cause considerable disturbance to rangeland soils and vegetation; such disturbance should be kept to an absolute minimum. For example, topsoil stripping on small-diameter pipelines should be restricted to the trench line. Topsoil and trench material can be piled on top of the fescue grassland cover at the time of excavation and then carefully bladed back into place, leaving the original grass sod as intact as possible.

Without any further treatment, the disturbed area will probably be occupied mostly by weedy species. This condition may last for as long as 10 years; the original character of the prairie may not be regained for 50 years or more. Reestablishing the original cover is more rapid on smaller disturbances but can also be increased by reseeding local native species. However, reseeding may not solve the problem because many of the desired native species may not be available, may be extremely

Fig. 13 Diffuse knapweed.
Fig. 14 Leafy spurge.
Fig. 15 Downy brome.

(Alberta Agriculture photos)

expensive, or may be difficult to establish. The alternative is to seed cultivated species that are compatible with the native grass cover. If you choose this alternative, avoid seeding soft grasses such as timothy, brome grass, and Kentucky blue grass, which draw livestock to the area and change the normal grazing pattern of the field.

Fire

Fire can have both positive and negative effects on fescue prairie. Fire may be beneficial by thinning brush cover and removing rank growth, which can increase forage production. However, production losses can occur after burning, depending on the intensity of the fire and on growing conditions. Lower forage yields result when fire damages the crowns of bunch grasses or removes too much litter and soil, thus further reducing water available for plant growth. Plant response to subsequent burning depends on the grazing management of the area. Livestock prefer recently burned areas, tending to concentrate on them and exerting excessive grazing pressure. Burned areas should therefore be fenced off and managed independently of adjacent unburned grasslands. Grazing after a fire should be delayed until midsummer or later to allow plants to recover; the stocking rate should be light to allow for ample carryover to build up litter reserves.

Suggested reading

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