

Quick and Easy Worksheet for Assessing Traffic-Induced Soil Compaction Risk

The purpose of this worksheet is to give you a simple, easy-to-use method for assessing the traffic-induced soil compaction risk posed by your field equipment. You can use the worksheet to evaluate compaction risk for any rig (tractor and towed implement, tractor and integral hitch implement, truck, self-propelled implement, and so forth). You can assess compaction risk by calculating or estimating the following three key values for each rig:

1. Heaviest axle load (in tons)
2. Highest tire contact pressure (in pounds per square inch or psi)
3. Total acres of tracks left by rig per acre of ground covered (percent)

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Once you've used the worksheet to calculate these values, you can use the information two ways to help you manage compaction risk on your farm:

1. You can compare the calculated values for your rig with some general guidelines and thresholds. You should keep the axle load below 10 tons—preferably below 6 tons. Contact pressure should be limited as much as possible. Contact pressure exceeding 30 psi is too high for farm fields. Decreasing contact pressure by making tires wider increases the percentage of the field that is trafficked. This can give you a general idea of the overall level of compaction risk posed by your equipment.
2. You can compare calculated values for different rigs to help you decide which is best for the job in terms of compaction risk. This is by far the most important use for this information. For example, suppose that you are buying a new manure spreader and you must choose between three different designs. You can estimate compaction risk values for each, and then use that information to help you make your selection. Another example involves comparing the same rig with duals versus singles, or with different tire inflation pressures.

More information about the effects of soil compaction and how to avoid it is available in the fact sheets *Effects of Soil Compaction* and *Avoiding Soil Compaction*, available from your Penn State Cooperative Extension office.

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Farm Equipment Soil Compaction Assessment Worksheet

Line	Axle	1	2	3	4	5	6	7	Sum total rig weight	A ↓
A	Axle weight in pounds									
B	Axle weight in tons (Line A/2,000)									
Write in highest axle weight from Line B here ↑										
C	Number of tires per axle									
D	Pounds per tire (Line A/Line C)									
E	Tire to soil contact width in inches									
F	Tire to soil contact length in inches									
G	Tire to soil contact area in square inches (Line E x Line F)									
H	Tire contact pressure in pounds per square inch (Line D/Line G)									
Write in highest tire contact pressure from Line H here ↑										
I	Total tire track width in feet									
<i>If all wheels are in line, use largest tire track width per axle from Line I. If all wheels are not in line, add the appropriate tire widths together to get the overall vehicle footprint width.</i>										
J	Swath width, or distance between passes, in feet									
K	Ground covered, percent (Line I/Line J) x 100%									
C ↑										

Instructions

- In order to use this worksheet, you will need a tape measure and a calculator. Also, you will need to weigh or estimate the weight of every axle on your rig when it is fully loaded. On tractor and trailer units, this means all tractor axles, too!
- Even if your rig has many axles, all you need are standard truck scales with a level on-ramp suitable for getting split weights. Stop and record the weight each time you pull another axle onto the scales. Finish by getting a total weight. Those weights plus a little figuring will get you weights for each individual axle. Write the axle weights into Line A of the worksheet, and proceed to fill in the other lines as indicated.
- If weighing tandem or closely spaced axles individually is impossible, get the combined weight of the axles, and then assume the weight is distributed evenly between each axle.