

# ***Does winter grazing leave you with Soil Compaction?***

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## **How to tell and Alleviation...**

Many corn growers in eastern Colorado find while they are driving the combine in their corn fields in October and November that all that 200+ bushel/acre corn just maybe need grazing. In many cases the cattleman pastures too long in any one field with a large number of critters when the soil conditions are near the soils field capacity causing compaction. In the following spring the grower rolls up the wire and brings out his disk and goes to work chopping, sizing and turning in some of the residue. Soils are moist after the winter moisture (we hope so) and this tillage operation will induce even more compaction usually right at the depth of the hoof compaction.

So what is the big deal you may ask? Soil compaction leads to several concerns for the corn-on-corn farmer in the irrigated fields of Colorado. First, early seedling development is retarded as well as the root development. Setting the plant back in the first 45 days of growth can be detrimental in how the plant sets the ear size, number of leaves, leaf area, and when the tassel and silk will appear. The root system will not be able to explore deeper into the soil profile so as to extract nutrients and water. When the plant has some restriction in obtaining a full root-zone profile of resident nutrients and soil water, the yield potential for the plants is diminished.

How can you tell if winter cattle's grazing has created a zone of compaction? Before you get on the tractor and hitch the disk behind, grab the spade from the garage or shop and head to the field to dig an 18 inch wide hole about 18 inches deep. Keep the walls vertical and then pull out your pocket knife and stick the blade in the sidewall, edge up, and then pull steadily up to the surface and you will feel where that tillage pan resides. Make a measurement of depth and then when the soil releases the knife fairly easily measure again and you will have a good idea where the bottom of the pan is and how thick it is.



***Compaction in wheat – visible tractor traffic patterns***

After you have determined if compaction is in your field or ends of your fields, what is the next step? Determine the moisture of the soil above and in the compacted layer. If the soil is below 45% moisture of field capacity and the ground is thawed – get the right implement attached to your tractor and disrupt/alleviate the pan so your next crop can have unrestricted root growth and reach its potential. Why? How deep, when, how fast, how much power do you need to pull the subsoiler? All good questions because subsoiling is quite a cost. Let us start with the why... compaction as mentioned above restricts water movement, fertility uptake, oxygen and other gases exchange, root growth/penetration, microbes life cycles, crusting of soils. To focus – root development is what begins and ends plant growth this is what growers of crops want to do, and to grow roots for fully functioning/yielding plants. Now that it is seen and poised to cause problems how do you go about removing the problem? To use an example; you have observed soil compaction between 4 and 6 inches deep at the ends of your field and where the cattle concentrated in several spots by digging the hole as we have spoke of in the above paragraph. Hitching up a subsoiler that will not cause the soil to boil up

and forward turning large clods and chunks is an important consideration in breaking up this pan. So, using a tool that will break up the pan in place and minimally disturb the soil surface is a wise choice. They are normally near vertical tools with a 75° to 85° angled shank from the toolbar to break up the pan. Whether three-point or pull type, insert the point of the subsoiler 1 ½ inches below the bottom of the pan to disrupt, fracture, and explode the major portion of the compacted zone. When – best time is in the fall before the winter freeze-thaws but it can be carried out several weeks before the spring pre-planting



operations are accomplished. But as mentioned before if the soil moisture is above 55-60% of field capacity, the subsoiling action will have little effect. How fast – after the tool is running at the depth you are, with the example we are speaking of, it would be 7 ½ to 8 inches deep, drive the tractor 3.5 to 4.5 mph for best action under ground. Power requirements – 25 to 30 hp per shank you are pulling at that depth. Common rule of thumb - if one pulls a subsoiler deeper than 8-9 inches the horsepower requirements climb to 35 hp per shank pulled. We offer an important suggestion; drive into your field and leave the unit in the ground and measure flat with the soil surface to the shank to make sure the

subsoiler is running deep enough to break up the pan. If you measure to the top of the soil heave along the shank, the soil billowing up (fluff) this is not an accurate measurement of the subsoiler tool's depth and action.

In much of the western Great Plains compaction can be a concern, it can limit water movement, instigate crusting and root development. Soil compaction by livestock can be readily managed and with that thinking you the grower can take care of this kind of soil degradation with good timing of tillage, the right tool and proactive thinking.

If you have other questions regarding soil compaction, how and why you need to alleviate it – contact your local Cooperative Extension office, USDA-NRCS field office conservationists, or agronomic consultant.



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