

Regenerative Agriculture: Reduced Tillage Practical Guide



Reducing tillage has received much media attention in recent years due to its potential benefits, however, cultivation also plays a crucial role in crop establishment in most arable systems. Before beginning to reduce tillage, it is important to understand the positive and negative effects this can have on crop growth, alongside the steps you can take to make this transition easier.

This Practical Guide unpicks some common problems around transitioning to reduced tillage and offers practical solutions.

Benefits of reducing tillage

There are many benefits associated with reducing tillage; some are listed below. However, benefits are varied and depend upon individual farms and soil types.

Soil protection: leaving crop residues on the soil surface can protect the soil from damaging weather events such as high winds and heavy rain. Preventing erosion ensures long term sustainability of fields and has secondary benefits such as promoting good water quality.

Promote soil biology and nutrient cycling: cultivations can damage soft bodied soil organisms such as earthworms and fungi. Reducing cultivations can promote an improved habitat for important soil biology, which in turn can increase nutrient cycling as organic matter is broken down.

Improved soil structure: although reducing tillage doesn't always guarantee a better soil structure, it can provide an opportunity to prevent compaction issues such as plough pans in field, this in turn can increase crop growth, boosting soil structure further through enhanced rooting capacity.



Reduction in fixed costs: tractors and implements are increasing in cost year after year; reduced tillage can result in a requirement for fewer machines and implements, and smaller tractors.

Additionally, the quick work rates can provide secondary savings in fuel and labour costs.

Five Principles of Regenerative Agriculture:

1. Maintaining a living root
2. Minimising soil disturbance
3. Maximising crop diversity
4. Keeping soil covered
5. Integrating livestock

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See also:

- [Soil Regenerative Agriculture Group - Farming For a Better Climate](#)
- [Valuing Your Soils PG.pdf \(farmingforabetterclimate.org\)](#)
- www.agrecalc.com
- www.soilassociation.org.uk
- [Home | Scotland's soils \(environment.gov.scot\)](http://Home | Scotland's soils (environment.gov.scot))



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Pitfalls and counter measures

Although there are many benefits to fewer cultivations, there are also some common barriers that prevent farmers and land managers from adopting a reduced tillage approach.

Patchy emergence: a reduction in tillage can often lead to delayed and uneven emergence in cereals crops. Although this is a short-term problem it can highlight the unevenness in a field and is most often seen in spring cropping where the growing season is short. Careful seed placement, often dependant on the drill being used, can help with this issue as can an active avoidance of compaction, rutting or other factors which will make fields uneven.

Grass weed accumulation: the increase in weed burden is a common concern of growers considering reduced tillage, however, grass weeds are usually a symptom of the rotation as well as the cultivation method. For example, an increase in brome is likely due to a high number of winter cereals in the rotation. Ensuring there is a diverse rotation with break crops can help to reduce weed burdens of grass and broadleaved weeds alike.

Compaction: a common issue in areas where the weather prevents ideal working conditions at key times of the year, compaction is a decrease in soil pore space caused by a pressure, most commonly heavy machinery. Although compaction is difficult to remediate in a reduced till system, smaller machinery can also prevent it occurring in the first instance.

Steps to consider

Before starting on a reduced tillage journey, it is worth considering the following:

Know your soils: although this sounds basic, a thorough understanding of your farm's soil will help to identify common issues and it may also provide opportunities to learn from other growers with similar soil types. Improving your soil knowledge by digging soil pits in each field and sending a selection of soils away for a soil health check are valuable ways to understand your soils better. Be sure to analyse the chemical, physical and biological aspects of your soil to provide a comprehensive picture of your soil health, this can also provide a baseline to compare against in years to come.

Appraise existing system: before deciding to reduce tillage, look at your entire system – from cultivations through to harvest. Are there any small changes that can be made which are low risk but can make a significant impact on your soil health and profitability? This could be as simple as beginning to chop straw or creating an opportunity within your rotation to include live-stock or manures.

Get the basics right: making sure that the soil pH is between 6.0 and 6.2 will ensure maximum nutrient use efficiency and having a liming plan in place will ensure that the pH is maintained at the correct levels. Additionally, it is important to ensure that the soil phosphorus and potassium levels are within the target ranges for your soil and crop types. Having a close look at drainage prior to transitioning can also help to address problems before they arise.



Steps to consider (cont.)

Rotation planning: carefully considering your rotation is crucial to make a successful transition to reduced tillage. Not only can the inclusion of break crops provide opportunity to control weeds and disease, but they can also leave the soil in good health to provide an entry to reduced tillage establishment.

Calculate the economic cost/benefits: weighing up the cost and benefit of a reduced tillage system is crucially important prior to transitioning. Yields are usually expected to be lower for up to four years from transition, and although this is partly compensated for by a reduction in machinery and labour costs, a detailed budget and cash flow is recommended.



Technical considerations

Alongside the more general points, there are also several technical considerations which can assist in a journey to reduced tillage.

Conditions before equipment: Often, farmers focus on the equipment being used over the ground conditions. Although some of this comes out of necessity due to weather, it is vitally important to ensure that the soil has a low enough moisture content to prevent compaction or smearing. Reduced tillage systems can be less forgiving than conventional tillage due to the difficulty that arises when trying to remediate compaction, this makes it vitally important to only travel on ground when it is suitable.

Drill selection: reduced tillage drills can be divided into two categories – disc and tine. Different drill types offer versatility for soil conditions and weather variation, matching the drill type to your farm requirements is important to ensure success. A high amount of above ground material such as cover crops or manures will usually suit a disc drill set up. Compared to a high number of break crops, existing surface compaction or a high clay content soil which will usually suit a tine drill. Considering what comes after the disc or tine is also important, are the packers suitable for closing the slots to ensure soil to seed contact in a variety of conditions? A good way to find out which drill works on your farm is to use a range of demonstrator or contractors – ensuring that the drills are tested on a range of challenging ground can provide an accurate picture of performance.

Beyond selecting a disc or tine drill it is also worth considering if a trailed or mounted machine is suitable; what ballasting is required to ensure even axle weight and ground pressure; and what row spacing will provide maximum light utilisation by the growing crops. If you are planning to transition over several years, making sure a drill is flexible enough to sow directly into stubbles or into cultivated ground can also help the transition period go smoothly. Investigating drill set up is also important and paying attention to the critical depth of discs or tines can be very valuable to ensure the machinery performs well.



Technical considerations

Pests and disease: soil type, crop, weather conditions and time of sowing will all impact pest and disease pressure. In Scotland, a common issue in reduced tillage systems is slug damage. Making sure that you are aware of the pest and disease pressures on your farm and being prepared for these can ensure timeliness and can make the difference between a successful crop and a crop failure.

When you sow: although it is recommended to have a varied rotation, it is worth calculating when most of the sowing will take place – autumn or spring? In spring the soil dries on the top but is wet underneath whereas in the autumn the soil is dry underneath but wet on the top. This is important for machinery selection and set up.

Soil health long term aim: Considering your current soil health and monitoring change (as mentioned) are both useful processes, however, setting realistic objectives on where you want to be in 5 to 10 years' time is also very important to ensure that you continue to move forward. Using basic measurements such as [VESS scores](#) or organic matter content can help to track changes on your farm over a set period.

Summary

Transitioning to reduced tillage is a major step for any farm to undertake and making sure that the process has been well thought through will reduce the mistakes along the way. It's important to seek advice specific to your own unit both before the transition has started and throughout the process.

Although reducing tillage is a large part of any arable unit, it's important to remember that it is only one aspect and other considerations should be made in regard to things like rotation, livestock and resource availability (machinery and labour).

For more information, see [Soil Regenerative Agriculture Group - Farming for a Better Climate](#) or find Farming for a Better Climate on Facebook and Twitter @SACFarm4Climate

