

SEEKING TRUTH: IMPLICATIONS OF CATTLE ON CROPLAND



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The clamor for putting cattle onto cropland has reached a hysterical fervor. *Put aside what you really want to believe on this topic for a few minutes.* Let's examine carefully the arguments put forth, and gain some perspective and clarity.

Cycling Nutrients

It is true that livestock on cropland will cycle nutrients faster. (The argument is sometimes dressed up as saying it will narrow the C:N ratio of the mulch, but microbes naturally occurring on the stubble will do that just fine if you're patient). That's another way of saying they will accelerate the decomposition of mulch cover, either by ingesting it and excreting the leftovers in a more degraded form, or by trampling the stubble and duff layer and putting them into direct contact with the soil, where the microbes can more readily get at them. Do you want less mulch cover? Depends on where you farm, and the crops you grow. If you're in North Dakota, or Canada, and grow a lot of grass crops, maybe you do need less mulch. Or if you're in a cool climate with long winters and grow irrigated corn, maybe you'd like less mulch cover. But in warmer climates, you just can't keep enough mulch cover to keep no-till soils in good condition (this assumes your seeding equipment is properly set up to handle it). In Neb, KS, OK, TX, it is particularly hazardous on fields with any slope to be removing any mulch cover whatsoever. Not until you get erosion truly to zero (no sign of any soil movement, ever, no matter how intense the storm) on cropland in this region should you even think about removing or destroying any mulch, which includes any grazing. Long-term no-tillers in this area should be acutely aware of just how difficult it is to get water erosion to zero if the field has any slope. (Wind erosion is a big concern in some areas, too.)

Soil Health

This gets nebulous in a hurry, but the argument is made that grazing animals do something beneficial to the soil, whether thru microbes or enzymes in their excrement or saliva, etc. This is perhaps true, but if you have additional soil erosion as a consequence of the grazing, then it's a rather ridiculous stance to take. How healthy can soil be if it's gone?

There are additional arguments if the grazing is of a living cover crop (rather than dead remnants). It is well-established that the tugging on the plant as the foraging animal is biting it causes changes in root morphology: The plant reacts to the tugging by adding roots to resist the chance of being plucked out by future grazing. Additional roots are no doubt beneficial to the soil. Again, this must be balanced against soil erosion as a result of the grazing. And it only

happens if the vegetation is living when the grazing occurs, and has enough time to grow new roots (and survives the grazing).

Extra Income

Sure, you can make some extra money by grazing, but there are hidden costs associated with it. Nobody puts a dollar figure on the increase in erosion, for instance, but I've seen fields that were grazed lose 1" or more of topsoil when a hard rain occurs later. These are fields that have no topsoil to spare. So, if you think you pocketed \$100/acre by grazing, but decrease the productivity of the land by a similar amount, then it certainly isn't sustainable. Our cropland is already severely degraded — we need to be doing something to regain productivity, not cause further degradation.

Furthermore, in Neb, KS, and southward, grazing often has a negative impact on the yield of the following grain crop, at least on dryland. The yield loss occurs for several reasons. The most typical is that the loss of mulch cover stores less moisture for the crop. The second reason is that the compaction of the surface from the cattle hooves makes it tough for the planter or drill to function, and tough for roots to develop (especially for corn, but none of the crops like high-density soil that creates more physical penetration resistance, as well as less aeration).

I hear the arguments that cattle hooves only put down 27 psi, or that the compaction is very shallow so we shouldn't worry about it. Well, 27 psi is extremely damaging if there's any moisture at all in the soil. As for the location of the compaction, near the surface is still extremely problematic, since all infiltrating moisture must go thru that layer! And anything that doesn't infiltrate runs off, creating erosion problems (not to mention it's water that's not available to the plants). Sealing of the surface is also very detrimental to aeration.

Furthermore, the mulch that cattle eat takes away directly from what is available to earthworms, which are proven to do many important things for the soil, including liberating P, and improving aeration & infiltration. Feed your underground livestock first, as they are what keep the soil in good condition and minimize erosion. In all my field scouting in Kansas over the past quarter-century, we never have abundant earthworms unless mulch cover is super heavy — such as cover-crop pearl millet or double-crop corn into really thick wheat stubble (preferably 2d-yr wheat).

Big Picture / Environmental Arguments

Dwayne Beck, a futurist if there ever was one in ag, is pretty sure that feedlots won't exist in a few decades: "Feedlots have significant shortcomings that cannot be overcome. Among these are problems with antibiotic resistance, nutrient concentration, extremely high energy costs associated with transporting feed to the animals and trying to transport the nutrient back to the land (most of the N is lost in the feedlot). In addition, consumers prefer animals be managed differently."

However, the nutrient concentration problem can be overcome with more engineering, and not

all animals in feedlots get antibiotics routinely. The energy costs of moving feed and manure need to be weighed against the costs of grazing (it's very labor-intensive if you do it correctly; and in some regions there will be negative consequences for future cropland productivity). But who knows what percent of consumers will insist on free-range or grass-fed¹ in the future (already the premiums for grass-fed beef are substantial, ~ \$0.50/lb live weight, but it's a tricky market). So, if you agree with Beck that the cattle have to go back out onto the land, then the question is where do we put them that will have the fewest negative consequences. There are a couple answers.

First, the cattle can be on annual cropland in cooler climates. Apparently, cattle don't cause much damage in North Dakota or the Canadian provinces *if managed properly*. Their soils are vastly better than in more southerly regions, and their long winters result in far less decomposition of mulch cover anyway.

Second, in warmer climates, cattle can be on vegetative mixes that are predominantly perennial species without incurring the harm that they do on annuals. The perennial mixes can be permanent rangeland, or a period of several years of perennials rotated amongst the annual grain crops on cropland.² These would cycle: a few years of annual crops (no grazing), followed by perennials with grazing for a few years, then back to annual crops, then grazed perennials again.

The inclusion of perennials for several years on cropland has numerous benefits. The deep-rooted perennials (especially if some alfalfa is included in the mix) do a great job of capturing nutrients that were leaching below the root zone of annual crops. Healthy perennials that are adapted to a locale also do an excellent job of using all the water infiltrating the soil — and this is key to reclaiming areas that are afflicted by salt accumulation, such as saline seeps.

Perennials are also much better at building soil OM, mainly because they put so much more biomass into roots than do annual species. The differences are important: Annual crops usually put about 1/3 of their biomass into roots, while perennials often put 2/3 into root stocks — and perennial roots go much deeper.

Because perennial roots are alive all the time, and because their root density is so high, there's far less damage to the soil from livestock when grazing them as compared to annuals.

Parting Thoughts

So be careful what Kool-Aid you drink. Don't think you are a failure if you haven't put cattle onto your cropland. I know of a large number of farmers who didn't really become great at grain farming until they got rid of their livestock — including Dietrich, Terry & Gary Kastens; Ralph Holzwarth; Ron Jacques and sons; and Craig & Gene Stehly. There are hundreds of others. It's just a matter of how many things you're trying to juggle. *It's difficult if not impossible to truly excel at two very different business activities* — there's only so much mental energy as well as physical energy to go around. (The synergies are more elusive than people think.) One highly skilled

farmer & grazer comments on the difficulty of excelling at two different things: “I cannot stress enough how true this point is. The beef business is equally as complex and marketing is even more difficult than grain production. . . . Inexperienced producers will suffer through expensive lessons.”

And growing grain crops has gotten very sophisticated and time-consuming if you avail yourself of all the technology (which you need to if you’re going to stay competitive). Another issue is quality of life: Many farmers finally got some sanity back in their work schedules after going to no-till; do you really want to undo the gains in quality of life by adding livestock? It is true that a grain farmer who wants to do grazing needn’t own or manage the livestock — a neighbor who’s already into livestock could do that, although will they be diligent about getting the livestock off the field after a rain, preventing cattle trails, moving them frequently, etc? If so, that is a good solution. Otherwise, to do everything internally and do it well and still have some quality of life, it takes at least 5 full-time people to do both and do them well.

As for cattle on cropland in South Dakota, even the outspoken proponent Dwayne Beck admits — when pressed — that caution is needed (it’s a high-management system), and that it isn’t yet proven. And I will add that the hazards are so very much worse on cropland in warmer climates.

¹ ‘Grass-fed’ can include about anything that isn’t grain: grazing of annual plants (including broadleaf species) and dead stalks are permitted for ‘grass-fed.’ So is ensilage, as long as it doesn’t contain grain.

² We would have more permanent pastureland if the gov’t in USA didn’t tilt the playing field by subsidizing grain cropping far more than rangeland. It’s a little perverse, since so much grain goes to feed livestock anyway, and grain farming almost always degrades land faster than perennial vegetation would.