Grazing Distribution

Department of Agronomy MF-515 Grazingland Management

Grazing distribution has traditionally been defined as the pattern created by livestock grazing a pasture. As grazing management goals expand beyond optimal forage conversion, increased efforts should be made to better understand grazing patterns. Concerns, such as water quality and air quality, increase the need to understand how grazing distribution can affect vegetative cover. A better understanding can be achieved by studying livestock response to management, weather, and the physical environment of pastures.

Managing livestock behavior for improved grazing distribution requires that the manager understand what influences livestock movement within a pasture. Identifying areas where livestock concentrate is the first step to understanding grazing patterns. Once these areas have been identified, it is possible to understand reasons why patterns occur. Primary factors that influence where animals concentrate are:

1. location of preferred water,
2. location of preferred shade,
3. prevailing wind direction, and
4. topography.

Managing livestock behavior for improved grazing distribution requires that the manager understand what influences livestock movement within a pasture. Identifying areas where livestock concentrate is the first step to understanding grazing patterns.

The location of most livestock concentration areas is influenced by two or more of these factors interacting. An objective for achieving multiple goals for grazingland (profitability, water quality, air quality, wildlife habitat, etc.) is to promote forage utilization throughout a pasture. This provides a mosaic of cover needed to reduce runoff and promote vigorous new growth for the following season. By keeping forage value high and groundcover adequate, uniform livestock distribution helps keep populations of noxious weeds and unpalatable forages to a minimum. This reduces the potential need for chemical treatments, reducing operating costs and environmental concerns.

An emphasis on managing animal behavior will require an extensive inventory and analysis of the management and landscape features of a pasture, plus the patterns of use and concentration of the livestock. This assessment necessitates an on-the-ground inspection of the entire pasture. In addition, a complete review of the management style also is needed. Reviewing pasture features, management style, and livestock behavior together greatly enhances the ability to find practical solutions that will result in improved vegetative cover in a pasture.

Grazing patterns are established as soon as livestock enter a new pasture. It is essential to have a management system in place to encourage uniform distribution from the first day of grazing. Animals tend to graze in spotty patterns that can be highly localized if management does not encourage more widespread use. When patchy grazing occurs, forage availability is reduced and grazing selectivity is lost, resulting in reduced animal performance.

Uneven grazing patterns generally occur due to a combination of the four factors listed previously and described in more detail below:

Livestock Water – Water is an essential nutrient for animals. As a general rule, livestock will select drinking water based on quality and accessibility. Recent research and field observations suggest that the typical order of preference for water source types is:

1. trough watered from a well or spring,
2. trough watered from a pond,
3. pond,
4. a pool in a stream,
5. a flowing stream.

In addition to water quality and accessibility, water temperature and fear for safety are possible influences on livestock water preferences. Safety concerns include ice, mud, and collapsing stream banks. Water quality and temperature influence water consumption, which in turn can influence forage consumption. Research also has shown that water in a trough can improve grazing distribution and may improve animal performance. Even when preferred watering facilities are available, poorly distributed water and/or rough terrain often results in underused areas within a

pasture. Animals will readily travel more than a mile to water on level terrain, but they may not travel even a half mile in steep or heavily rolling terrain.

Topography – Slope, aspect, and terrain comprise the elements of topography. Steep slopes create barriers to animal movement and grazing. South facing slopes green up earlier than the north facing slopes, creating more desirable grazing areas. The location of streams and other drainages add to the complexity of topography. All of these factors combine to create opportunities and barriers to animal movement.

Prevailing Wind Direction – Wind direction, along with other seasonal weather factors, has a major influence on how animals graze and where they concentrate. As a rule, animals grazing during the growing season tend to use the south side of the pasture most frequently. Prevailing north and northwest winds influence distribution patterns of livestock wintering on grazed forage.

Shade – Shade is attractive feature for grazing animals. It provides cooling, protection from the sun, and can provide protection from insects. Trees with broad crowns with reasonable clearance above the ground are preferred. Tall trees, such as cottonwoods, provide little opportunity for quality shade.

Other features that can influence grazing distribution are:

Pasture Shape – The shape of a pasture can affect uniformity of grazing. For example, in a large "L" shaped pasture with the water in one end, the end farthest from water will usually be underutilized. Even utilization of these areas is often difficult and requires changing the grazing animals' habits and patterns.

Grazing Preference – Grazing animals prefer certain forages over others; preferred forages are said to be more palatable. The relative palatability of a plant species depends on factors such as the stage of growth and water content of each species, soil fertility level, and the palatability of other species present. Grazing animals will concentrate where the plants are most palatable. In Kansas rangeland, highly palatable species include eastern gamagrass, big bluestem, Indiangrass, little bluestem, and sideoats grama. Switchgrass, blue grama, and buffalograss will be grazed least when species that are more palatable are present. Western wheatgrass is palatable in the early spring, but it is rarely grazed during late spring and summer. In the fall, new growth again makes it palatable. Tame pastures, such as smooth brome or tall fescue tend to be more uniformly grazed, except when physical barriers are present, incompatible forages have invaded, or fertility problems exist.

Some forages are rarely preferred when other plants are available. These species are readily grazed only when planted and managed as a pure stand or when high stock density forces animals to consume plants they normally would not consume. Examples of such forages would be the Old World bluestems, tall fescue, and switch grass.

Forbs (broadleaf plants) and browse (woody plants) vary in palatability. Examples of highly palatable forbs are showy partridgepea and compass plant, while leadplant and Russian olive are examples of browse that are palatable at certain times of the season.

Seasonal nutritional needs – Forbs and shrubs often fill nutritional needs during certain periods of the year and may cause seasonal variations in grazing animal distribution.

Spot grazing – Animals create and maintain grazing patches. Forage outside the patches is not utilized until regrowth on overgrazed patches slows. Effort made to improve grazing distribution can be monitored based on the number, size, and distribution of spot grazing areas.

Managing for Grazing Distribution

Several management practices can be used to improve grazing distribution. These can be divided into two groups:

1. Adjustments in normal management practices
2. Management changes and/or capital improvements

Adjustments in Normal Management Practices

Many normal management practices can be adjusted to help encourage more uniform grazing patterns, such as salt/mineral placement, use of oilers and dust bags, winter feeding, riparian zone management, and prescribed burning.

Salt/mineral feeders should be placed away from water to improve grazing distribution. They should be located in undergrazed areas, and livestock should know where they are. It may be necessary to move the salt/mineral feeders whenever livestock congregate and begin to trample the vegetation.

In the past, people believed livestock must have water after salting. However, research has shown the utilization of salt or minerals and water are not related. In areas where water has a high salt content or natural salt licks occur, changing salt locations will not influence grazing distribution.

Oilers, rubbing posts, or dust bags can be used to attract cattle in the same way as salt and mineral feeders. These items should not be located with the salt/mineral feeder or near water. Oilers or rubbing posts should not be placed between water and salt.

Oilers, rubbing posts, or dust bags should be located throughout the pasture as needed to promote uniform animal distribution.

Winter feeding location is one of the most underutilized grazing distribution practices. The goal should be to move feeding grounds throughout the pasture into areas not normally grazed by animals. Concerns associated with exposed soil and/or livestock waste should be considered when selecting feeding areas. Whenever possible, locate feeding areas away from streams, ponds, and windbreaks.

Feeding livestock repeatedly in the same location results in overutilization or trampling of the vegetation, opening the area to erosion. In the spring, bare areas will be the first to green up with cool-season species, particularly grasses, causing livestock to begin grazing these areas first. These areas will also be the first invaded by broadleaf annuals. Once the grazing pattern is established, livestock will return to the winter feeding area throughout the season.

Riparian areas require special consideration in grazing distribution management. Riparian areas include streambanks and sometimes part of the adjoining floodplain. Water quality, both for the grazing animals and downstream users, is a consideration. Well vegetated, stable riparian areas can provide desirable forage, shade, and water. When flowing streams are a source of livestock water, trampling and bedding along the banks can lead to erosion of the banks and deposition of animal waste directly into the water. Under these conditions, water in the immediate area and downstream can be contaminated by bacteria and other pathogens, plant nutrients (nitrate and phosphate), and sediment.

Providing an alternative water source and moving salt and mineral feeders away from the stream are useful in shifting grazing patterns away from riparian areas. When winter feeding, feed away from streams and stock ponds to help improve grazing distribution. Fencing of the riparian area should be considered as a last resort when other practices fail. Fencing will affect how the area is managed for the grazing that will be needed to maintain quality of the vegetation.

Prescribed burning can be a grazing distribution practice. Livestock prefer forage in burned areas. When distribution problems exist, prescribed burning can be used together with previously mentioned practices to change the grazing distribution in a pasture. A uniform burn is essential for uniform grazing distribution.

Other options are available that require only adjustments to normal management or the outlay of limited capital. One management option is the use of drift fences. Short fences across trails or other access areas can force livestock to use alternate routes. Another management option is spot treatment of underutilized areas with prescribed burning or fertilizer. It is possible to promote livestock use in underutilized areas by spot burning or fertilizing small areas (2 to 5 acres) with 20 to 30 pounds per acre of nitrogen. When spot fertilizing, be sure to use low rates of nitrogen. Phosphate and potassium amendments will be unnecessary in spot treatments. Producers should be aware that spot fertilization or burning may result in vegetation changes that can cause extreme shifts in grazing patterns. These practices should be limited to cases where more routine management practices have not accomplished grazing distribution changes. Spot treatments should not be used on the same area for 2 years in a row.

Management Changes and Capital Improvements

If adjustments in normal management practices fail to produce the desired results, a management change and/or capital improvement may be necessary. Capital improvements may include water development(s) or cross fencing. Water placement is a powerful attraction for livestock. Fencing can modify the influence of water placement.

A management change would entail a more dramatic shift in management style or philosophy. For example, management changes could consist of changing class of livestock grazed or season of pasture use, or could involve options requiring more intensive grazing management such as a complementary or sequential forage or rapid rotation grazing systems.

Together or independently, management changes, water placement and fencing can improve grazing patterns or make them worse. The suitability of available resources (land and livestock, labor, capital and management) are essential considerations when changing management or investing in capital improvements.

Water Developments

Water is the most important, but often the most overlooked, nutrient or management tool. It also is a critical component of rotation options. Lack of adequate water, poor quality water, or poorly placed watering facilities are the usual problems encountered. The following are brief discussions of water development options available, with emphasis on improvements or new technology. Water developments can have a significant impact on grazing

distribution if properly located and developed. They also can be some of the most expensive grazing distribution tools to develop.

Considerations. If a new water location is needed, five criteria need to be considered:

1. location
2. water availability
3. water quality
4. how the water facility could be integrated with existing physical features, management practices, and other factors to best encourage uniform distribution
5. design of the water facility to meet livestock and management needs.

Quantity and quality of water are the most important factors in developing a new watering location. Beef cattle consume up to 15 gallons of water per day per 1,000 pounds of body weight.

If a new water source is developed in a pasture where an old pond is still in use, the distribution pattern may be reversed, since the quality of the new water source may be higher than that of the pond. If the availability of water from the new source can be controlled, the livestock can be shifted between watering sources.

Water developments include ponds, springs, water wells, and pipelines.

Ponds

Ponds have historically been the most common method of storing water. Two basic designs are used, stock ponds and pit ponds. Both have advantages and disadvantages. Any open water is a potential hazard in the winter since cattle can fall through ice and drown. Ponds can be fenced to restrict access by the animals, reduce silting in, and maintain water quality.

Stock ponds are effective distribution aids in areas where the subsoil strata can be sealed. Properly located, built, and protected, they will supply livestock water plus improved wildlife habitat, fishing (if stocked), and can provide recreational opportunities. Construction costs have increased rapidly in recent years, making stock ponds expensive investments. They also are prone to sedimentation if built on steep slopes or fed by runoff from cropland that is lacking proper conservation practices.

One way to reduce sedimentation, improve water quality, and provide a controlled water supply is to lay a pipeline through the dam to a trough while fencing the entire pond (pool, dam and adjacent area) to exclude livestock.

Pit ponds or dugouts are small excavations, usually in streambeds, drainages, or areas with water at or near the surface. A pit is dug so that at least one side has a gentle slope (4:1 or less). The soil removed may be piled to one side or used to build a low dam around the pit. Check state and local regulations before excavating a streambed or streambank.

Wells

Water wells are a common source of livestock water. Most utilize groundwater strata. Aquifers occur at varying depths across most of the state and vary in the amount and quality of water provided. Wells should have a minimum capacity of 5 to 10 gallons per minute, unless a larger stock tank is used. Storage for 2 or 3 days should be considered as a minimum. Water wells require a pump to lift the water to the surface. Many different power sources can be used.

Windmills have supplied livestock water for more than a century, although the basic design has changed a little. A revival in their use has occurred in the last 15 years. Windmills are for use in areas where other power sources are unavailable or expensive.

Advantages:

1. Power is supplied by the wind, which is usually readily available.
2. Can operate in remote areas, but maintenance is variable.

Disadvantages:

1. Relatively high initial cost.
2. Maintenance costs can be high.
3. If winds fail for extended periods, reliability of the water supply is compromised.

Electric pumps, both aboveground and submersible, can supply livestock water. Water systems using electric pumps can supply large areas through a pipeline. The reliability and efficiency of pipeline systems are frequently enhanced with storage tanks and/or multiple water sources.

Advantages:

1. Can pump significant amounts of water quickly within system limits.
2. Water can readily be pumped to multiple watering points.
3. Water can be pumped long distances economically.
4. Maintenance costs are normally low.

Disadvantages:
1. Requires an electrical source.
2. Can be relatively expensive to install, especially if very far from an existing power line.
3. A contractor, not the landowner, normally accomplishes pump maintenance.

Solar-Powered Pumps are relatively new. Solar panels have been designed to power low-volume pumps capable of raising water from as deep as 200 feet. Solar-powered pumps should be considered in areas where electricity is not available or where windmills are not cost-effective. Low-volume, solar-powered pumps are a versatile tool for grazingland management. Selection and use of these pumps will depend on the depth of the well.

*Shallow Well*s – The pump is normally a small, low-voltage centrifugal pump. Typically, a corrugated steel culvert is buried vertically in the ground, with the pump mounted inside near the top. Water rises inside the tube. The solar panel is mounted above the unit to either charge a battery or power the pump directly. The unit can be used for continuous or controlled flow.

Wells to 200 Feet – The pump is normally a 12- or 24-volt diaphragm pump installed in a similar manner as electric submersible pumps. The solar panel is mounted near the well to charge a battery that powers the pump.

Advantages:
1. Allows pumping of lowland water to more desirable areas when power sources are not practical.
2. Allows development of "seeps" or "wet spots" for livestock water.
3. Controlled flow design allows efficient use of limited water.
4. Solar panel and pump can be used in more than one location to reduce cost.

Disadvantages:
1. Requires regular maintenance to ensure operation.
2. Limited pumping volume.
3. May not pump sufficient water during cloudy weather, depending on battery storage or tank size.

Pipelines and Troughs

Changes in materials for pipelines have opened new possibilities for supplying livestock water. Improved materials for pipelines and new designs for troughs that withstand freezing have reduced installation and maintenance costs. Pipelines and troughs can be used with all water sources. Water can be moved through the pipeline by use of either pressure or gravity flow.

Piping for livestock water is similar to that used for domestic water. Troughs have been improved to make them more durable and/or to reduce storage requirements. To reduce freeze damage, concrete troughs with sloped inside walls have been developed. Troughs with large diameters (more than 20 feet) also can be used for storage.

Advantages:
1. Water can be placed at the best locations to benefit grazingland management and animal performance.
2. Adequate water supply can be made available where wells, ponds, and other water sources are not possible.
3. Allows multiple waterings from one water source.

Disadvantages:
1. Requires initial installation cost.
2. Increased maintenance of the system may be necessary compared to other possible options.

Spring Development

Newer types of pipe and troughs have made spring development a more viable option. Often, livestock water can be collected from locations too wet for livestock use and piped to a trough in a more suitable location. This provides clean water under controlled conditions. With the use a of gravity flow pipeline, troughs may be located some distance from the developed spring.

Advantages:
1. Provides livestock easy access to spring water, which is usually in short supply.
2. Provides clean water away from low, wet areas.
3. With a continuous flow of 1 to 2 gallons per minute, water seldom freezes.
4. Relatively low cost and low maintenance in many cases.

Disadvantages:
1. Site availability may limit development.
2. Some sites may be difficult to develop without increased costs.
3. Installation procedure results in bare ground that may need erosion protection.
4. Volume and dependability of water flow may not be accurately determined before beginning development.

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The importance of livestock water in grazing distribution and related issues should be among the first considerations in capital improvements. Location, type, and water quality are all considerations in designing new water facilities. The following are types of watering facilities that can be developed.

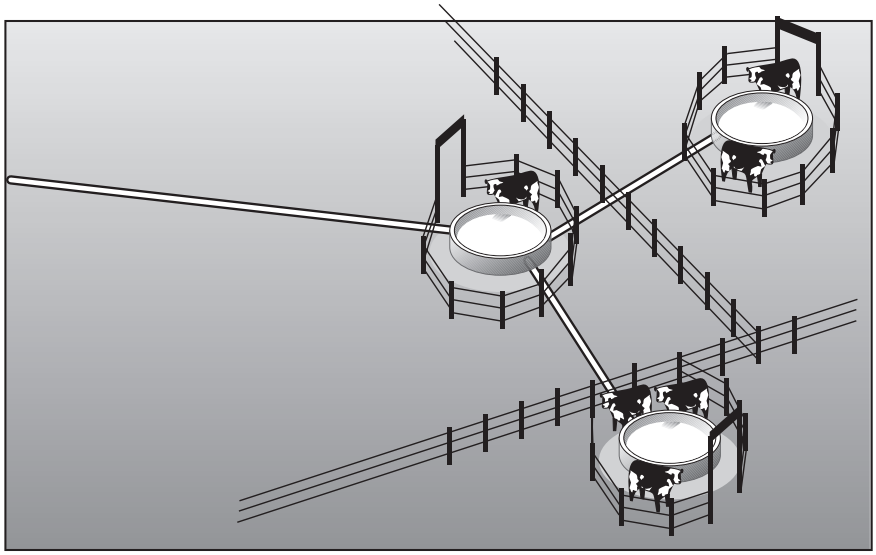

Figure 1. *Water can be delivered anywhere through pipelines and troughs. The source can be a well, spring development, or pond. Gravity or pressure can be used to deliver the water.*

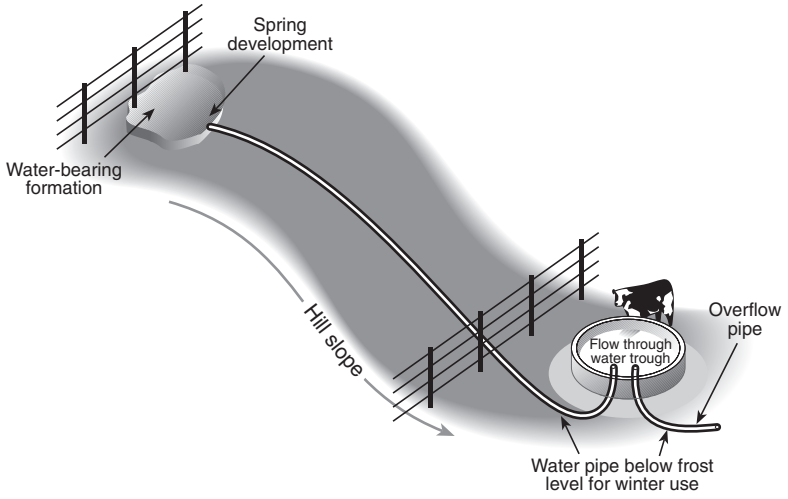

Figure 2. *Water from a spring can be delivered to troughs through a collection system by gravity flow. Excess flow is returned to a stream or channel near the trough.*

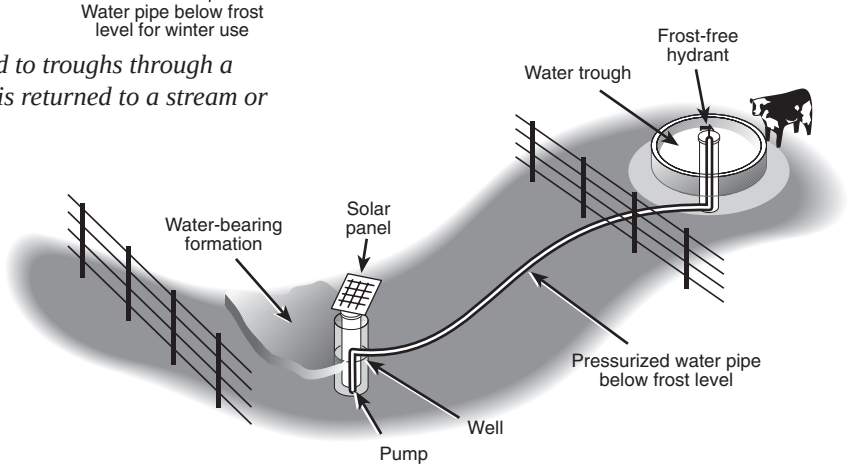

Figure 3. *Groundwater can be distributed through pipelines and troughs using a pressure pump powered by electricity or solar energy.*

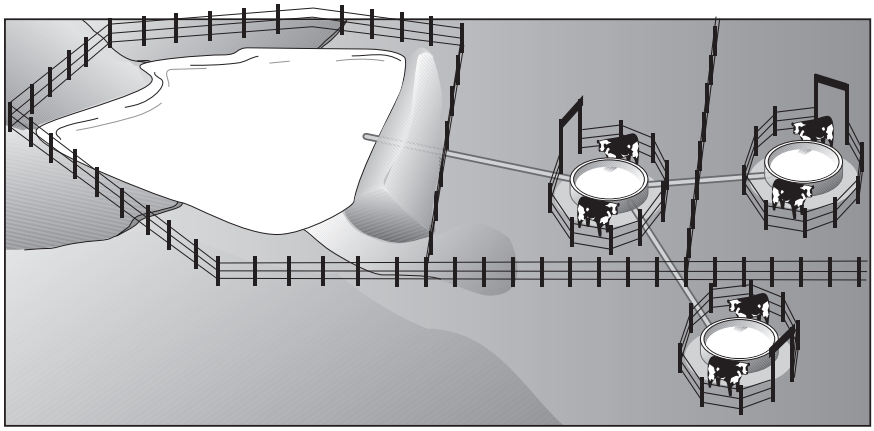

Figure 4. *When gravity allows, water can be distributed to one or more troughs below a pond, allowing the water to be available where it is needed.*

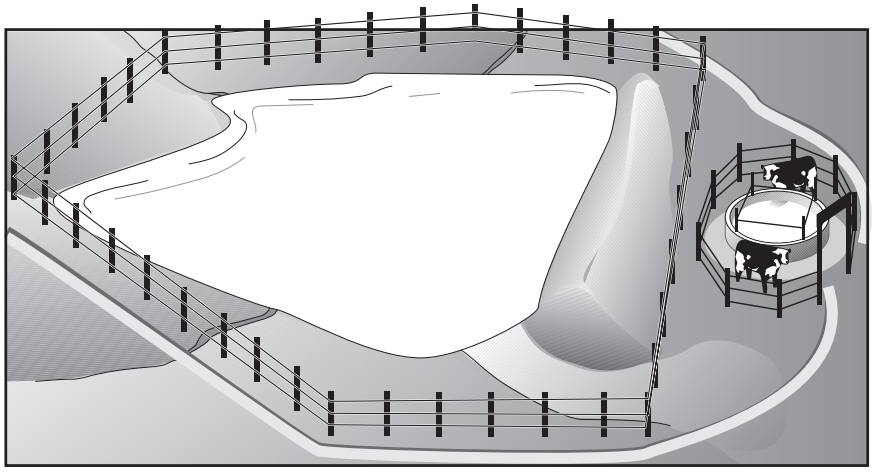

Figure 5. *Fencing a water trough has proven successful to provide an incentive for the animals to drink and leave the area. Also, the gate entry provides a convenient place to provide fly control that is very effective. The fence needs to allow 10 to 12 feet around the trough to be effective. A "fence" inside the trough can keep animals from getting into the trough.*

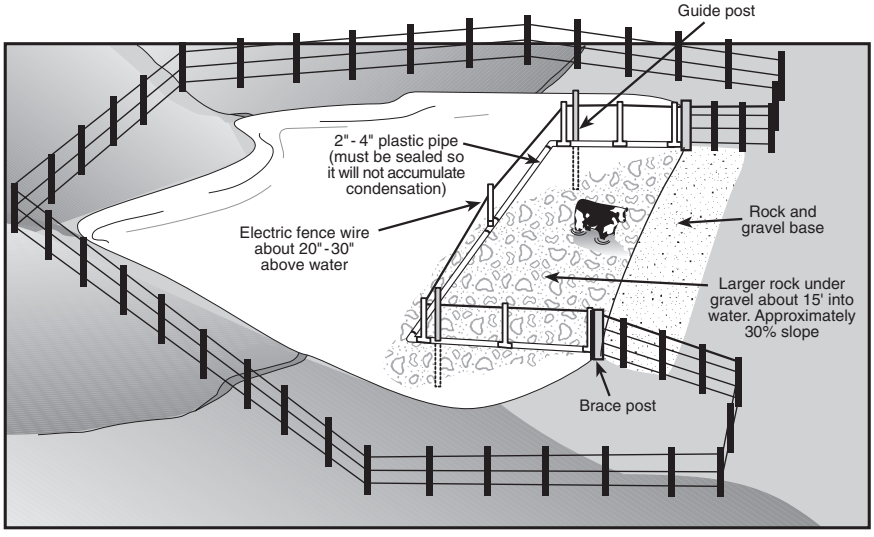

Figure 6. *Limiting access to ponds can improve water quality for the animals, prolong the life of the pond, and provide wildlife habitat. Fencing the pond and developing a hardened approach (graveled area to the pond and into the water) is one option. The barrier is floating plastic pipe with an electric wire along the top.*

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Design and Development of a Water Source Site

Stock tank capacity is an important factor in any water development. Adequate capacity of the tank to water livestock with refilling, plus a reserve supply of 2 or 3 days in case the water source fails, are the key considerations. It is also important to have some kind of device, such as a bubbler or heater, to prevent the stock tank from freezing.

To protect the trough and provide a stable surface for animals to stand, build up 12-inches of rock in a 12-foot area around the perimeter of the tank.

Cross-Fencing

Adequate fencing is required to manage the grazing resource. Manipulating the grazing animal to benefit the plants and to effectively harvest forage are the primary goals of cross-fencing. Design of the fence should consider location and the animals to be controlled.

One of the most effective management changes is cross-fencing large pastures to change grazing patterns. Cross-fencing designed to separate vegetation types or topographic areas can be particularly effective for achieving more uniform grazing distribution. The following factors should be considered in determining where to fence:

1. needed improvements in grazing pattern;
2. factors influencing current grazing patterns (water, topography, vegetation types, barriers crossing, etc.); and
3. how the fencing pattern will affect the ability to manage the resulting pastures.

All fencing will require extra bracing in rough terrain.

Conventional Materials for Cross-Fencing Pastures

For cross-fencing, a three-strand barbed wire fence with post spacing of one rod (16.5 feet) or more is conventional. The posts may be wood or steel. This design has been used for many decades.

Advantages:

1. Proven method.
2. Relatively low maintenance.
3. Long life.

Disadvantages:

1. High initial cost.
2. Easily damaged by wildfires and lightning.
3. Can injure livestock (cuts and scratches).

High-Tensile Steel Wire

High-tensile steel wire has an old reputation to live down. Historically, this wire was difficult to splice, hard to keep tight, kinked easily, and broke when kinked. Today's wire is vastly improved. Compression splicing sleeves, special tighteners to maintain the tension, and other options make high-tensile steel wire a more attractive management option. Use a $12^{1}/_{2}$ gauge Class III galvanized wire, with a tensile strength of at least 110,000 pounds per square inch and a breaking strength of at least 1,100 pounds.

Advantages:

1. No barbs to cause injury to livestock.
2. Lower cost than barbed wire.
3. Repairs may be reduced.
4. Best adapted to uniform terrain.

Disadvantages:

1. Requires stronger braces to sustain wire tension.
2. Increased maintenance to sustain wire tension.
3. Usually requires more wires to control animals (unless electric).
4. Acceptance may be difficult due to local traditions.

High Energy, Low Impedance Electric Fencing

Electric fences provide more of a "mental" or "psychological" barrier to livestock rather than the "physical" barrier provided by a barbed wire fence. High energy, low impedance fencing is different from conventional electric fencing. A solid state "energizer" is used to charge a high-tensile steel wire fence. Developed in Australia and New Zealand, these fences were first brought to the United States to keep out predators. They are a relatively low-cost option to permanent barbed or netting wire for cross-fencing. High-energy, low-impedance fencing is not recommended for legal perimeter fence along county or state roads due to the potential liability created by escaped livestock.

Two wires (high tensile steel wire) are a minimum for reliability. Spacing and height above the ground will vary with the livestock and/or wildlife being controlled. Brace and stretch posts must be better than those for conventional fences to maintain the 150 to 200 pounds of stretch needed. Line posts can be made of several materials, but self-insulating posts (fiberglass and certain woods) are desirable. Power for the

energizer can be from batteries, solar panels, or a 110/120-volt power source. Energizers should be either Underwriters Laboratory (UL) or Canadian Standards Association (CSA) approved. Never connect a 110/120-volt power source directly to a fence without using an energizer. In addition, proper grounding of the energizer and fence is critical. Most energizers operate at 3,000 volts or higher for cattle. Installation must be in accordance with the manufacturer's recommendations.

Advantages: (two or more wires)

1. Lower cost than barbed wire.
2. Effective livestock control when properly designed, installed, and maintained.
3. Can be designed for predator and wildlife control.
4. Fencing over uneven terrain, especially streams and other depressions, can be simpler.

Disadvantages:

1. Tradition — acceptance by ranchers and others may be slow.
2. Higher voltage (3,000 volts or higher) results in a highly unpleasant shock to people. "Electric fence" warning signs along fence are recommended.
3. Prolonged contact with the fence may cause injury under some conditions, although this has not been adequately verified.
4. Durability of fencing materials is unclear when prescribed burning is practiced. Some poles and plastic insulators may be lost to fire.

Grazing Management Strategies

There are two basic grazing management strategies in use: conventional season-long grazing and rotation grazing systems. Grazing methods can influence distribution patterns. The type of grazing distribution tools used, and how those tools are applied, influence the selection of a grazing management strategy. Likewise, grazing methods can limit the use of certain grazing distribution tools.

Season-Long Grazing

The easiest grazing management strategy is season-long grazing, in which cattle simply remain on a single pasture for the entire season. Stress on the animals is minimal. For growing cattle, season-long grazing often results in the best weight gains. The challenge with season-long grazing is to maintain adequate grazing distribution so adequate forage production is provided.

Rotation Grazing Systems

Rotation grazing systems are a specialized form of grazing management in which periods of grazing and rest alternate in a systematic way. These systems have become popular in the past 20 years. There are many different kinds and each has advantages, disadvantages, and limitations.

Designing and implementing a grazing system involves more than just moving livestock from pasture to pasture. System design requires a knowledge of the resources (land, labor, and capital), kind of livestock and their management, managerial ability of the operator, and the management goals of the owner/operator. Careful attention to details of physical developments (water, fencing, etc.), timely decision-making, and financial conditions are major considerations.

Animal performance on a per-animal basis in a rotation grazing system is normally slightly below that for season-long grazing. Without proper management, animal performance can be drastically lower; overall animal production per acre, however, may be enhanced.

Kinds of Rotation Grazing Systems

The following are several categories of rotation grazing systems in use today (some are known by other names). As the complexity of the system increases, the level or intensity of management also must increase. Many systems can save on labor (time), but will be replaced by more management (time). Some systems are designed to primarily benefit plants, some to benefit the animals, and some will benefit both.

Sequential or complementary forage grazing systems involve using two or more forages in combination during the grazing season. These systems have only been used for about 30 years. These combinations provide high-quality forage for the longest feasible period. Normally, producers design a system to graze each forage when it is at its highest quality. Properly designed and managed, these systems benefit both the plant and the animal.

Sequential forage systems are those where two or more forages are grazed in sequence. To properly design a sequential forage grazing system, forages must have different growing seasons and be separated by fences. Each forage is grazed only during its vegetative growth period. Regrowth may be stockpiled for dormant season use. Moving livestock from one actively growing forage to another helps prevent significant change in the nutritional level of the animal.

Complementary forage systems are those that use two or more forages simultaneously. One forage is used to supplement or complement the major forage. Generally, the complement is an annual such as sudan, wheat, or triticale. Complementary forages are grazed with a primary forage to increase diet quality. Similar to changing forages in a sequential forage systems, providing access to a complement forage when the nutritional value of the primary forage begins to decline helps prevent significant change in the nutritional level of the animal.

Partial-season grazing is a system in which livestock are allowed to graze the forage during only part of the growing season. Partial-season grazing is best used for stocker operations, not cow-calf. Intensive early stocking, used only on rangeland, is an example. Doubling the number of stockers during the first half of the grazing season (late April or early May until July 15), benefits both forage and livestock production. After grazing during the early part of the season, the pasture must not be grazed again until after the plants are dormant.

Deferred grazing is a system in which a pasture is grazed during the dormant season and rested during the season of growth. This system does not require a systematic rotation of pastures. The major disadvantage of this system is low-quality forage.

Advantages:
1. Low cost, compared to harvested forage.
2. Ability to meet the nutritional needs of cows in mid-gestation.
3. Protection for calving. Pastures used during the dormant season and rested through the growing season are usually in the best condition in terms of density and growth, however, the nutritional quality is relatively poor. Unless the livestock are adequately supplemented, animal performance may be reduced when grazing deferred pastures.

*Two-to-four pastures/one-herd system*s, often called "rotation grazing," require livestock to be moved from pasture to pasture, with each pasture being grazed only once a year. With each new year, grazing begins in a different pasture. To maintain nutritional quality, the rotation should be managed so that animals do not face major palatability and/or nutritional changes. For a two- or three-pasture system, the first move must occur in mid- to late-June. Palatability and quality of the forage are the main criteria to use in determining when the move is made. With the three-pasture system the second move should come in mid-August, based on the same considerations. With four-pasture system moves are dictated by a combination of forage availability, palatability, and quality. Forage potential is usually improved by these systems, but animal performance may be reduced unless careful management of livestock nutritional needs is maintained.

Rapid rotation grazing systems utilize fewer than six pastures and have relatively short grazing periods in relation to the long rest periods. Each pasture is grazed two or more times during the season. The length of the grazing period will vary according to the number of animals (grazing demand) and the growth or regrowth of the forage. Moves must be made to ensure adequate nutrition of the animals. These systems can be used on rangeland, tame pasture, and irrigated pasture. Properly designed and managed, rapid rotation grazing systems benefit both plant and animal performance.

Cell or time-controlled grazing is an intensified rapid rotation grazing system. Grazing periods and move dates change as conditions dictate. Generally, there are six or more pastures involved. The goal is to use the best parts of all the plants and not just the most palatable (making it a form of nonselective grazing). Relatively long rest periods follow the grazing period. This is the most intensive of these grazing management systems. Research and experience indicate both the plant and animal can benefit if the system is carefully designed, implemented, and managed.

Disadvantages:
1. Start-up costs are high.
2. Costly water developments are required.
3. Animals must be moved every few days.
4. Nonselective grazing usually reduces animal performance.

Designing a Rotation Grazing System

A rotation grazing system involves more than just moving livestock around. It must be designed to accomplish specific goals and objectives using available resources (land, labor, and capital). Design considerations include not only the mechanics of the system, but also the livestock, marketing, and financial management. Above all, the attitude, understanding, and ability of the operator is important. Three major concerns must be addressed: water, fencing, and animal nutrition.

Water for grazing animals must be adequate. A reserve must be available in case the source fails. Generally, wells and springs are more reliable than stock ponds and streams. Clean, high-quality water is the major requirement.

Fencing is another important consideration. Fences control animal movement, while ensuring that they are constrained.

Animal nutrition is directly related to animal performance. One concern in many systems is the varying level of nutrition resulting from the rapid movement of animals from grazed to ungrazed forages. Moving animals before nonselective grazing becomes excessive will help ensure that nutritional needs are met.

Other Factors to Consider

Management intensive grazing systems should be suited to the kind of plants and soils present. A good system will improve forage condition and production by favoring desired plants. Changes in species composition and reduction in forage production will occur with systems that do not allow desirable perennial grasses time to replenish their food reserves.

Stocking rate decisions also influence forage production and animal performance. Individual animal performance should not be sacrificed for high livestock production per acre. The type of livestock operation and managerial ability are important in considering a grazing system and an appropriate stocking rate.

Summary

A management plan for improving grazing distribution should be a priority for grazingland managers. Livestock establish their grazing habits when they first enter a new pasture. Therefore, it is important to establish beneficial livestock grazing patterns from the first day the pasture is used. Uniform distribution of livestock on grazingland is essential for efficient use of the forage resource. Uniform distribution also plays a role in protecting water quality.

Other Publications

C-402 *Smooth Brome Production and Utilization*
C-729 *Tall Fescue Production and Utilization*
C-567 *Range Grasses of Kansas*
L-514 *Management Following Wildfire*
L-565 *Prescribed Burning: Safety*
L-664 *Prescribed Burns: Planning and Conducting*
L-815 *Prescribed Burning: A Management Tool*
MF-1020 *Rangeland Weed Management*
MF-1021 *Rangeland Brush Management*
MF-1118 *Stocking Rate and Grazing Management*
SRP-884 *2002 Chemical Weed Control for Field Crops, Pastures, Rangeland & Noncropland*

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