

Getting Started In Ag: Comparing Tillage Systems

Wyoming comes with a unique set of challenges. Our growing seasons can be tough and are often short; weather extremes can be intense; precipitation can be hard to come by; and the wind can be brutal. Discovering what options are available or which work best can be tough, especially for those just getting started in agriculture.

The type of tillage system selected and how well it is implemented can mean the difference between success and failure. Our past articles have offered insights into various forms of risk management, including production risk, financial risk, human risk, and more. Have you ever considered that adopting the correct tillage system could act as a form of risk management?

Evaluating alternative approaches and choosing the tillage system that best fits the conditions on your operation can go a long way toward increasing profitability. Note that every farming operation is unique, with different soil types, crops, and goals; we are not endorsing any particular tillage system over another. What works for one situation may not be an option for another for a variety of reasons. Our goal here is to outline and compare features of various tillage systems and how effective each may be in different applications.



Tillage Costs

Tillage and the associated machinery cost is often the largest expense for most Wyoming farms. These costs have risen sharply, particularly over the last two years. Fuel and other input costs have also increased significantly. Add the skyrocketing cost of equipment (both new and used) and it becomes clear that maintaining profitability is much more challenging. Unfortunately, this inflationary, high-cost environment is projected to persist into the foreseeable future. For this reason, it is vital that you examine every tillage activity in your operation.

From major soil preparation down to every minor cultivating pass, make sure that what you are doing is effective from an economic standpoint. Improving the efficiency of your tillage system can also help cut down on fertilizer use, another major expense for most farms. Every tillage pass you can eliminate, while maintaining the same result, is money in your pocket.

Tillage and Soil Health

A growing body of research shows that the more you cut down on major tillage, the more overall soil health improves in the long term. Simply put, the more living plant material in the soil and the less disturbance, the more organic matter and the accompanying soil nutrients increase. Water-holding capacity also increases with these beneficial nutrients and soil structure improvements. In a dry state like Wyoming, soil moisture is often crucial; to be successful, we must manage for soil moisture as well as crop nutrients. This is especially true in a non-irrigated setting.

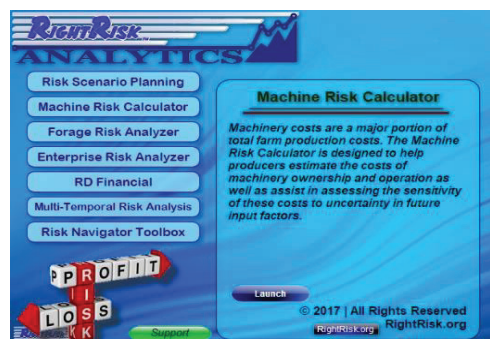
Cover crops are a growing part of this equation, as they have been shown to provide more benefits than fallowed ground. Erosion is always a concern in Wyoming, and focusing on soil health should be a major focus of every farm, regardless of the tillage system used. Yearly soil testing and the services of a certified crop advisor can point out what deficiencies should be addressed, as well as help monitor progress.

Conventional Tillage Systems

Conventional tillage systems are still the most commonly used. This approach requires tilling the soil for all seedbed preparation and weed control. It typically involves some major primary tillage, such as a moldboard plow, sub-soiler, or chisel plow. Additional follow-up passes including roller-harrows, disking, and

Machine Risk Calculator from RightRisk.org

- Allows users to estimate machinery and equipment costs on a comprehensive basis
- Includes custom rates for many machinery activities in WY
- Free to download and use



cultivating are often also a part of these systems. In row crop settings, especially those that are irrigated, some form of chemical weed control is also used.

The main advantage of a conventional tillage system is that it is a simple way to prepare the seedbed and provide initial weed management, when completed properly and on a timely basis. Follow-up work, such as cultivation in row crops, can provide weed control if performed in a timely manner, i.e. not letting the weeds get too tall. These types of tools are often also the most common and easy to obtain.

The primary disadvantages are in the cost of both the field operations and the equipment. Primary tillage tends to be one of the most fuel-intensive tillage systems, due to the horsepower required. This system is also the most prone to soil erosion due to wind, water, and irrigation.



Reduced-Till and Strip-Till Systems

Also called minimum-till, these systems are geared towards reducing the number of tillage passes as much as possible. This usually implies as little major tilling, such as plowing or ripping, as possible. Seedbed preparation is focused on minimal soil disturbance and leaving as much crop residue as possible. This helps reduce erosion potential and saves soil organic matter.

Strip-till refers to a system in which only a narrow strip is cultivated where the seed will be placed, leaving residue on the surface. Machines used in this type of system combine several types of tillage and can also place fertilizer all in one pass, saving soil moisture, fuel, and time.

The main disadvantage is that this system requires more specialized management and machinery. Geographic Positioning System (GPS) guidance and a planter or drill designed to handle increased crop residue is almost always required in these types of systems. Increased herbicide use to control weeds, because crop residue can make mechanical cultivation difficult, is often necessary as well.

No-Till Systems

No-till systems are systems where there is zero tillage. Crops are planted with planters and drills set up to handle a lot of crop residue. This approach offers both the best way to increase soil health and decrease erosion, while simultaneously offering the biggest management challenge.

When zero tillage is the goal, it often takes a comprehensive approach to managing cropping rotations, weed management, and irrigation to reach the objective. Weed management is accomplished through herbicide applications and crop rotations. There are significantly fewer fuel and fertilizer inputs under no-till compared with conventional tillage. No-till farming also reduces the amount of water (both irrigation and precipitation) necessary to raise a crop, when properly implemented. The surface residue and increased organic matter help to increase the soil water holding capacity.

The primary challenge of no-till farming is that the benefits are long-term in nature. Soil structure and organic matter take substantial time to regenerate, and there may be a reduced yield for a period of years until the soil structure has been restored.

For More Information

We have presented a broad overview of alternative tillage systems. Each farm has different goals and needs when it comes to tillage; there is no single solution that is best, though some options may fit your situation better than others. For more information on tillage systems, visit GrowinG-WY.org > Resources > Toolbox.