



Extension
UNIVERSITY OF WISCONSIN-MADISON
CALUMET COUNTY

Agriculture Newsletter

November 2019



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If you will need any type of accommodation or assistance as you attend any Extension sponsored events, please contact the host county office at least two days prior to the event. All requests will be confidential.

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Greetings!

2019 is almost over! I think just about everyone involved in the agricultural industry is ready to put 2019 behind us and hope for a better year of farming in 2020. Trying to stay positive, milk prices have recovered. However, the cold, wet spring leading into record rainfalls throughout the growing and harvest season, and finishing with a cold, wet fall has brought stress to more than just the dairy farmers. While the majority of corn for grain is usually off by deer hunting season, we still have soybeans sitting under inches of snow. The soil compaction in some fields from this year's harvest will take years to recover. See pages 11-14 for managing compacted soils. It's no secret that getting manure out of the pits has been an issue all fall and will continue through the winter and into next spring for many farms. See pages 4-6 to review over some options that farmers can consider if pits are near flowing over.

Stress, lack of sleep, and the need to rush has caused problems for farmers and custom operators throughout the state. Do your best to slow down, get some sleep, and don't forget to double check equipment to keep yourself and the environment safe.

Amber O'Brien

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Dealing with Wet Frozen Soybeans

Like many farmers the UW BeanTeam still has soybean sitting in the field. Both locations (FDL and East Troy) have not been fit to run since maturity and FDL had 7 inches of snow piled on top of standing water yesterday. Anyway, once fields freeze and we can get back after the crop, here are a few things to consider. Check back as this information will likely be updated as I glean more information and receive audience feedback. This information is provided in greater detail in the below two excellent resources.

1. Call and mail (i.e. paper trail) your crop insurance agent to let them know you may not be able to get the crop out before the deadline.
2. Take what you can get this fall. Soybean does not “store” well in the field over the winter. Shatter and seed quality degradation may lead to an unmarketable crop if taken in the spring.
3. Set the combine and check it often if you are running snow through the housing. The cold temperatures may be to our advantage as the snow should move easier.
4. Header shatter will be an issue. Make sure you set the combine to manage flow. Remember for every 4 seeds per square foot on the ground that equates to roughly a bushel in yield loss.
5. Double check your combine moisture with another device to verify correct moisture as this cold weather will wreak havoc with sensors. We pulled beans today and they were 16.4%.
6. Call ahead and around. Verify what the elevators will take in terms of moisture content. Furthermore some elevators are assigning a wet bin to assist farmers in harvest.
7. Do not harvest and store wet beans on farm. I have heard some coffee shop talk about cutting and “freeze blasting the soybean seed.” This is a bad idea.

Don't use too much heat. It appears that 100F is about the right temperature to minimize splits.

Drying and storing wet soybeans (https://www.canr.msu.edu/news/drying_and_storing_wet_soybeans)

Harvesting and storing soybeans (<https://www.ag.ndsu.edu/cpr/stored-grain/harvesting-and-storing-soybeans-09-13-18>)

Updates from Brian Luck regarding combine settings:

Harvesting soybeans later than intended can present many challenges for minimizing harvest losses. These challenges are amplified when snow is on the ground and impacting harvest. Minimization of losses starts at the header. Checking that the sickle bar knives are sharp and the guards are adjusted properly will ensure the stems are being cut rather than broken or leaned over by the header. Generally, reel speed should be slightly faster than ground speed to make certain the plants are being collected by the header. Another good practice for harvesting soybeans in wet and snow covered conditions is to reduce the combine ground speed while harvesting. This will give the machine extra time to cut the plants and ensure that they are transported to the throat of the machine with minimal damage or losses.

Concave clearances, rotor speeds, fan speeds, and sieve settings all depend on the condition of the crop at harvest. If the beans are generally dry but the stems, pods, and remaining leaves have increased moisture contents more aggressive threshing may be required to clean the plant material from the crop. More aggressive threshing can also lead to damage and reduced crop quality. Incremental adjustments of concave clearances (increase for wet conditions) then threshing rotor speed (increase for wet conditions) will help to find the optimal settings. Also, ensure that you have a uniform feed rate into the machine maintaining a consistent load on the threshing rotor to ensure optimal performance. Finally, increased fan speed can help pneumatically separate the soybeans from the plant material, however this can also lead to greater losses through the sieves if set too high.

Small adjustments to these combine settings can have a big impact on the performance of the machine. Check for losses behind the combine often to make certain that your harvest is as efficient as it can be in adverse conditions. Try to identify where losses are happening when operating the machine. If you can see beans leaving the header focus on minimizing that loss before making any other adjustments. Incorrect settings at multiple stages in the combine can significantly increase losses and will be difficult to identify.

References:

<https://cropwatch.unl.edu/2017/tips-harvesting-soybeans-13-15-moisture>

<https://crops.extension.iastate.edu/cropnews/2016/09/consider-combine-adjustment-wet-field-conditions>

https://www.canr.msu.edu/news/recommendations_for_a_late_soybean_harvest

<https://agfax.com/2019/10/09/ohio-soybeans-is-a-late-harvest-in-your-future/>

2019 Soil, Water & Nutrient Management Meeting

Tuesday, December 10, 2019, Millhome Supper Club, Kiel

Registration 9:30 – 10:00 a.m. Lunch 12:00 Noon Meeting 10:00 a.m. – 3:00 p.m.

The Department of Soil Science, in conjunction with University of Wisconsin-Madison Division of Extension, will conduct eight **Soil, Water, and Nutrient Management Meetings** in 2019. The purpose of these meetings is to provide research updates in the fields of soil, water, and nutrient management. Carrie Laboski, Brian Luck, Matt Ruark, Francisco Arriaga and Sue Porter will present current information. The \$45.00 registration fee includes lunch and educational materials. Certified Crop Adviser CEU credits (2.0 soil & water management and 2.0 in nutrient management) will be provided. Pre-registration deadline is December 6th.

Discussion Topics

+	<i>TITLE</i>
Francisco Arriaga	<ul style="list-style-type: none"> • Comparing tillage practices and nitrogen rates for corn • Early corn development and yield impacts
Carrie Laboski	<ul style="list-style-type: none"> • Evaluating corn N management decisions • Profitability of P and K fertilization of no-till corn and soybean
Matt Ruark	<ul style="list-style-type: none"> • Cover crops, fall manure, and nutrient management • Biological indicators of soil health
Sue Porter	<ul style="list-style-type: none"> • Wisconsin nutrient management update
Brian Luck	<ul style="list-style-type: none"> • Planter aftermarket closing wheels • Wheel traffic effects on alfalfa

Registration

Pre-registration and payment must be made to the Extension Sheboygan County Office by: December 6th. **Checks payable to: Extension Sheboygan County**

Mail registration and check to:

Extension Sheboygan County, Attn: Tammy, 5 University Drive, Sheboygan, WI 53081
For more information, contact Mike Ballweg (920) 459-5904 Fax: (920) 459-5901

Soil, Water & Nutrient Management Meeting Registration

Tuesday, December 10, 2019

Registration Deadline: December 6th, 2019

Name(s): _____

Email(s): _____

Company: _____ Telephone: _____

Address: _____ Zip: _____

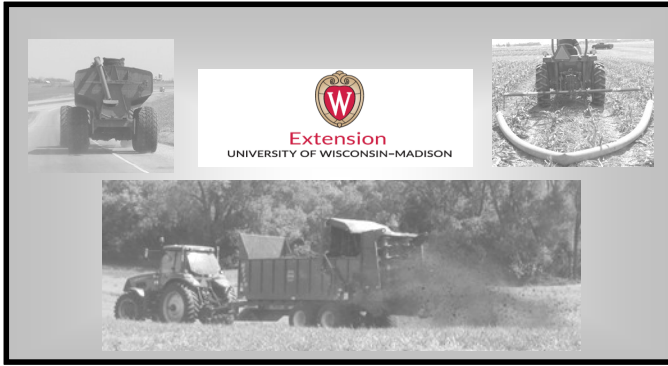
Meeting & Meal _____ People x \$45/person = \$ _____

Late or Walk-In Registrations _____ People x \$50/person = \$ _____
are an additional \$5.00 each



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TOTAL = \$ _____



Wisconsin Manure Applicator Update

Full storage, frozen fields and mud: What are the options?

Kevin Erb, UW Extension - November 4, 2019

2019 is a year of frustrating challenges for manure application. Early season cold weather is not making things any easier. If there is a silver lining, it's that the industry and agencies are really working together to help farmers through this difficult time - things go better if the farmer is proactive rather than reacting to a problem the neighbor noticed. While there are no "simple solutions", there are things to keep in mind over the next few months.

CAFO/permitted operations should check with both the WI DNR and the county Land and Water Conservation Department (LWCD) before taking any action, as pre-approval may be required.

"My storage is full! I don't have enough room to make it through the winter"

- Find other storage:** The easiest solution for producers is to find space in someone else's existing storage. Work with the county LWCD as they likely have a list of manure storages built according to proper engineering standards. Do not assume that any older storage is ready to use – check with the LWCD first. Your farmers may know of dairies that are no longer milking cows nearby that have available storage as well.
- Add to/Modify existing storage:** Some farms have already added soil on top of their existing berm to add capacity. The problem is – this greatly increases the risk of seepage or storage collapse. The topsoil between the storage's compacted clay and what is added can allow seepage, and un-compacted soil will move with only a small amount of head pressure. Seepage between compacted and un-compacted soil is causing issues across the state. As wet as it has been, any equipment on the berm may create more problems. Work with county LWCD staff to determine how to safely modify the storage, and the right way to do it.
- Take to a sewage treatment plant:** This option can be very expensive, but not knowing what you are doing can make it much more expensive. Some plants have the capacity to take manure, others do not. Start the conversation with the plant manager a few days before you need this option. The fee per gallon will depend on the nutrient and solids concentration, so take the most diluted water. A couple of tips are to not agitate and load out from the corner of the storage farthest away from entry points of barn pipes/concentrated silage leachate. Work with the treatment plant manager to determine best time of day for delivery, gallons per hour that can be accepted, and where to unload into their system.

(Continued on page 2)

“I have no option but to land apply”

- **The farmer should work with the farmer’s Nutrient Management Planner/Agronomist and the County Land/Water Conservation Department (CAFOs should also include their DNR contact):** These people are going to be able to help identify the fields with the lowest risk and alert you to any permissions/permits needed. They may also be able to connect the farmer with non-livestock neighbors who may have fields suitable for application.
- **Apply to fields with the lowest risk:** Risk factors for manure moving off the field include field slope, soil type, soil roughness and previous crop as well as how wet the soil is. A low risk field when you can inject/incorporate may become a high risk field when the ground freezes. The agronomist/agency staff person can help decide which fields are lowest risk based on current and expected conditions. Don’t be afraid to ask about using different fields in the farmer’s plan.
- **Consider non-traditional fields:** Pastures, grasslands and CRP (Conservation Reserve Program) acres may be options in limited cases. Most of these likely don’t have a recent soil test, so identifying these fields before the ground freezes, and having the agronomist pull soil samples and prepare setback maps/determine rates is critical. Some fields (CRP, other programs) may require additional permissions before application can occur.
- **Watch the weather forecast, and take screenshots:** Use the Runoff Risk Advisory Forecast (RRAF) to gauge the risk. <http://www.manureadvisorysystem.wi.gov/runoffrisk/index> Document both the weather forecast and the RRAF for each field by taking screenshots used to inform your decision. Combine this information with the advice of the agronomist/agency staff.
- **Reduce rates/cover only part of the field/inject across the slope:** With the soil saturated, manure ponds on the surface and remains more slurry-like when injected. Lower rates will reduce the chances of movement. In saturated conditions, injected manure can ooze, over time, downslope and pond weeks after application in low areas of the field. Inject across the slope rather than up and down. Cover only part of the field (in strips) and come back later and apply in between previous strips.
- **BEWARE CONCRETE FROST:** In a normal winter, liquid manure and slowly melting snow will soak into the soil. After several January thaws, sometimes all of the air pockets (pores) in the soil are full of water when the soil re-freezes, forming concrete frost. This year, many fields will have concrete frosts as soon it freezes this fall. With concrete frost, very little manure or melting snow soaks in and runoff occurs every time it warms up throughout winter.

(Continued on page 3)

“I have no option but to land apply” (Continued from page 2)

- **Frozen/snow covered soils:** If these can't be avoided, work with the agronomist and agency staff to modify both setbacks and rates.
- **Working fields before land application:** Rough soil has depressions that will contain some runoff, (it's almost always a good idea to think working the field borders before a regular application before the ground freezes, *even more so this year*). Be careful, however. Working part of, or an entire field may impact the farmer's eligibility for crop insurance and other benefits (not following their conservation plan) or impact their soil health management system. This decision needs to be made by the farmer and their agronomist.
- **Walk the field, increase setbacks:** New sinkholes and wet areas may have developed during this wet year, so take a close look at the field before applying. Don't be afraid to increase the setback from water resources/receiving waters and sinkholes to reduce the risk.
- **Borrow/rent a tanker and get some applied:** Taking out even a small volume may give you some breathing room this fall until the custom applicator is available. Work with your agronomist to make sure you have the most up to date information on rates and setbacks.
- **Document that you did the best job possible.** Take photos to document the work that you completed. If a spill happens/runoff occurs, calling the DNR Spills hotline (800-943-0003) is an essential part of documenting that you are taking the right steps to address a situation.

The information above was gathered with input from staff with UW Discovery Farms, UW Madison Division of Extension, county LWCDs, NRCS and DATCP.

Online Employee Training Available

New hire? Busy the day the classroom training session was held? A free online training course is now available for manure applicators in Wisconsin.

The course is available through the end of the year by registering at <https://campus.extension.org/course/view.php?id=1672> (after Dec 31, the course will still be available at no charge, but at a different internet location).

The course includes several equipment safety walkthrough videos, as well as an update on the current regulations **How to enroll:** This video (https://www.youtube.com/embed/GpCO00gMV_g?rel=0) will walk you through the process.

For more information, contact Kevin Erb at 920-391-4652



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Respiratory Health with Dusty and Moldy Grain

Wisconsin farmers working feverishly to get crops harvested before the snow flies may find themselves exposed to a variety of dust. Breathing grain dust can affect your comfort and is a health concern for all in the grain industry.

Grain dust is a complex soup of particles. The smallest dust particles are easily inhaled and find their way deep into the respiratory system. Grain dust is biologically active. It's made up of plant material, mold, insect parts and excreta (bug poop), bacteria, endotoxins (toxins contained in the cell walls of some bacteria) and soil particles including silica.

Most people will have some reaction to dusty harvest conditions. Often, this will be a nuisance reaction (like a runny nose) or throat irritation. In some cases, bigger health problems occur. Even inside a combine's cab, there is some dust. Endotoxins associated with some types of bacteria (even with a sealed cab and proper air filtration) can cause problems for some individuals. At low dust levels during prolonged and busy harvest operations, a cough is common. This might be an intermittent cough, producing more phlegm when you're working near dust. Other symptoms are chest tightness/wheezing, sore/irritated throat, nasal and eye irritation and feeling stuffed-up and congested.

Chronic and acute bronchitis is also common for those who handle grain. Bronchitis occurs as lung passages get inflamed. Grain dust can also be quite a debilitating concern for those with asthma.

A massive exposure to a thick cloud of dust is something to avoid. Though, total avoidance is not always possible. Massive exposures to moldy, dusty grain even for a short period of time can result in two distinct medical conditions having symptoms that include cough, chest tightness, malaise (a general feeling of discomfort, illness or feeling 'ill-at-ease'), headache, muscle aches and fever.

People exposed often begin to feel sick a few hours after their exposure, and may feel quite sick as they go to bed at night. The two conditions are 'Farmer's Lung' or Farmer's Hypersensitivity Pneumonitis and Organic Dust Toxic Syndrome.

'Farmer's Lung' or Farmer's Hypersensitivity Pneumonitis is less common and affects about 1 in 20 exposed individuals (5 percent or slightly more). Often, farmers get sick and tell their health provider about their symptoms and their illness sometimes gets misdiagnosed as FHP.

However, FHP is a delayed allergic reaction caused when sensitive people inhale dusts causing their bodies to produce antibodies. Since FHP is an allergic reaction and involves the immune system, each new FHP bout gets worse. With repeated exposure, some people become unable to work in dusty areas and can develop permanent lung damage.

FHP is caused by dust that contains mold, mold spores and bacteria that developed in warm storage conditions. Heat-loving

molds are more likely to grow in stored hay or top layers of silage. FHP molds can also occur in stored grain. If you've been diagnosed with FHP before, and get sick again while working around grain (or hay/silage), you should visit your local clinic.

Organic Dust Toxic Syndrome, the second type of illness is a toxic reaction. With ODTS, your respiratory system becomes inflamed from the dust, molds, bacteria and endotoxins in dust. Symptoms look like FHP. But, the body's reaction causing symptoms is different. People who develop ODTS usually recover in a few days. Permanent lung damage from ODTS is rare. Again, your local health professional should be consulted if you develop this type of reaction.

Agricultural health experts face a difficult problem, as Farmer's Lung and Organic Dust Toxic Syndrome look almost identical. At times, even rural health professionals can have a hard time recognizing these illnesses and knowing the difference. Medical testing is often needed to truly tell the two apart. Medical treatment is also different. References found on the website cited at the end of this article might be helpful if you visit a clinic.

Grain dust exposure and related health symptoms are complex. Here are specific things to reduce risk:

- **Have a clean air filter in place when operating a combine.** Use correct settings on the cab blower when the heater or air conditioner is being used to create a positive pressure. When replacing cab filters, ensure gaskets are installed and sealing correctly.
- **Avoid exposures to dust whenever possible,** regardless of your sensitivity. When combining, stay in the cab with the door closed when unloading.
- **Properly adjust your combine to minimize grain damage and dust generated.** Properly harvested grain will store better with fewer mold (and insect) issues.
- **Wear a NIOSH-approved 'N-95' dust mask that fits properly in conditions where dust is unavoidable.**

Caution: Wear a respirator only if you are free of health problems, particularly with your heart and lungs. If you need extra protection, a powered air purifying respirator (PAPR) or 'air helmet' can be used in these situations. There are other regulatory requirements in commercial grain storage facilities. Consult experts before requiring employees to use respirators.

- **If you feel sick, call your health care provider.** This is especially important if you know you are allergic to these dusts, or if your symptoms continue to get worse.
- **Smoking makes grain dust exposure symptoms much worse.** ■

By John Shutske, Ph.D., agricultural engineering specialist for UW-Madison and UW-Extension.

Industrial Hemp End of Season Education & Networking Meeting

Thursday, December 5, 2019

Swan Club, 875 Heritage Road, DePere, WI 54115

Organized by: Extension Brown County

Share | Learn | Network

This meeting is open to all. You do not need to be a Brown county resident. This meeting will provide educational and networking opportunities. This is meeting is for those interested or actively involved in the hemp industry (i.e. growers, processors, retailers, and more)!

Venue can accommodate approximately 500 people, but I would not be surprised if we max out the venue capacity. These meetings have been very well attended. Early sign up is encouraged!

Cost: \$45/person (early bird rate) | \$60/person (starting Nov. 19). Registration fee includes continental breakfast, lunch, social hour refreshments, bound copy of proceedings

Register online here: <https://browncountyhemp2019.eventbrite.com>

A block of rooms has been reserved at the Holiday Inn & Suites Green Bay Stadium (2785 Ramada Way). Hotel block available evenings of Dec. 4 and/or Dec. 5. Use this online booking link (Use Find Rooms tab, enter dates, group code BCE should appear, then Check Availability) or call 920-569-4248 and mention group code BCE to get special \$90/night rate (plus taxes and fees). Deadline to book at BCE rate is November 15.

Questions? Contact Liz Binversie at 920-391-4612 or eybinversie@wisc.edu.

Complimentary registration for the first 25 who [completed buyer profiles](#)

Agenda

9:30-10:00 am	Registration/Networking (with continental breakfast)
10:00-10:45 am	Welcome and Mitigating Risk in an Evolving Market
10:45 am-12:00 pm	Hemp Grower Panel (From Seed to Storage)
12:00-1:00 pm	Buffet Lunch
1:00-2:15 pm	Wisconsin Hemp Research Update
2:15-2:45 pm	Afternoon break/Networking
2:45-3:45 pm	Wisconsin Hemp Regulations
3:45-5:00 pm	Post-Harvest Panel (From Processing to Retailing)
5:00-6:00 pm	Social Hour (light refreshments & cash bar)

Complete program with speaker bios is available at <https://www.eventbrite.com/e/2019-hemp-end-of-season-educational-networking-meeting-tickets-74498281365>



AGENDA:

- BQA & FARM UPDATES
- PAIN MITIGATION
- HEIFER LAMENESS
- ANIMAL WELFARE IN BEEF
- CONSUMER TRENDS
- SOCIAL SCIENCE & ANIMAL WELFARE

CEUs AVAILABLE FOR:
 ANIMAL SCIENTISTS, VETERINARIANS,
 BQA, AND FARM



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WISCONSIN CATTLEMEN'S WELCOMES WISCONSIN DAIRY AND BEEF WELLBEING CONFERENCE!

FEBRUARY 21-22, 2020 | CHULA VISTA RESORT, WISCONSIN DELLS

FOR REGISTRATION DETAILS AND MORE INFORMATION:

608.228.1457 | WINTERCONFERENCE@CATTLEMEN.COM | WISCONSINCATTLEMEN.COM

Survey on Dairy Calf Care



Study contact:
Jennifer Van Os
jvanos@wisc.edu



for a research study on current animal care practices for pre-weaned dairy calves in the United States.

The survey should take no longer than 15 minutes to complete. **Your input is very important to us!** If you have not already completed the survey, please consider participating. Click to access at www.dairyanimalwelfare.org/survey or scan the appropriate QR code:

Survey for Dairy Producers and Calf Raisers

Full URL: <https://tinyurl.com/y3jxl989>



If you complete the survey, you can choose to be entered into a drawing to win a prize from our generous sponsors (\$50-\$250 value):



Survey for Bovine Veterinary Practitioners

Full URL: <https://tinyurl.com/y2ebfpcm>





Hemp License Applications, Registration Open for 2020 Season

Hemp licensing applications and registrations are available for the 2020 Wisconsin growing season starting November 1, 2019. The deadline for current licensees to renew their registration is March 1, 2020. New licensees can apply at any time during the year.

Wisconsin's research pilot program requires that anyone who wants to grow or process hemp obtain a license from the Wisconsin Department of Agriculture, Trade and Consumer Protection, and register their intent to grow or process in the coming season. Hemp can contain no more than 0.3 percent total THC, the psychoactive ingredient present in marijuana.

People who received licenses in 2018 or 2019 will not need a new license, but will need to register if they plan to grow or process in 2020. Anyone who does not already have a license will need to apply for a license and register if they intend to grow or process in 2020. They can do both online, or download printable forms, at <http://datcp.wi.gov>. DATCP will not issue licenses until the application is complete and payment is received. Current licensees must also have paid all sampling fees from the 2019 growing season and submitted their 2019 final production report before their 2020 license will be issued.

"This year we had 1,247 growers and 556 processors who were licensed and registered to be active in 2019," said Brian Kuhn, Director of DATCP's Plant Industry Bureau. "Ultimately, about 850 growers reported actually planting a crop, totaling approximately 5,000 acres."

Kuhn said similar to 2018, the first year for the program, growers in 2019 were plagued by persistent cold and rainy weather during planting season, which likely kept some from getting their crops in.

Nevertheless, said Kuhn, DATCP collected about 2,200 hemp samples and certified approximately 1,911 fit for commerce certificates, meaning they met the low-THC requirement.

State law requires that growers and processors pass a background check with no state or federal drug convictions. Growers pay a one-time licensing fee of \$150 to \$1,000, depending on how many acres they intend to plant. Processors also need a one-time license, at no cost. The annual registration fee is \$350 for growers and \$100 for processors. Fees cover a portion of the cost of administering the program.

Growers must also develop a research plan, sign a research agreement, meet other reporting and recordkeeping requirements, and pay to have their crops sampled for THC levels. Hemp varieties that test higher than 0.3% total THC are considered illegal by state and federal law enforcement and will be required to be destroyed by DATCP.

The USDA released its Interim Final Rule for the US Domestic hemp program on October 29. DATCP is reviewing that information to evaluate its potential impact on our hemp growers. During the 2020 growing season, DATCP will continue implementing the existing hemp pilot research program, authorized by the 2014 Farm Bill.



Francisco Arriaga, Brian Luck, and Geoffrey Siemerling

Managing soil compaction at planting and harvest

Soil compaction is the increase in soil density due to pressure being applied to moist or wet soils, typically from heavy vehicles. Compaction can happen any time of the year, but the risk during rainy planting and harvest months is often greater. There are some simple guidelines you can use to minimize soil compaction, figure out where exactly it has occurred, and determine how to fix it.

Effects of soil compaction

Soil compaction reduces field productivity in many ways.

- **Stunted roots**—Plant roots are unable to grow through compacted soils, resulting in root systems unable to support healthy crops. Wisconsin research has shown compaction can cause up to a 50% decrease in crop yields.
- **Decreased internal drainage**—Water (either rainfall or irrigation) will not internally drain through compacted soils, resulting in longer time periods when the ground is too wet for field operations.
- **Greater fertilizer needs**—Prolonged wet conditions lead to soil nitrogen losses due to increased denitrification.
- **Increased susceptibility to drought**—Lower soil porosity leads to reduced water holding capacity.
- **Increased fuel consumption**—Tractors require more fuel to till compacted soils.
- **Lower biological activity**—Compacted soils contain fewer pore spaces, reducing soil aeration and biological functions like residue decomposition.
- **More soil erosion**—When soils are compacted, soil aggregates are destroyed and runoff and erosion increase. Reduced internal drainage leads to greater runoff and lower soil moisture.

I had to plant/harvest while my fields were wet. Are they compacted now?

If you worked your fields while they were wet, there is a good chance your soils are compacted to some degree. However, the exact soil conditions when you worked your fields have a dramatic impact on the likelihood and type of soil compaction. Use the flowchart in figure 1 to help figure out if your soils are compacted and how they might be repaired. Most important in determining if compaction occurred is whether the field soil was saturated or at field capacity when worked (see box below).

Soil water content effects on compaction potential

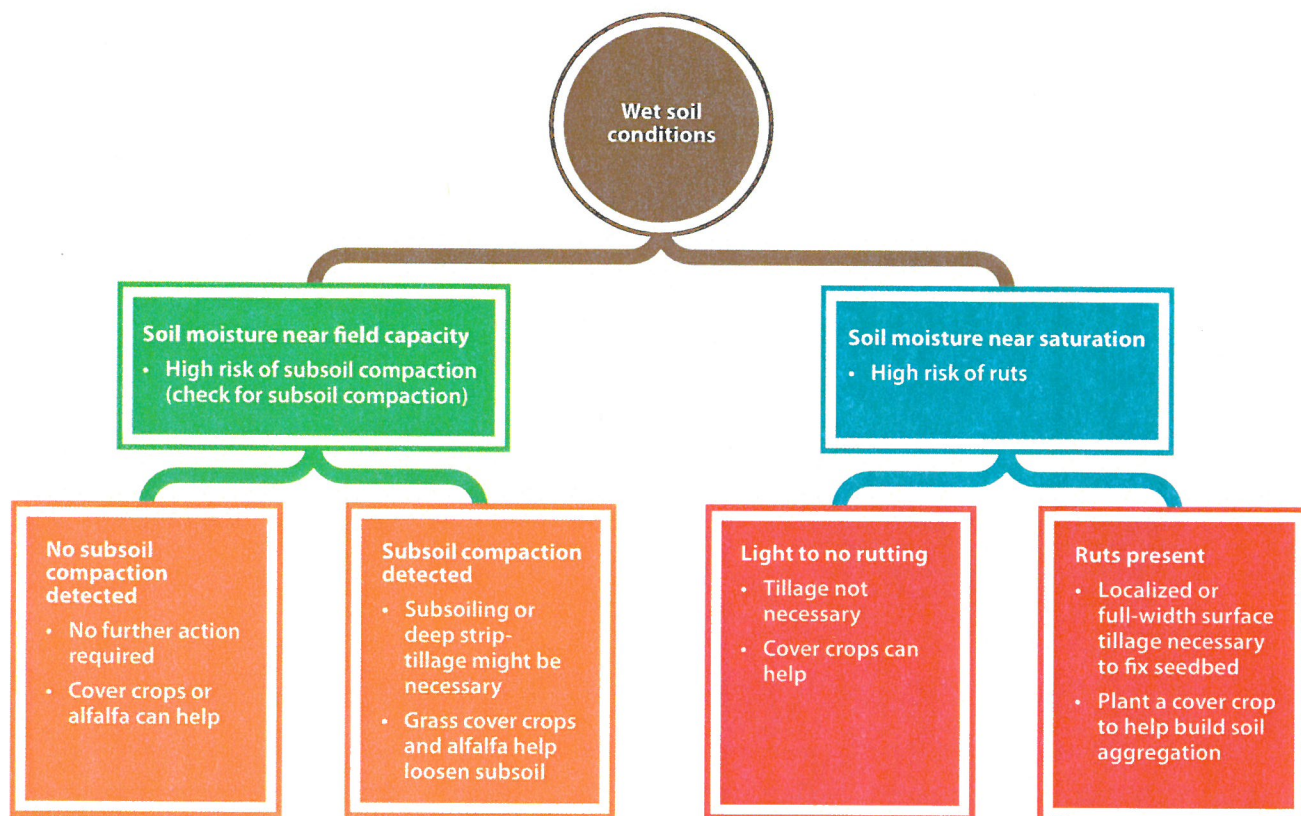
Field capacity is defined as the soil water content after the soil has been saturated and allowed to drain freely for about 24 to 48 hours. Soils are most susceptible to compaction when their water content is at or near field capacity because the proportion of soil pores filled with air and water is just right for compaction to occur. Soil well below its field capacity naturally contains tiny air pockets that work as shock absorbers and support heavy weight without the soil particles smashing together. Also, soil aggregates help dissipate loads when the soil is drier.

It seems counterintuitive, but soils that are fully saturated (i.e., their pores are completely filled with water) are less susceptible to soil compaction than those at field capacity. Since water cannot be compressed, a saturated soil can bear heavy equipment without compacting. However, soils at or near saturation are very prone to rutting and smearing near the surface.

Key facts

- Whenever possible, wait for drier soil conditions before entering fields.
- Reduce axles loads and lower equipment tire pressures.
- Keep axle widths similar when purchasing equipment.
- Manage equipment traffic patterns to minimize tire tracks.
- Rutting may not indicate that deep tillage or subsoiling is needed.
- Surface tillage alone may be sufficient to remove ruts and clay smearing.
- Cover crops can help remediate soil compaction.
- Compaction repair can take multiple growing seasons.

FIGURE 1. Decision diagram for predicting soil compaction in fields worked while wet.



Detecting soil compaction

There are several ways to determine if your soils are compacted. These including looking closely at the side of a small soil pit dug in your field, using a hand probe, or using a cone penetrometer. A detailed explanation of how to measure soil compaction can be found in UW-Extension publication *Soil Compaction: Causes, Concerns, and Cures* (A3367). The penetrometer method will provide the most accurate results. UW-Extension has a YouTube video showing how to use a cone penetrometer (see **Additional information**). These instruments may be available for loan through your county Extension office.

The following are easily identified signs of soil compaction. It is probably worthwhile to conduct an in-depth investigation in the areas where these signs are seen.

On the soil surface

- Dense surface clods that don't break down after rainfall or tillage
- Water ponding in tracks and headlands
- Wheel tracks with a smeared or glazed appearance
- Poor plant growth (e.g., reduced plant height) and stands
- Uneven plant growth or yields
- Plant leaf yellowing

Under the soil surface

- A hard zone of soil immediately below the depth of cultivation
- Hard clods that don't break when squeezed by hand
- No structure to the soil
- Misshapen or shallow crop roots ("J-rooting" or pancake roots)

How to prevent compaction

Wait for drier conditions

The single most effective way to prevent compaction is to stay off wet fields for as long as possible. Soils are most susceptible to compaction 24 to 72 hours following a soaking rain, depending on soil type.

Manage farm traffic

Repeating travel patterns between transport equipment and the harvester (i.e., driving in the same wheel track) can reduce the damage of operating on wet soils and will confine damage to specific and well-known locations in the field (figure 2). Global Positioning System (GPS) guidance is helpful, but regular traffic patterns can also be achieved with some awareness and discipline on the part of the operator.

Optimize vehicle parameters

- Maintain tires at the tire manufacturer's recommended pressure to spread the machine's weight over a greater surface area.
- Attach dual wheels wherever possible.
- Use machines equipped with tracks to spread the machine's weight over a greater surface area. Using machines with uniform wheel track spacing reduces the risk of soil compaction (figure 2).
- Consider carrying half or reduced loads out of the field.
- Use tractor-based transport equipment such as grain or dump carts within the field and load transport trucks (which have high-pressure tires) at the edge of the field.

How to restore compacted surface soils

Light tillage

If ruts are present, surface tillage is necessary to improve the seedbed for planting. Tillage can be localized only to rutted areas. The presence of ruts does not mean you definitively have compacted soil below the surface.

Cover crops

If shallow compaction (less than 6" deep) is detected, planting a cover crop will help break apart the compacted soil and restore soil aggregation through natural root action. Fibrous-rooted cover crops (e.g., cereal rye) are more effective than tap-rooted cover crops (e.g., clover).

Freeze/thaw

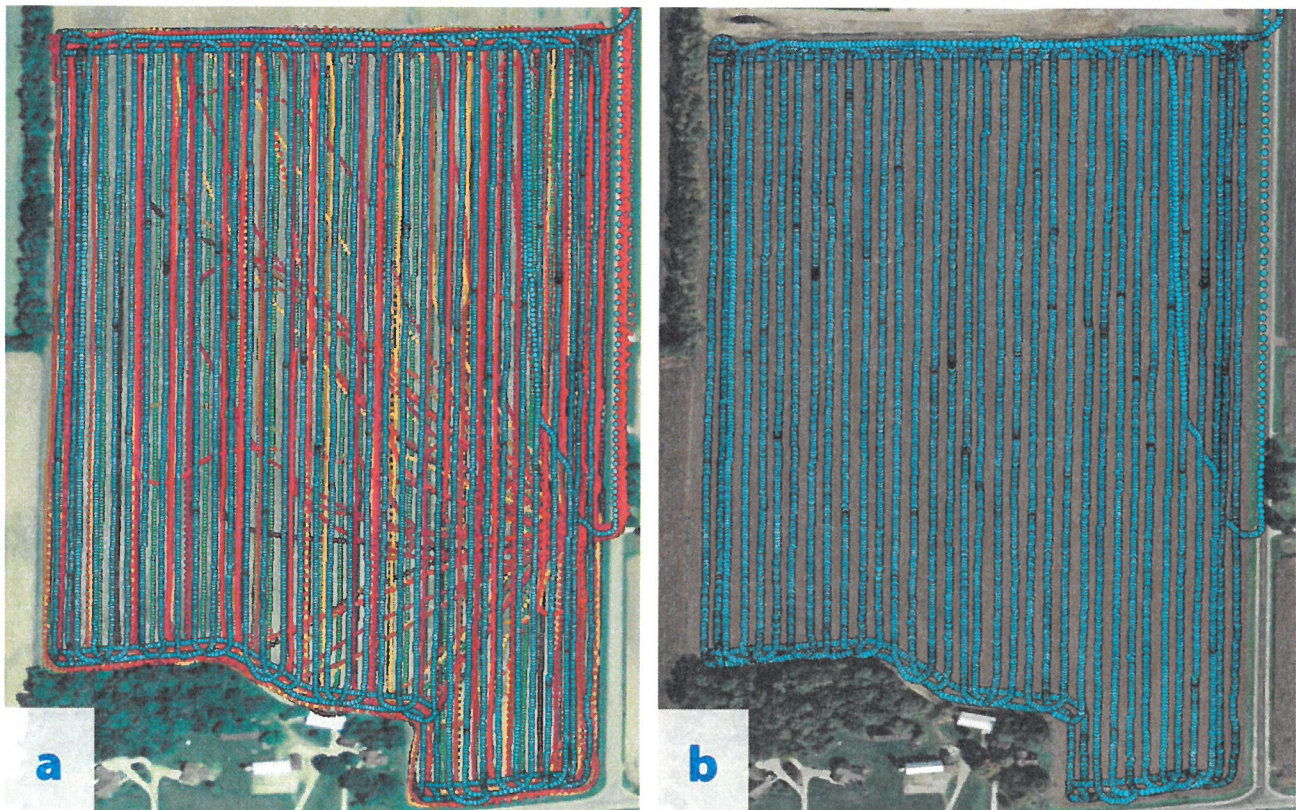
Winter freeze and thaw conditions may alleviate shallow compaction depending on soil type and other conditions. Compaction should be measured with a penetrometer in the fall and spring to determine effectiveness.

How to restore compacted subsurface soils

Deep tillage

If subsoil compaction (deeper than 6") is detected, subsoiling or deep strip-tilling can be helpful. Deep tilling involves breaking up a hardpan using long shanks usually to a depth of 12" to 15". This should only be done when the soil is at a moisture that allows the soil to crumble at the depth you are tilling. Till only to just below the compacted zone (2" to 3" below) as deeper

FIGURE 2. Part a shows an uncoordinated traffic pattern of two mergers, one forage harvester, and six transport trucks collected once per second during harvest. Part b shows the same field with a simulated traffic pattern where every machine follows in the path of the forage harvester. Although the entire field is impacted by machinery in both scenarios, corrective measures would be needed only on tire ruts from managed traffic (b) rather than the entire field (a).



tilling risks even deeper compaction and uses much more fuel. Deep tilling has shown yield benefits in sandy to clay loams but in finer textured soils the benefits may only be short-term due to recompaction.

Vary tillage depths

If a subsurface hardpan of soil has developed, tillage depth may be altered to break this up.

Tillage is not a permanent solution to address soil compaction. Identify practices that caused the compaction and modify as needed.

Restoration for no-till/low-till fields

If ruts must be repaired for seedbed planting, tillage in only the affected area is recommended. Soils in long-term no-till fields have a greater ability to recover from compaction than soils managed with conventional tillage. The higher organic matter content and aggregation normally found in no-till soils makes them more resistant to soil compaction and resilient in recovery. Research from Kentucky shows that surface compaction in a no-till field disappeared completely after two years of normal operations (Murdoch and James, 2008).

Additional information

View the YouTube video "Using a penetrometer to detect soil compaction" at https://youtu.be/Zq_785JqRq8.

View UW-Extension publication *Soil Compaction: Causes, Concerns, and Cures* (A3367) at <https://learningstore.uwex.edu/Assets/pdfs/A3367.pdf>.

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Dairy Situation and Outlook, October 22, 2019

By Bob Cropp, Professor Emeritus
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Milk prices continue to strengthen. Higher cheese prices have increased the Class III price from its yearly low of \$13.89 last February to \$18.31 in September and will be around \$18.65 for October. Cheese prices have been up and down since September, but higher cheese prices have more than offset lower dry whey prices. Dry whey prices which were \$0.3975 per pound mid-September are now \$0.2865. On the CME cheddar barrels were a low of \$1.6125 per pound on September 26^h, reached \$2.025 on October 15th, the first time at \$2.00 since 2014, and are now \$2.105. The price of 40-pound cheddar blocks reached \$2 per pound on September 9th, also the first time since 2014, but fell below \$2 by September 24th, didn't reach \$2 again until October 8th, only to fall again below \$2.00 on October 17th to \$1.9675 with a rally on October 22nd to \$2.1025. The cheese market perhaps is a little more settle now with the spread between barrels and blocks more than \$0.30 per pound parts of September to now close together.

Higher nonfat dry milk prices have more than offset lower butter prices to increase the Class IV price. CME butter prices have been averaging lower in October than in September. October butter was as high as \$2.185 per pound and is now \$2.09. The nonfat dry milk price which started September at \$1.475 per pound increased steadily since to now \$1.165. The Class IV price which was at a yearly low in January at \$15.48 was \$16.35 in September and will be near \$16.45 in October.

Continued relatively small increases in milk production, favorable butter and cheese sales, dairy exports doing better than earlier thought with the ongoing trade war with China, and tighter stock levels have all supported higher dairy product prices and higher Class III and Class IV prices. We can expect some further price strengthening for November before some drop back for December. For the year the Class III price could average around \$16.75 compared to \$14.65 last year and the Class IV price around \$16.30 compared to \$14.65 last year.

USDA's estimated milk production for September to be 1.3% higher than a year ago due to higher milk production per cow. Milk production per cow was 1.8% higher than a year ago with milk cow numbers down 0.6%. Relatively strong increases in milk production occurred in Texas at 9.3%, Colorado at 5.6%, South Dakota at 5.4%, Michigan at 3.8% and Idaho at 3.6%. Milk production was 1.6% in California, 2.0% in New Mexico, 1.7% in New York, and just 0.6% in Wisconsin. Milk production fell 7.3% in Virginia, 4.9% in Arizona and 3.8% in Pennsylvania.

Compared to August a year ago, exports were down 18% for nonfat dry milk, 55% for butterfat, 21% for dry whey and 6% for cheese. Cheese exports year-to-date were still 2% higher than a year. Lower dairy exports to China, Japan and Oceania have been partially offset with higher exports to Southeast Asia, South Korea and South America. On a total milk solids basis January through August exports were still 14.1% of milk production, but down from 16.5% a year ago.

Compared to a year ago, September 30th stocks of American cheese were 4.0% lower, total cheese 0.8% lower, but butter was 7.0% higher. August 31st stocks of dry whey and nonfat dry milk were down 1.8% and 3.8% respectively.

Market indicators are for milk prices to average higher in 2020. Milk prices below the cost of production all of 2015 through the first half of 2019 placed a lot of financial stress on dairy producers and loss of equity. This will keep the increase in 2020 milk production to a modest level. A build back of loss equity will be needed before we see dairy producers responding to higher milk prices. We will likely see no or little increase in the average number of milk cows. July 1st dairy Replacement numbers were 2.4% lower than a year ago. With higher milk prices some dairy producers may find lower producing cows still profitable and keep them in the herd longer. With a wet spring, summer and fall which delayed corn planting and made harvesting quality forages a challenge will likely dampened increases in milk per cow. USDA is forecasting a slight increase in the average number of milk cows at 0.1% and a 1.43% increase in milk per cow resulting in a 1.56% increase in total milk production.

Barring a recession domestic butter and cheese sales will be positive for milk prices. Dairy exports could be a little higher in 2020. A summer drought in parts of Western Europe and compliance to environmental issues is keeping the increase in milk production well below 1%. Milk production in both Argentina and Australia is running almost 6% lower due to weather issues. Milk production is running a little higher in New Zealand. Overall it looks like world milk production will be up less than 1% resulting in higher world dairy product prices. Barring a world recession that dampens world demand this should open opportunities for U.S. dairy exports. USDA is forecasting U.S. exports to be up 3.3% on a milk fat basis and 6.5% on a skim solids basis.

As of now I could see the Class III price averaging in the strong \$17's for the first half of the year and the strong \$18's in the second half with an average for the year around \$17.85, more than a dollar higher than 2019. With anticipated stronger nonfat dry milk prices the Class IV price could average around \$17.10, about \$0.65 higher than 2019. USDA's forecast is not quite as optimistic with Class III averaging just \$0.65 higher and Class IV \$0.10 lower. But, all forecasts will no doubt be modified as we move through the year and see what actually is developing. Nevertheless, 2020 should be a better year than 2019.

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