

Getting Started In Ag: Irrigation System Alternatives

Agricultural productivity in much of the Western U.S., including Wyoming, is tied closely to the availability of irrigation water. Most of the highly productive land in the West is irrigated. If you are new to farming or ranching, it is imperative to educate yourself about irrigation options and determine which system(s) might work best for your operation. The goal should be to identify the most efficient use of available water in the most cost-effective manner possible.

Important Factors to Consider

It is important to remember that no single irrigation system or setup is going to work for every operation. A variety of factors should be considered when deciding which system works best for an individual farm or ranch. Cost is often the deciding factor for many managers. As with most equipment purchases, the more acres the irrigation equipment can be used to cover, the more economical it becomes. Conversely, it may not be cost effective to purchase a \$120,000 sprinkler to cover 20 acres.

The irrigation water source, whether groundwater or surface runoff, may also greatly influence the system of choice. The layout of the property is another factor to consider; some operations may favor one type of system over another simply due to the way fields are laid out or the distance to available water. The availability and distance to electrical power sources may also be an important consideration. The irrigation system selected might be determined simply by the level of access to electrical power, including type of service, e.g., single phase versus 3-phase power.

Soil type and water holding capacity can also be a factor in deciding which system would work best. For example, heavier soils may be more conducive to sprinkler irrigation than flood irrigation due their ability to hold water for longer periods. Of course, there are many other factors to consider—largely dependent on the unique characteristics of an individual operation and the people involved.

Flood Irrigation Systems

Flood irrigation has been around nearly as long as humans have cultivated plants for food. This method is still utilized throughout Wyoming and the western U.S. in many different forms. Flood irrigation in much of Wyoming can be as simple as using a ditch to flood a hay meadow or as complex as using gated pipe on a surge system to irrigate row crops.



Figure 2 Center pivot sprinkler system at work



Figure 1 Siphon tubes pulling water from a ditch

Dirt or cement ditches can be used for flood irrigation. Typically, siphon tubes are used to deliver water from the ditch in a consistent way. More advanced systems use gated pipe in which aluminum or PVC pipe is slotted with spacings, often 20 to 40 inches, with moveable gates that open and close to evenly distribute water. Flexible plastic pipe, sometimes called plastic ditch, can be used to flood irrigate as well. This type of pipe is utilized once per season and often works in places where ditch irrigation is impractical.

The main advantages of flood irrigation systems are their lower cost, when compared with other systems such as sprinklers or drip. This can be especially true if it is possible to gravity flow water without the expense of pumping.

Disadvantages of flood systems are that they tend to be the most inefficient way to spread water over a large area, especially

in drought years. They are more prone to losing water through evaporation and seepage, depending on how the system is set up. These systems are also labor intensive; many hours are required to monitor, change water, and lay out and pick up pipe. Flood irrigation may also require specialized equipment, such as ditchers, corrugators, and other soil management equipment, depending on which crops are grown.

Sprinkler\Center Pivot Irrigation Systems

Sprinkler irrigation is one of the more efficient methods to apply water to cropland. Most sprinkler systems are of the center pivot variety, where the sprinkler rotates around a central point. However, there are also many side roll and hand line options available. Sprinklers allow more precise control over the amount of irrigation water applied and the timing of application compared to flood systems, especially with center pivots.

In times of drought, this can be invaluable, especially when watering crops up. Center pivot irrigation tends to be much less labor intensive than most flood systems. Hand lines and other sprinklers that require manual labor to change irrigation sets are exceptions.

The primary disadvantage of center pivot sprinklers is their cost. This is especially true when converting from a flood irrigation system to center pivot; both new pipelines and electrical service lines are often required to make the change. It is important to remember that sprinklers require regular maintenance, parts, and upkeep, which adds to their cost of operation over and above the cost of water and electricity.



Figure 3 Drip irrigation system

Drip Tape Irrigation

Extended periods of drought highlight the need to become increasingly more efficient with irrigation water use. Drip tape systems are one of the options gaining in popularity. This type of system uses tape (a hose with small perforations) to deliver water with very little evaporation. The tape or hose can be placed above ground or buried below ground with the water seeping up toward the crop. The buried tape is placed at spacing appropriate for the particular crop, e.g., every 30 inches.

These systems can save substantial water when compared to conventional systems. In addition, drip systems can be made to fit just about any shape of field, unlike many sprinkler-based systems. Their main disadvantage is their initial cost, often double the cost of center-pivot systems. Furthermore, an accurate guidance system is necessary for planting and other field operations to ensure the crop aligns with the buried drip tape.

For More Information

Visit farmanswers.org for more information about irrigation systems and how they may fit individual operations. This site also offers a section devoted to programs available to assist new producers in purchasing irrigation equipment through Natural Resource Conservation Service (NRCS) cost share. Visit a local NRCS office for more information on cost share programs available in your area. For a detailed comparison of various pivot-based irrigation systems, visit RightRisk.org and select Applied Risk Analytics under the Resources tab.

Applied Risk Analytics:

Hay Producers Evaluate Pivot Irrigation Alternatives

- The guide provides an example utilizing the Multi-Temporal Risk Analyzer Tool (MTRA)
- MTRA offers users the ability to compare production changes or decisions over a 20-year timeframe
- Outlines an alternative to traditional pivot irrigation
- View at RightRisk.org/AppliedRiskAnalytics

