Species Selection,
Seeding Techniques
and Management of

Irrigated Pastures

in Montana and Wyoming

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SPECIES SELECTION, SEEDING TECHNIQUES, AND MANAGEMENT OF IRRIGATED PASTURES IN MONTANA AND WYOMING

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Irrigated pastures are lands planted to introduced or native forage species that receive periodic irrigation and are harvested by livestock. Montana and Wyoming have about 600,000 and 325,000 acres of irrigated pasture land, respectively. Their use is often integrated with native range, dryland pastures and other sources of roughage. They provide high yields of quality forage. One acre of irrigated pasture along the Yellowstone River has the potential to provide enough forage for 12 cow-calf pairs for one month.

Management of irrigated pastures varies with site characteristics, landowner objectives, capital, labor, and technology. This publication provides general information on site and species selection, methods of irrigation, seeding techniques, and proper management of irrigated pastures. It is a non-technical overview for use by private and public land managers and other agency personnel.

Site Selection

The first requirement for development of an irrigated pasture is a source of high quality water low in salt and sediment. Dry cropland, rangeland, or dry pasture land can be converted to irrigated pasture. The conversion of cropland or dryland pasture is less risky because soil productivity is known. Potential productivity of land converted from range is less certain. Mature plant communities are useful indicators. For example, dense, vigorous, silver or big sagebrush plants indicate a highly productive soil.

Topography must be suited for cultivation and irrigation water management. Soils should be: 1) deep, well-drained, permeable, with good water holding capacity; 2) free of rocks; 3) of low salinity or alkalinity, and 4) not susceptible to erosion. Except for soils with high water tables or appreciable salt concentrations, soil texture does not restrict the potential of developing irrigated pastures.

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Methods of Irrigation

Irrigated pastures require about 24 inches of water during the growing season. If the rainfall is 10 inches, an additional 14 inches should be applied according to plant needs, seasonal weather patterns, and the soil's water-holding capacity. Depending on specific site conditions, water can be applied with sprinklers, borders, or water spreaders.

Sprinkler Irrigation

Sprinkler irrigation is one of the most efficient irrigation methods. However, the cost of developing, installing, and operating the system should be evaluated. Fancy, over-developed irrigation systems are a common feature on many bankrupt ranches in western Montana.

Sprinkler irrigation usually provides a more even distribution of water than other methods. It can be used on rolling topography. It is the most efficient way of irrigating coarse, sandy soils. Steep slopes can be irrigated with less erosion hazard.

Center pivot systems require special features for use in intensive grazing programs. Special gates have been designed to allow the wheel lines of the system to roll over the fences. Additional information on sprinkler irrigation systems is available in Extension Cir. 1199, "Choosing Proper Irrigation Methods."

Flood Irrigation

Flood irrigation entails spreading water over a unit of land. Border dikes, cross-ditches, or water spreading systems are used to control the water. Although a properly-designed flood irrigation system is economical, poorly-designed systems are labor intensive.

In border irrigation, water is applied between low parallel dikes on nearly level land. It is an efficient way of irrigating many pastures. The length and width of a border strip depends on available water supply and the intake rate of the soil.

Waterspreading is a form of flood irrigation accomplished by diverting and spreading runoff from sloping areas over adjacent flood plains (Fig. 1). A system of dams, dikes and ditches is designed to control the diversion and spreading of water.

Fig. 1 A range water spreading system that collects water from 1060 acres and spreads it over 275 acres

Systems are constructed so that operation is usually automatic whenever sudden, torrential storms occur.

Most waterspreaders are located in the Northern Great Plains, not in the foothills and mountains. Because the availability of water is not reliable from year to year, a water-responsive yet drought tolerant native species such as western wheatgrass is well-suited for waterspreaders. Four- to ten-fold increases in forage production are possible. Forage produced on waterspreaders is usually harvested for hay. Regrowth is frequently grazed in the fall and winter. However, most waterspreaders cannot be managed as "irrigated" pastures due to unpredictability of water supplied by precipitation.

Species Selection for Irrigated Pastures

The best forage species for irrigated pastures depends upon the landowner's objectives and managerial abilities. The forage species needs to be:

1) Adapted to climatic and soil conditions;
2) Capable of high forage yields with increasing inputs (i.e. fertilizer, grazing systems, water management);
3) Long-lived;
4) Palatable to livestock;
5) Nutritious; and
6) Capable of regrowing after grazing or haying.

Cool season species are recommended for most irrigated pasture seedings in Montana and Wyoming. Most of their growth occurs in late spring and early summer. Although warm season grasses are available for irrigated pastures in other regions, additional research must develop and evaluate new cultivars before their use is widely recommended in Montana or Wyoming. The cool season species and cultivars recommended for seeding irrigated pastures are described in Table 1.

Seeding a single species to establish a monoculture is rarely recommended for irrigated pastures. Simple mixtures are more diverse and stable. Because of differences in rooting, characteristics and phenology, two or more species usually make better use of available nutrients and water than does a monoculture. Thus a mixture will usually be more productive than a monoculture. With uniform soil chemical and physical characteristics, simple mixtures are appropriate.

Simple mixtures of one or two grasses and a legume often produce as much or more high quality forage than does a single species or a complex mixture. Simple mixtures are also easier to manage. With proper grazing, desirable plant composition and a dense ground cover can be maintained while providing satisfactory levels of forage production and livestock gains.

Complex mixtures may be appropriate where water tables, sodic and saline concentrations, and soil characteristics are variable. In this situation, a single species may not be adapted across the entire area. Because the individual components of an area may be too small to seed or fence separately, a more complex mixture should be sown.

Each cultivar will "sort out" and become established within the area to which it is best adapted. A typical mixture on a saline soil with high water tables may include: 'Shoshone' beardless wildrye, 'Prairieland' Altai wildrye, 'Kenmont' tall fescue, and 'Garrison' creeping foxtail. Seed for this mixture is expensive. To reduce cost, soil analyses should be used to identify areas that are large enough to be seeded with a simple mixture.

Grasses and legumes differ as to season of growth and dormancy. Each species in a mixture should serve an identifiable purpose and be compatible with other species. Grass and legume cultivars in a mixture should have similar palatability when used for either hay or pasture (Table 2). This provides for more uniform pasture grazing, higher quality hay if cut at the proper growth stage and stand longevity.

Combinations of legume and grass species are recommended for most seedings. Alfalfa is a commonly used legume. However, alfalfa is intolerant of high water tables and has a higher bloat hazard. Ladino clover, birdsfoot trefoil, cicer milkvetch, alsike, red and strawberry clovers may be used in areas with high water tables. Characteristics that influence a specie's usefulness in irrigated pastures are summarized in Tables 1 and 2.

Alternate row or cross-seeding grasses, separate from the legumes, is a way in which the desired mixture can be established. The practice also extends the life of the seeding. Maintaining a desired legume-grass mixture on pasture land is often difficult because the legume declines due to winterkill, preferential grazing pressure or fertilizer practices.

Bloat is a potential problem with most legumes. Risk of livestock loss is reduced if legumes make up less than 40 percent of the stand and if an anti-bloating compound such as proloxene is fed. No case of bloat has been documented from birdsfoot trefoil, cicer milkvetch or sainfoin. However, these species are not as productive as alfalfa, are harder to establish, and in the case of sainfoin, short-lived.

Root proliferating alfalfa cultivars, such as Spredor-II, are better choices for irrigated pastures than are the tap rooted alfalfas such as Ladak. They resist grazing pressure, cause less bloat, and persist longer under grazing than do the crown or hay types.

'Regar' meadow bromegrass, 'Remont' sainfoin, and birdsfoot trefoil is an excellent mix for many irrigated pastures. The Regar and Remont dominate the initial stand and provide forage for either haying or grazing. Although the birdsfoot trefoil is slower to establish, over time it replaces the sainfoin.

Seedbed Preparation

Success in establishing an irrigated pasture requires careful planning and timely preparation. Unlike the cereal grains, grass seeds are small and germinate slowly. They should be seeded from 1/4 to 1/2 inch deep for optimal seed-soil contact. Seedbeds should be level, firm and moist. The seedbed should be firm enough that a person's footprint does not go deeper than a quarter of an inch. All weeds need to be controlled to reduce competition and enhance grass establishment.

Many different tillage methods and kinds of equipment can be used to prepare a seedbed. Each producer has a unique set of machin-

ery. If the available machinery and equipment cannot prepare a suitable seedbed, the job should be contracted to an individual with equipment and experience in establishing grass stands.

Two types of seedbeds are recommended for seeding irrigated pasture—conventional (or clean till) and standing stubble. The conventional seedbed can be prepared with a tool bar using sweeps or chisels, a moldboard plow, or other types of equipment. A long term supply of phosphorus should be applied prior to chiseling or plowing. After smoothing and firming, seed is planted directly into the seedbed using a disk or furrow drill.

Seed can also be interseeded directly into most cereal grain stubble on coarse to medium textured soils. Cereal grain stubble provides a firm seedbed and a favorable micro-climate for grass seedling establishment. However, competition from volunteer grain, cheatgrass, and other weeds makes it difficult to establish a dormant seeding in winter wheat stubble. Furthermore, straw should be removed from the field or shredded and uniformly distributed. This improves the seed-soil contact and reduces chaff toxicity. Double disc drills or deep furrow drills with acra-plant openers are usually used for stubble plantings.

Competing vegetation must be removed before range or pasture land is converted to irrigated pasture. It is often advisable to grow cereal grain crops for a year or two. The tillage and time will allow the high organic matter content, i.e. root and shoot masses, to decompose into mineral soil. High-organic-matter soils make poor seedbeds because they are difficult to firm. They also dry rapidly and the seed soil contact for seed germination is inadequate. Crop rotation is especially important on old pasture land because it breaks disease and insect cycles.

Many landowners want "instant" results and try to interseed improved species into an existing plant community. However, numerous studies have shown that interseeding into mixed plant communities is not to be recommended. There is too much competition for water and nutrients from existing vegetation, and sometimes there may be allelopathic toxicity from living or dying and decaying vegetation. Therefore, interseeding is not recommended unless the existing vegetation is of a single species and can be destroyed with labeled herbicides prior to interseeding.

‘Garrison’ creeping foxtail is an exception to the above rule. It can be established in an existing stand of other species. Garrison is very opportunistic and aggressive on wet sites. It has established itself in wet meadows dominated by wiregrass and sedges. Garrison’s establishment increases the forage value and productivity of these wet sites.

Establishing Garrison in wet sites that cannot be farmed is possible by feeding Garrison hay on the site or broadcasting seed over the area. Livestock hoof action will plant the seed and with proper irrigation and fertilizer, Garrison can establish and eventually crowd out the less-desirable forage species. Although the process may require five to ten years, it is often the cheapest way to establish Garrison.

Fertilizer

Nitrogen fertilizer should not be applied before the stand is seeded nor during the first growing season. It generally benefits annual grasses and weeds at the expense of more slowly establishing perennial forage species.

Adequate amounts of phosphorus, potassium and sulfur are needed to enhance root growth. Thus, materials should be applied during seedbed preparation at rates determined by soil analyses.

Planting

A grass/grain drill equipped with an agitator, double disc openers, depth bands and packer wheels is the ideal grass drill. This type of equipment will allow positive seed placement at the proper depth, with good seed-soil contact for moisture retention. However, with a properly prepared seedbed, many shortcomings of a drill can be overcome. For example, a good firm seedbed will allow a drill without depth bands to place the seed properly if the spring tension on the openers is relieved. If the drill is not equipped with packer wheels, the field can be rolled or cultipacked following seeding. Drills equipped with shoe openers can be modified by fastening delivery tubes behind the openers so that the seed falls in the furrows and is properly firmed with the packer wheel.

Companion crops (usually cereal grains) compete for water, light and nutrients. They reduce seedling vigor and growth, and delay, suppress, and shorten the productive life of the stand. Although companion crops are not recommended, they are less damaging when seeded at light rates and harvested for hay. To minimize the economic cost of deferring grazing until the new stand is established, the grass should be seeded in late summer, immediately following the grain harvest. This strategy does require a reliable source of irrigation water to insure adequate establishment.

Irrigation

Sprinkler or flood methods of irrigation are suitable for forage establishment. Light sprinkler irrigations are best because the surface soil can be kept moist until seedlings have emerged. The crust of most soils can be broken by a roller, rotary hoe, or by sprinkler or corrugate irrigation.

Weed Control

Early removal of weeds eliminates competition and allows establishment of a vigorous forage stand. Weeds can be controlled using labeled herbicides or by mowing prior to seed set.

Table 1. Adaptation characteristics of forage species and cultivars recommended for irrigated pastures in Montana and Wyoming. [1]

FORAGE CULTIVAR ADAPTATION CHARACTERISTICS			
Common and Scientific Name	**Cultivar**	**Release Origin**	**Unique Characteristics**
INTRODUCED GRASSES			
Beardless wildrye *Leymus triticoides*			Rhizomatous species responding to high fertility levels; slow to establish; very palatable forage.
	Shoshone	1980-MT & WY	Most wet-saline-alkaline tolerant species tested; seed dormancy requires late fall planting or scarification for spring planting.
Meadow bromegrass *Bromus biebersteinii*			Slightly rhizomatous; compatible with legume component.
	Regar	1966-I	Rapid seed germination; lax basal leaves; good regrowth; excellent hay or pasture.
Smooth bromegrass *Bromus inermis*			Strong sod formers; southern types—good erosion control; northern types—leafy, good in legume/grass mixtures.
	Manchar	1943-WA	Intermediate between weakly spreading northern types and aggressive sod-forming types; good pasture type.
	Lincoln	1942-NB	Aggressive sod-forming type (southern type); good seedling vigor and easy to establish.
Altai wildrye *Leymus angustus*			Slightly rhizomatous; seedlings slow to establish.
	Prairieland	1976- Canada	Saline tolerance less than tall wheatgrass; deep rooted, retains good nutrition into fall and winter; Canadian release.
Tall wheatgrass *Thinopyrum ponticum*			Bunchgrass; saline/sodic tolerant; requires high level of management for production.
	Jose	1965-NM	Leafy; medium tall; less coarse and more palatable than other tall wheatgrasses.
	Alkar	1951-ID & WA	Good seedling vigor; tall; late maturing stemmy type.
	Largo	1937-NM	Large coarse, and deeply rooted; late maturing.
Orchardgrass *Dactylis glomerata*			Upright tillering bunchgrass; very palatable. Cultivar selection should be based on maturity and environment.
	Latar	1957-WA & ID	Late maturing; leafy; hay type-maturity corresponds with alfalfa.
	Chinook	1959- Canada	Early maturing, most winter hardy orchardgrass; vigorous spring growth, good fall dormancy.
	Napier	1964-IA	Early maturing; good winter hardiness; rust resistant.

[1]Irrigated or nonirrigated with >18 inches of annual precipitation, subirrigated, overflow or run-in moisture. Under these conditions, Timothy, Intermediate and pubescent wheatgrass and similar species are not usually recommended.

Table 1. (continued)

Common and Scientific Name	Cultivar	Release Origin	Unique Characteristics
INTRODUCED GRASSES (continued)			
	Potomac	1954-East coast	Early maturing; recommended for pasture; good regrowth.
	Kay	1980-Canada	Late maturing; grows rapidly in cold, wet conditions; less resistant to hot, dry weather; winter hardiness similar to Chinook
	Pennlate	1957-PA	Late maturing; recommended for pasture and hay; maturity corresponds with alfalfa.
	Comet	Northrup King	Early maturing; good winter hardiness; resistant to rust.
Tall fescue *Festuca arundinacea*			Adapted to wet heavy soils; should be grazed close for animal acceptance and food value.
	Alta	1940-OR	Hardy; remains green during summer; good forage yield.
	Fawn	1964-OR	Mid-season production superior to other cultivars tested in Montana; good spring vigor.
	Kenmont	1963-MT	Mid-season production superior to other cultivars tested in Montana.
Creeping foxtail *Alopecurus arundinaceus*			Strongly rhizomatous; well adapted to wetland pastures; fluffy seed difficult to plant.
	Garrison	1959-ND	Produces good yields of high quality forage on wet sites; high N user.
	Retain	1979-SD	Less seed shattering in seed production.
Kentucky bluegrass *Poa pratensis*			Best adapted to well drained soils; tolerates a low management level.
	Troy	1955-MT	Vigorous pasture strain; early maturing; tall erect open-sod strain.
INTRODUCED LEGUMES			
Alfalfa *Medicago sativa*			Excellent legume; root proliferating or creeping types maintain stands longer and are more grazing tolerant than crown types.
	Ladak-65	MT	Crown type; very good cold tolerance; slow cutting recovery; very winter hardy.
	Iroquois	NY	Crown type; good cold tolerance; medium cutting recovery; winter hardy.
	Spredor 2	1982-US	Root proliferating; good vigor; rapid recovery; very winter hardy.
	Rambler	1955-Canada	Creeping root; slow cutting recovery; excellent winter hardiness.
	Roamer	1966-Canada	Creeping root; slow cutting recovery; excellent winter hardiness.
	Rangelander	Canada	Creeping root; slow cutting recovery; excellent winter hardiness.
	Drylander	1971-Canada	Creeping root; slow cutting recovery; more winter hardy than Roamer or Rambler.
	Travois	SD	Root proliferating; rapid recovery; same winter hardiness as Rambler.

Table 1. (continued)

Common and Scientific Name	Cultivar	Release Origin	Unique Characteristics
INTRODUCED LEGUMES (continued)			
Sainfoin *Onobrychis viciaefolia*			Shortlived, very palatable, non-bloat.
	Remont	MT	Released from MSU for regrowth following harvest; susceptible to crown rot.
Birdsfoot trefoil *Lotus corniculatus*			Non-bloat legume; slow to establish; nutritive value better than alfalfa; reseeds itself.
	Tretana	MT	MSU release; winter survival equals Leo; slow spring/rapid mid-season growth.
	Empire	NY	Leafy, late maturing semi-erect; long lived; hay or pasture type.
	Leo	Canada	Winter survival better than Empire; vigorous early spring growth.
	Dawn	MI	Comparable to Empire; has greater resistance to root rots, leaf and stem diseases.
Cicer Milkvetch *Astragalus cicer*			More frost and moisture tolerant than alfalfa; non-bloat; cutting recovery slow.
	Lutana	1970-MT	Rhizomatous, decumbent; requires low fertility; forage yield slightly less than alfalfa
	Monarch	1980-CO	Improved seedling vigor and better stand establishment than Lutana.
Clovers *Trifolium sp.*			An alternative legume for situations where alfalfa is unsuited. Some are bloat-prone.
Alsike *Trifolium hybridum*			Adapted to wetland areas; compatible with Garrison creeping foxtail in mixtures, more productive than strawberry clover.
Red Clovers *Trifolium pratense*			
Medium Red Clover			Two-cut type; second cut matures about the same as alfalfa; use where irrigation is full season.
	Dollard		Resistant to northern anthracnose.
	Kenland		Resistant to southern anthracnose; yields better in first year compared to Dollard and Lakeland.
	Lakeland		Highly resistant to northern anthracnose and powdery mildew.
Mammoth Red Clover			Single-cut type; makes little regrowth following harvest; use where irrigation is limited; later maturing than medium.
	Atlaswede		Use in short-term hay-pasture programs; only cultivar recommended in Montana based on MSU |trials.
Strawberry Clover *Trifolium fragiferum*			Good for high moisture sites; tolerates moderate salinity; prefers deep heavy soils, grazing type.
White Clovers *trifolium repens*			
Small leaved			Short stolon; prostrate; adapted to grazing.

Table 1. (continued)

Common and Scientific Name	Cultivar	Release Origin	Unique Characteristics
INTRODUCED LEGUMES (continued)			
Medium leaved			Intermediate between small and large leaved types.
Ladino			Large leaved type: tall with long stolons; used for hay.
NATIVE GRASSES			
Reed canarygrass *Phalaris arundinacea*			Adapted to poorly drained soils subject to flooding; alkaloids may limit animal gains.
	Ioreed	1946-IA	Hardy, vigorous moderately productive with good leaf disease resistance.
	Frontier	1959-Canada	Tall, leafy and late in maturity; adapted to high fertility soils with adequate moisture.
	Palaton	1983-IA	Low alkaloid content for grazing; more palatable than Frontier or Ioreed.
	Venture	1983-IA	Low alkaloid content for grazing; more palatable than Frontier or Ioreed.
Western wheatgrass *Pascopyron smithii*			Sod former; moderately saline tolerant; cured foliage retains good nutrition.
	Rosana	1972-MT & WY	Originates in Rosebud County, Montana; selected for seedling vigor and ease of establishment.
	Rodan	1983-ND	Vigorous, leafy type adapted to same areas as Rosana; similar in forage yield to Rosana.
	Arriba	1973-CO & NM	Originates in southern Colorado; released for dryland hay, grazing and conservation; adapted to southeast Montana.
	Barton	1970-KS	Intermediate between northern and southern types; strongly rhizomatous leafy erosion control type.

table 2

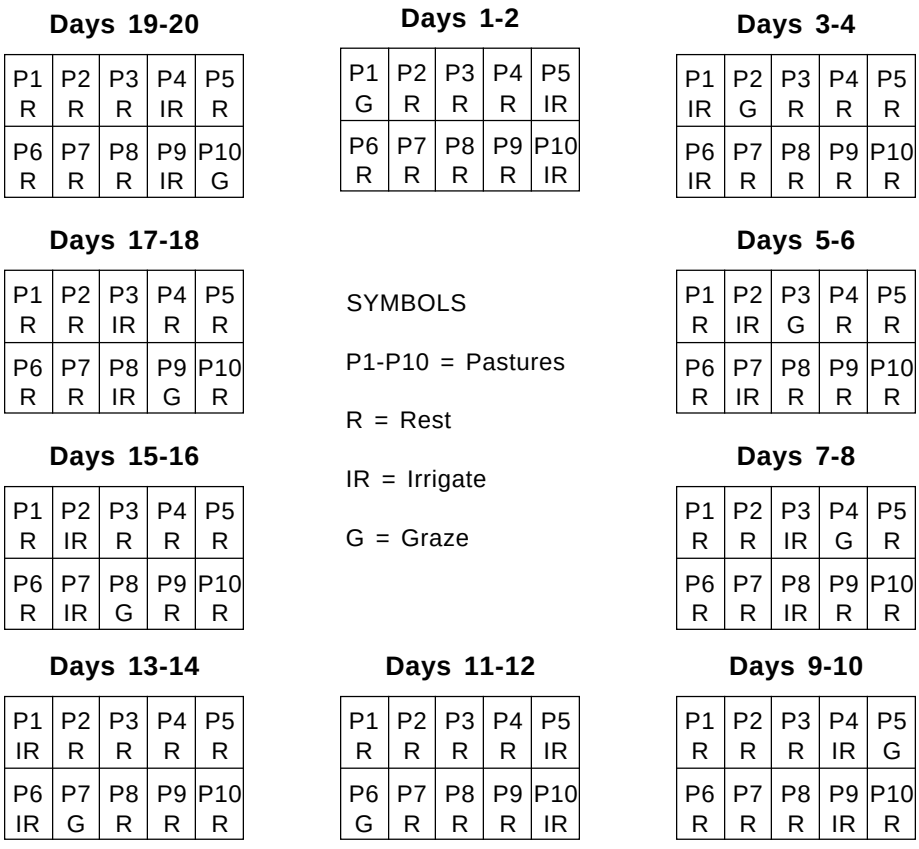
Management of Irrigated Pastures

Highly productive irrigated pastures are similar in many respects to other crops. They require fertile soil and proper management. Some landowners use irrigated pastures to maximize production of lamb or beef — they evaluate it as an alternative to other economic crops. Others use irrigated pasture to complement dry land forages. Better reproductive performance and higher weaning weights are possible.

Many irrigated meadows occurring along streams in small mountain valleys and in large, seasonally-flooded lowlands along rivers annually produce about 2,000 pounds of low-quality forage per acre. Low productivity is due to: 1) low soil fertility, 2) excessive flooding in the spring and drought in the summer, 3) a short, cool growing season, 4) species that have low productive potential, and 5) poor grazing management. Poor grazing management is usually the factor limiting productivity. Proper grazing management is the key to maintaining productivity.

Fig. 2. Example of a 10-pasture rotation system for irrigated pasture with suggested grazing, resting, and irrigation dates for each pasture. Length of rest and grazing periods should vary during the growth season. The rotational scheme should be repeated throughout the grazing season.[1]

1 More pastures require an earlier turnout, or the pastures grazed near the end of the rotation will be maturing, thus reducing regrowth and nutrition.



[1] More pastures require an earlier turnout, or the pastures grazed near the end of the rotation will be maturing, thus reducing regrowth and nutrition.

A grazing management system defines recurring periods of grazing and rest for two or more pastures. When used correctly, grazing systems are relatively inexpensive, efficient tools for plant management. To be successful, a grazing system must be specifically tailored to match the physical and vegetation characteristics of the land as well as the financial condition and managerial ability of the operator.

Livestock should be moved from pasture to pasture based on plant growth in a rotation grazing system. Rotation grazing is more productive than season-long grazing where animals are grazed on a single pasture for an entire grazing season.

Productivity of irrigated pasture increases with the level of grazing management. A rotation system among four or five pastures does not allow maximum forage production. Additional pastures allow more animals to graze smaller areas for shorter periods of time. This shortens the actual grazing period and lengthens the rest time between grazing events. Livestock distribution is improved and plant use is more uniform. For example, the ten-pasture rotation system shown in Figure 2 might prove satisfactory. It would allow livestock to be rotated to fresh pasture every two to three days. Plants would have from 18 to 27 days to regrow between grazing periods. However, this rest period may still be too short except for early in the growing season. Strip grazing—where temporary fence is moved every few hours—may be the best approach to maintaining the highest level of productivity.

Table 3. Minimum heights of plants to begin grazing and minimum heights to maintain through growing season.[1]

Species	Beginning Grazing		Height to Maintain (inches)
	Approximate Date[2]	Minimum Height (inches)	
Grasses			
Beardless wildrye	May 1	5	4
Altai wildrye	May 1	6	5
Creeping foxtail	May 1	5	4
Kentucky bluegrass	May 1	4	3
Timothy	May 1	6	4
Western wheatgrass	May 1	5	4
Tall Fescue	May 5	6	4
Orchardgrass	May 10	6	4
Reed canarygrass	May 15	8	8
Regar brome	May 15	6	5
Smooth brome	May 15	6	4
Tall wheatgrass	May 15	8	8
Legumes			
Alsike Clover	May 1	4	3
Birdsfoot trefoil	May 10	5	4
Common white clover	May 10	3	3
Red clover	May 10	6	5
Alfalfa	May 15	6	6
Cicer milkvetch	May 15	4	3

[1] *Stubble heights are more critical following fall-grazing, and going into winter. Stubble insulates plants from winter injury.*

[2] *Approximate dates vary greatly with elevation, latitude, and annual growth season conditions.*

Plant growth and successful regeneration require that green leaves and stems manufacture more food than what is used. The higher the stubble following grazing, the faster the rate of regrowth. The amount of top growth that should remain after grazing varies with plant species, environmental conditions, and the time of year. Most pasture forages should not be grazed shorter than four inches during the growing season (Table 3) if adequate and rapid regrowth is a goal.

Smooth bromegrass should occasionally be grazed to a two to three inch stubble. The practice is recommended to enhance the persistence of alfalfa in an alfalfa-smooth

bromegrass mixture. Under rotational grazing, the close grazing reduces the competitive ability of smooth brome relative to alfalfa.

Several cultural practices are recommended for maintaining productive irrigated pasture:

1) Legume-grass mixtures can be manipulated by fertilizer applications. Grass is stimulated by nitrogen and legume by phosphorous. Proper combinations can maintain a desirable species composition. Apply fertilizer in split applications as indicated by soil test. Split applications are recommended because the efficiency of fertilizer use is enhanced and potential contamination of surface and subsurface water is reduced.

2) Irrigate according to plant and soil needs. Water should be applied immediately following grazing. Do not graze a pasture while it is being irrigated, or until the soils have dried.

3) Combination of grazing and periodic haying may improve the persistence of legumes over grazing alone.

4) Mowing old "wolfy" plants should not be necessary if pastures are intensively managed. However, animal numbers may not be adequate to efficiently harvest the forage during periods of rapid plant growth. Some pastures may have to be harvested as hay or clipped.

5) Weeds should not be a problem when pastures are properly managed. Proper management includes weed control practices when they are needed.

6) Harrowing to breakup and distribute manure is recommended, especially prior to green-up in the spring.

7) Feeding hay on irrigated pastures compacts soil and reduces forage production. If hay is fed on irrigated pasture, light mechanical tillage is recommended to improve infiltration and soil aeration.

8) Most irrigated pasture species require re-establishment every eight to ten years to maintain optimum long-term production. However, forage yields in the short-term can be increased by proper cultural practices. For example, smooth bromegrass becomes sod-bound over time and produces little forage. When this happens, the smooth brome can be stimulated by chiseling and nitrogen fertilizer.

Summary

Irrigated pastures can be an economical use of productive land. They are a forage resource that can enhance the profitability of livestock production. However, successful management of irrigated pastures requires more capital and labor than does dryland pasture management. Suitable forage species, irrigation and an intensive grazing system are recommended. Economic returns will vary directly with site productivity and level of management.

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