

Central Washington Animal Agriculture Team



Fact Sheet # 1003-2003

Irrigated Pastures for Livestock in Yakima County

W. Frank Hendrix, Yakima County Extension Agent

Forage Production Goals:

A well-managed irrigated pasture can supply most of the nutritional requirements of grazing animals. Managed irrigated pasture is high in digestible nutrients. Livestock animals harvest the crop so limited labor is required to maintain pasture production.

With proper management, irrigated pastures can last and be extremely productive for decades. Irrigation, fertilization and grazing management are keys that contribute to longevity, production and forage quality within a sustainable irrigated pasture system. At a high level of management an irrigated pasture may allow three or four times the stocking rate as a poor level of management. High economic returns have been recorded from well-managed pastures. These returns compare favorably with other high value farm crops.

Prior to irrigated pasture establishment, time should be spent setting forage production goals. These goals should be compatible with the soil and water resources, livestock goals, livestock species and the quality of life considerations of everyone involved in the operation. The goals are important and will affect the establishment and management decisions a producer makes, such as, which plant species to select and what grazing system is used.

ESTABLISHMENT

Planning:

Planning for an irrigated pasture should include the soil resource, the availability of irrigation water, the level of management desired, climate, topography, elevation and livestock species. Productive pastures can be established on a wide range of soil types, providing the plant varieties are matched to the soil type.

The number of pasture divisions or paddocks should allow 24 to 35 days of rest and regrowth between grazing during the warm part of the growing season. This rest period will allow the forage plants to reach recommended height for grazing and help maintain a strong, healthy pasture. Irrigated pasture division into six to eight grazing paddocks with four to five days of grazing in each paddock approaches an ideal management and production balance for most producers. Higher density, short duration grazing will require more pasture divisions, but can be much more productive. Production reaching and exceeding 2,000 pounds of beef per acre can be achieved under highest management levels.

Planting Suggestions:

Pasture can be established in either spring (mid April to early May) or late summer (August to October). There are

several advantages to the late summer seeding date. Competition from annual weeds will be significantly less. Fall seeded pasture germination occurs faster and higher production levels during the first grazing year will be seen. With spring seeding, most of the grazing season will be lost establishing the pasture; it should not be grazed until fall. A fall seeded pasture will be ready to graze during the following spring.

Production and harvesting of an annual crop (barley, oats, triticale, wheat) prior to seeding pasture in the late summer works into many management operations and decreases competition from weeds.

Seedbed Preparation:

Good soil-to-seed contact is essential to keep in mind during preparation of the seedbed. The seedbed should be fine but firm. The soil needs to be firm enough to allow moisture to move upward to the seed.

A firm seedbed will hold moisture close to the soil surface, helps control the depth at seeding and provides anchorage for young seedling roots. To obtain a firm seedbed several methods may be used. One method is plowing to bury surface residue, then disking and harrowing until the seedbed is fine. Packing or rolling of the seedbed may be necessary to firm the seedbed using this method. Another method is to rototiller the soil. A harrow may need to be used to finish seedbed preparation in this case.

Seeding Depth:

Seeding depth is one of the critical things that often affects the pasture plant population. Forage grasses and legumes seeding depth should not exceed ½ inch in fine and loamy textured soils. Depth should never exceed 1 inch. Smaller seed sizes require less depth, so when seeding a pasture mix, the depth should favor the smaller seed size.

Seeding Methods:

Many differing ways can be used to

plant a pasture. Probably the best method is the use of a Brillion seeder. The Brillion deposits the seed between two sets of corrugated roller packers, which gives excellent soil-to-seed contact and places the seed at the depth of ½ inch.

Disked grain drills can be successfully used by either very shallow settings of the disks or setting the disks down approximately an inch and disconnecting the seed delivery tubes. Dragging a chain or a roller/packer behind the drill can be beneficial.

Broadcast method can also be used. If broadcasting seeding method is used packing or rolling the soil should be done before and after the broadcasting of the seed. This will give better soil-to-seed contact and greatly enhance seedling survival. Harrowing after broadcast seeding is not recommended because much of the seed will end up being too deep.

Frostseeding is a method that is used in other countries more than here in the US. This method works well but timing is critical and some species work better using this method than others. On a personal note, I have experimented with and used this method and have been pleasantly surprised at the results in most cases. Frost seeding is a method of planting irrigated pasture most commonly used in spot seeding of an open area or in rejuvenation of an existing stand. The seed is broadcast on the soil during the early spring (January/February) when the soil is frozen in the morning but is thawed in the afternoon. The freeze-thaw occurring each day will work the seed into the soil. This method of seeding is widely used in other areas of the world. Some species of grass (fescue and ryegrass) and most legumes respond well to this method of seeding.

Plant Selection:

The selection of plant species for irrigated pastures will depend on forage production goals, soil type and condition, soil pH, subsurface moisture, availability of water, climate, physical attributes of the pasture and, to some extent, species of

animals that will graze the pasture. Some forage species are more suited for some management regimes, soil types and conditions than others. For most situations a single grass species or a grass-legume mix is recommended, but the highest production irrigated pastures are single species legume. High management precautionary practices are needed with straight legume pastures to prevent bloat.

Seasonal variation in the growth rate of forage plants is normal. Cool season grasses (orchard grass, tall fescue and ryegrass) are most productive in the first two or three months of the growing season. Growth and production taper off as temperatures increase in the summer months. Legumes (alfalfa, clovers and trefoils) produce more of their growth as the temperatures rise in the summer.

In deep, well-drained soils, the most commonly recommended grasses are orchardgrass, perennial ryegrass and tall fescue. All species are high producing and palatable. Perennial ryegrass is not as winter hardy but is the easiest to establish and reestablish by frostseeding or overseeding. Orchardgrass has several varieties that mature at different times, early versus late. If the pasture is going to be an orchardgrass-legume mix it is recommended that a late maturing orchardgrass variety be seeded. This will bring the maturity of the grass and legume closer together for easier management. Tall fescue has some new varieties that are excellent producers and very palatable. Some of the older varieties lacked palatability. Tall fescue tends to come out of dormancy faster than orchardgrass or ryegrass and is easier to establish than orchardgrass.

For wet or alkaline type soils or areas that get abused such as in pathways or around stock tanks, tall fescue varieties are recommended. Care should be taken to either purchase only certified endophyte free tall fescue seed or to purchase a new variety with non-toxic endophyte (MaxQ).

Inoculation of Legume Seed:

One of the reasons to include legumes in the pasture mix is the ability legumes have to fix nitrogen from the air and deposit it into the soil. This is done by bacteria in nodules on a legume plant roots in a symbiotic relationship. Legume nitrogen fixing can lower the need for chemical fertilizers in the pasture. Always check to be sure that legume seed has been pre-inoculated with the nitrogen-fixing bacteria before planting. If it has not been pre-inoculated or you are not sure, the seed should be inoculated prior to planting. Use the inoculum that is specific to seed you are going to plant and follow the label directions. After inoculation the seed should be kept out of direct sunlight until it is planted. Sunlight can kill the bacteria that we need on the seed.

Companion or Nurse Crop:

In most, if not all, regions of Yakima County nurse or companion crops seeded during pasture establishment is not recommended. Historically, they were recommended in situations where wind erosion was a significant problem. Companion crops do not help forage plant establishment. They have a negative affect in establishment due to shading and competition for moisture. Tests show a significant decrease in forage plant population when a nurse crop is planted at the same time. A friend of mine with 60 years of pasture experience calls nurse crops, curse crops. I agreed with that analogy.

Fertility Management:

It is wise to take soil samples before planting a pasture to determine the amount and type of fertilizer needed. There are variations not only between farms but also between fields on the same farm. Soil tests are essential in the development of a cost effective fertility program.

Annual soil testing is the best tool available to maintain adequate soil nutrients. Soil testing eliminates the guesswork involved in deciding what and how much fertilizer to use. Soil testing

should include macronutrients, such as nitrogen, phosphorus, sulfur, potassium and micronutrients such as boron, molybdenum and zinc.

Nitrogen (N): Grasses are heavy users of nitrogen. In order for irrigated pastures to stay healthy, vigorous and productive they need an adequate supply of nitrogen. The amount of nitrogen required depends on: 1. The density of the stand, 2. Species of forage plant, 3. Length of growing season and 4. Management. Some management factors that will influence nitrogen needs are irrigation, grazing management, percentage of legumes in the pasture and if the legumes were inoculated.

In legume or grass-legume pastures containing 50 percent or more of a well nodulated legume, little or no fertilizer may need to be applied. With grass-legume pastures containing less than 50 percent legume, 60 to 150 pounds of actual nitrogen per acre will need to be applied. With legume mixes care must be taken to not apply more than 40 pounds of actual nitrogen at any one time, because it may inhibit the nitrogen-fixing bacteria in the nodules of the legume plants.

In poor stands, composed mostly of grass, applications up to 150 pounds of actual nitrogen per acre is advised. High yielding grass pastures may require 240-320 pounds of actual nitrogen for maximum production.

Nitrogen is easily leached through the soil profile and beyond the pasture root zone. Ideally, nitrogen application should be divided into several (3-4) applications during the growing season. No one application should be more than 60 pounds of nitrogen per acre. Management to control over irrigation is important to prevent nitrogen leaching.

Phosphorus (P): Phosphorus is required by plants for strong root growth and meristem production. It is especially important in the establishment of new pastures, because it promotes early

development of the plants, increases root growth and hastens maturity. Phosphorus does not move through the soil profile and is needed by plants in very small amounts. If phosphorus is needed it is recommended that it is applied in the fall.

Legumes require more phosphorus than grasses. It is important that phosphorus is adequate to support strong stands of legumes within the pasture. Soil testing is important to monitor phosphorus.

During the last several years phosphorus deficiencies have been found in many pastures and grass hay fields within the Yakima Valley. Historically, few phosphorus problems have been seen in the region, but it is worth checking with a soil test.

Potassium (K): Potassium or potash is important for the hardiness of disease resistance of grasses. Soils typical to Yakima County contain sufficient amounts of potassium. In areas where land leveling has been done there is a need to check for adequacy.

Sulfur (S): Sulfur is essential to new growth in a plant. It is often deficient in the Yakima Valley soils. There are several products available to provide sulfur, so it may be necessary to contact a local fertilizer supplier to find the most economical product available.

There are several other micronutrients like Zinc and Boron that need to be checked in soil testing. Most of these are needed in very small amounts, but if deficient they should be applied.

pH: The ideal soil pH for irrigated pasture is 7.0. A soil test is necessary to learn the pH of the soil within your irrigated pasture. At acidic pH levels (less than 5.5) liming may be needed to obtain maximum production levels. At basic pH levels (7.5 or above) it may be necessary to change grass species or to apply acidifier type fertilizers like ammonia sulfate for several years before maximum production can be realized.

PLANT SPECIES FOR IRRIGATED PASTURES

Below is a table showing the recommended seeding rates of some of the species of irrigated pastures. From personal experience, I always exceed the recommended rates of seed application per acre. In some cases, I have doubled the rate. The reason I have done this is that an irrigated pasture, if managed well, has an indefinite productive life. Spending an additional \$20 per acre when amortized

over ten to twenty years is a good investment. I would rather have an over population of plants than an under population of plants. An over population of plants has a tendency to inhibit annual weeds, undesirable species and lowers the need for herbicide use. Don't be cheap with the seed and make sure to plant only certified seed. There is nothing wrong with a new seeded pasture coming up resembling green dog hair.

Soil Conditions & Plant Combinations	Seeding Rate (lbs. Ac)		Remarks
	Alone	In combination	
Well Drained			
Orchardgrass	10-20	5-10	Very palatable, highly productive, good with alfalfa in a mix.
Alfalfa	10-18	5-9	Good production, manage for bloat.
Perennial Ryegrass	10-20	5-10	Very palatable, productive, dormant in heat, easy to establish, frostseeds well.
Tall Fescue	10-20	5-10	Tolerates low fertility, wetter sites, and hardy.
Red Clover	10-15	5-7	Productive, short-lived, not recommended for sheep.
White Clover, New Zealand, Birdsfoot Trefoil	8-10	4-5	Productive, palatable, longer lived, frostseeds well.
Wet Soils			
Meadow & Creeping Foxtail	6-12	3-6	Good in cool, moist areas, medium palatability
Reed Canarygrass	15-20	7-10	Good on flooded sites, drought tolerant, lower palatability.
Alsike Clover	8-10	4-5	Adapted to wetter soils, productive, palatable, short-lived.

Grazing Management:

Grazing management is the key to high yielding, sustainable, high quality pasture. A flexible grazing system needs to be established that can adapt to seasonal plant growth variations and change when needed. Monitoring of the plants and animals is needed to have a successful grazing system. Managing a grazing system with a mindset of being a grass farmer is the key.

It is very important to understand a little about grass physiology to be a successful grass farmer. The grass calendar starts early in the year. Grass plants start growing when the average air temperature hits 43 degrees. If the temperature, for example, is 25 degrees on a morning and 62 degrees in the afternoon on February 23rd the pasture has started growing. Animals should be removed from the pasture until a 10-inch height is accomplished. Leaving animals on an early growing pasture severely lowers total annual production due to damage to meristem formation, elongation and production. It is also important to understand that in August and September of every year the grass plant sets itself up for the following years production. Every meristem forming every stalk and blade of grass for the next year is produced at this time of year. It is critical that the pasture is not overgrazed and is adequately fertilized in the fall. Leaving additional stubble height (5 inches) from mid-August until mid-September or until dormancy occurs is of great benefit during the following year.

There are several generalized rules to follow in grazing. Start grazing in the spring when forage has reached an average height of at least 10 inches. Remove animals when an average of 3 to 4 inches of stubble remains. Allow 24 to 35 days of rest before re-grazing occurs.

The closer a grazing system manager can come to a hay producers management schedule the higher the production level of the pasture will be. A hay producer swathes (3 inches height) the crop and removes it as fast as possible. At

least 30 days of rest/regrowth occurs before the next cutting when the system repeats. The system of cutting or grazing then rest/regrowth can be as flexible as the grazing managers goals. Highest production of an intensive grazing system moves the animals to new paddocks twice a day. This system has a very high level of management. From personal experience, a grazing system set up with 6 to 10 paddocks and being flexible with livestock stocking rate gives high production and management levels of leisure responsibility.

Bloat Prevention and Control:

Management is key in the reduction of bloat associated with irrigated pastures:

1. Do not graze irrigated pastures before they obtain 10 inches of growth in the early spring. Later in the season the height is not as important as the first growth.
2. Do not turn livestock out into irrigated pasture containing legumes when the animals are hungry. Fill animals with roughage before turning them out. Do not let them get hungry before moving them into the next paddock.
3. A swath of pasture can be mowed and left to wilt before turning the livestock out on pasture.
4. Sell any chronic bloaters that end up in your herd.
5. Turn the animals out into the pasture in the evening with a few hours of grazing left in the day.
6. Plenty of fresh water and trace minerals should be available at all times.
7. Feed a product containing poloxalene to reduce bloat in alfalfa and clover pastures. This must be fed for approximately two (2) weeks prior to turn out to maximize effectiveness and must be continued while the animals graze.
8. I have found that combining 10 pounds of plain clothes washing soap (Tide) with a 50-pound bag of trace mineral to be very effective in reducing the incidence of bloat. A key to this system

is the animals must be consuming at least an ounce of the trace mineral mix each day. Another key is to make sure the animals have been consuming the product for two (2) weeks prior to turn out. I cannot recommend this soap procedure, but I have used it for 20 years and continue to use it.

Trace Minerals:

Trace minerals are an important part of a grazing system. Animals cannot perform properly if they are inadequate in any of many trace minerals. In Yakima County hard trace mineral blocks are not recommended. Livestock will need to spend too much time licking a hard block to get the level of trace minerals needed. Yakima County is severely deficient in selenium and mildly deficient in copper (warning – copper can be toxic to sheep). A granulated trace mineral product is recommended for all livestock species in Yakima County. In many locations of Yakima County high levels of salt (20% and above) is not needed nor advised. Trace mineral consumption should be monitored so that cattle are consuming an ounce per head per day, sheep ¼ ounce per head per day. Salt is a consumption-limiting ingredient in most trace minerals. My own livestock consume the correct level of trace mineral product with only 4% salt in the mix. Many trace mineral products made outside of the Yakima Valley contain 70% to 90% salt. These high salt products are not designed for this area of the country. Salt, selenium and copper levels should be set so the animals can consume the necessary levels without spending a great deal of time away from grazing. The consumption is easily checked by measuring out, for example, 10 pounds of trace mineral. Ten pounds is 160 ounces. If 10 cattle are in the pasture they should consume the 160 ounces of trace mineral in 16 days.

Trace mineral mixes are available that contain ionophores (Bovatec or Rumensin). These products aid in the digestion of forages within the rumen and have been shown to be of benefit.

Weed Control:

A well-established, adequately fertilized pasture is the best method of control for annual and perennial weeds. Well-managed pastures rarely have weed problems. The presence of weeds or an increase in the number of weeds is an indication of a management problem. The most common problems are improper grazing, improper irrigation and poor fertility management. Occasionally, additional control measures are needed.

Correct weed identification is necessary for control. Most perennial weeds are susceptible to herbicide at the bud or early flowering stage of development. Annual weeds are, in general, most susceptible at an early vegetative stage. Rules and recommendations for chemical control of weeds change from year to year. The best thing for a producer to do would be to contact the local county WSU Extension agent for current recommendations. Clipping or grazing can often be used to manage weed infestations without herbicide use.

Irrigation Management:

Irrigation schedules should be set in relation to the species demand, climate and soil type. Grass requires an even supply of moisture within the root zone for optimum growth and production.

Irrigated pastures use approximately 30 inches of water per acre during the growing season. Drastic over watering and under watering reduce production, health and longevity of forage plants. Different soil types require different irrigation schedules. In a loam type soil irrigation may be needed every 7 to 10 days. In a sandy type soil irrigation may be needed every 4 days or more frequently. An extremely vigorous pasture with a high level of production and a dense plant population will need more frequent irrigation than a lower producing pasture. A pasture manger using a soil probe can take all of the guesswork out of irrigation scheduling.

For optimum production a soil probe should be used to monitor the available moisture in the root zone of the pasture. Pastures should be irrigated when they reach 50% soil moisture holding capacity. For most soil types in the region, when a ball of soil probed from the root zone fails to stay in a ball in your hand 50% of the available moisture is gone. If the soil fails the ball test then it is time to irrigate again.

Renovation of Existing Pastures:

Renovation or upgrading of existing pastures is almost a science in itself. Some professional pasture managers believe that 15% of existing pasture acreage should be renovated each year. There are positive changes in grass varieties each year and to take advantage of new technology some irrigated pasture upgrading should be considered. After all, if Tall Fescue did not have the new palatable varieties few would want it in their pastures. Another example is the modified endophyte in the tall fescue variety MaxQ. MaxQ will be released in 2002; because of modified endophyte, forage production may increase by 20%.

An interseed drill is the best way to renovate pasture stands. This drill is designed to deposit seed in small trenches or cuts made by the drill within the existing forage stand. A packing wheel rolls the trench shut giving the seed good soil to seed contact. The new variety will eventually work into being the majority of the forage stand.

Frostseeding can also be used to renovate pastures. Soil to seed contact is needed for this to work. Any seed not making it to the soil will not sprout. Tight grazing of the area to be renovated is advised. After seeding livestock can be used to help plant the seed using hoof action. Some forage varieties work better than others using this method. Contact your local Washington State University Extension faculty for more information.

Answers to Questions:

If questions arise Washington State University Cooperative Extension has excellent knowledge and coverage of this expertise area. Please call. Irrigated pasture is one of the largest crops in Yakima County with over 80,000 acres in production. Over 30,000 private property owners in the county raise grass and forage as a crop.