

# Cornell Cooperative Extension DIGEST

South Central NY Dairy and Field Crops Program Broome \* Chemung \* Cortland \* Onondaga \* Tioga \* Tompkins Mar/Apr 2023

# The price of my accounting system just went up! What should I do?

By Mary Kate MacKenzie, Farm Business Management Specialist

Farm managers need sound financial records to prepare income tax returns, obtain financing from lenders, analyze new investments, and make decisions with confidence. A strong financial accounting system is foundational to the success of any farm business. Every accounting system has its costs and benefits, and farm managers must analyze both carefully to select the best option for their business. Recent changes to the pricing structure of one popular accounting program have driven many small business owners to reevaluate their choice and consider alternatives.

#### Changes to QuickBooks Desktop Pricing

If your business uses the desktop version of QuickBooks for financial recordkeeping, you are probably aware that Intuit, the maker of QuickBooks, has increased the price and changed the pricing structure for QuickBooks Desktop programs. In the past, a thrifty small business owner could pay once to download QuickBooks Desktop Pro software and use it for years without additional fees by choosing to forgo annual upgrades. However, 2021 was the last year that Intuit made QuickBooks Desktop available for a one-time fee. Beginning in 2022, new QuickBooks Desktop releases are only available with an annual subscription. If you wanted to purchase QuickBooks Desktop today, the least expensive model currently advertised on the Intuit sales page is QuickBooks Desktop Premier Plus, with a starting annual subscription fee of \$799/year. Additional

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fees apply for payroll and other add-on services. Business owners accustomed to paying a one-time fee of \$200 to \$300 for years of accounting software use are not pleased with this change, and some are exploring alternative accounting systems.

# How long can I continue using an older version of QuickBooks Desktop?

The answer to this question depends on which version you own, and which features you use. If you only use basic recordkeeping and accounting features, you may not need to upgrade at all. You can continue entering transactions and generating reports without issue. However, if you use an older version, you may have trouble sharing your company file with other QuickBooks users, like your accountant, who have the latest version.

If you own QuickBooks Desktop 2020 and use any add-on services, you will lose access to those services this year. According to Intuit's service discontinuation policy, QuickBooks Desktop 2020 users will lose access to QuickBooks Desktop Payroll Services, Live Support, Online Backup, Online Banking, security updates, and other services after May 31, 2023. If you use any of these services, you should be prepared to upgrade to the latest version of QuickBooks Desktop or switch to another program.

#### Alternatives to QuickBooks Desktop

If you are a QuickBooks Desktop user looking for an alternative accounting system, QuickBooks Online is a natural option to consider. Intuit offers different pricing levels depending on the features included. At \$30 per month, the lowest cost subscription model is adequate for many farm businesses. On an annual basis, the QuickBooks Online subscription fee is less than half of the 2023 QuickBooks Desktop subscription. One huge perk of QuickBooks Online is that it can synchronize with bank and credit card accounts to automatically import transactions, saving hours of data entry. If you are curious about the online version, you can use the following link to test drive a hypothetical company in QuickBooks Online for free without entering any personal information:

(continued on page 3)

The South Central New York Dairy and Field Crops Program is a Cornell Cooperative Extension partnership between Cornell University and the CCE Associations in 6 Counties.

# **Cornell Cooperative Extension**

South Central NY Dairy and Field Crops Program

We are pleased to provide you with this information as part of the Cooperative Extension Dairy and Field Crops Program serving Broome, Cortland, Chemung, Onondaga, Tioga and Tompkins Counties. **Anytime we may be of assistance to you, please do not hesitate to call.** Visit our website: <u>http://scnydfc.cce.cornell.edu</u> and find us on social media! Facebook, YouTube, & Twitter!

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# Building Strong and Vibrant New York Communities

# **Cornell CALS & ProDairy Dairy Technology Tuesdays**

# **Recording Links**

## **Health Monitoring and Reproductive Management** Jan 10

Julio O. Giordano, DVM, MS, PhD, Associate Professor – Dairy Cattle Biology and Management, Cornell University. Recording Link: https://youtu.be/ozflMEu205I

## **Technology for Housing and Managing Dairy Calves** Jan 17

Dr. Joao Costa, Assistant Professor, Univ. of KY Recording Link <u>https://youtu.be/3aZtQowexIM</u>

# To Retrofit or Not to Retrofit

## Jan 24

Timothy Terry, Farm Strategic Planning Specialist, PRO-DAIRY, Cornell University. Recording Link <u>https://youtu.be/ogl0ETi0Z68</u>

## **Utilizing Drones to Track Forage Inventory** Jan 31

Harrison Hobart, Dairy Farm Specialist, Alltech Recording Link: <u>https://youtu.be/sG-yRNV5vfl</u>

## Looking Ahead: Dairy Technologies of the Future Feb 7

Jeff Bewley, PhD, Holstein USA Recording link: <u>https://youtu.be/jf9t02\_H4E</u>

## From Robots to Low-Cost Parlors-How Do Ya Milk a Cow? Feb 14

Larry Tranel, PhD, Dairy Specialist, Iowa State University and Parlors, Rotaries, or Robots-What Technologies are for Me?

Nancy Charlton, DVM, Senior Advisor and Project Management, DeLaval

Recording link https://youtu.be/5-6FyLp\_L-c

## Integrated Barn Climate Systems Feb 21 Mark Reynolds, ASAP Interiors. Recording Link: https://youtu.be/gMLQKmXCuF0

#### (Accounting System; Continued from page 1)

#### https://qbo.intuit.com/redir/testdrive

If you are ready to consider accounting systems beyond QuickBooks, there are many options available. Here is a list that, while not comprehensive, may be useful in guiding your research. The first five programs listed are specifically designed for farm businesses.

- CenterPoint Farm Accounting Software
- EasyFarm Accounting and Management Software
- Farm Biz or Ultra Farm Accounting Software
- PcMars<sup>®</sup> Farm Accounting Software
- FarmRaise cash flow tracking app

Here are three additional small business accounting programs that, while not designed specifically for farms, may be adequate for the accounting needs of some small farm businesses.

- Quicken
- ZipBooks
- Wave

If your farm uses an accounting program that is not on this list, I would love to hear about it!

#### **Considerations when Selecting an Accounting System**

Here are my top four questions to ask when evaluating possible accounting systems.

1. What is the full cost of an accounting system, including record keeping and accounting labor?

2. What does the learning curve look like for the person on the farm who will be managing the accounting system? Are there adequate resources for education and support, and do they add to the total cost?

**3.** Does the accounting system meet the needs of external entities? Can we file tax returns on time and easily generate information that our lenders require?

4. Does the accounting system provide value for internal decision makers? Does it help farm managers make better business decisions

and support strategic planning to strengthen farm viability? How much is this worth to the farm?

#### There is No Such Thing as a Free Lunch

It is important to remember that a "free" accounting system is not really free. It takes time to complete recordkeeping and accounting tasks, and that labor has a cost. If a farm owner is the person doing the recordkeeping work rather than an employee or an accounting firm, it can be easy to overlook the cost of their labor. However, farm owners have an infinite number of important things they could be doing with their time if they were not sitting in front of a computer entering financial transactions. For this reason, it is critical to include the opportunity cost of owner labor when evaluating the true cost of an accounting system.

To illustrate this point, consider a small business owner who decides to use a free Excel spreadsheet instead of paying \$360 per year for a QuickBooks Online subscription. Assume the Excel spreadsheet requires four hours a week of bookkeeping labor. With the automated features available in QuickBooks Online, the same accounting tasks can be completed in two hours per week. If we value the owner's labor at \$20 an hour, the annual cost of the Excel accounting system is \$4,160 compared to \$2,440 for QuickBooks Online. Given the many financial reports that QuickBooks Online can generate at the click of a button, it also has potential to produce far greater value for managers and decision makers compared to an Excel spreadsheet.

To make the best possible decision, be sure to consider the true cost of each accounting system and its benefit to farm managers when comparing alternative systems.

"QuickBooks Desktop Premier Plus." Intuit QuickBooks, 31 Mar. 2023, <u>https://quickbooks.intuit.com/desktop/premier/</u>. "QuickBooks Desktop 2020 Service Discontinuation Policy." QuickBooks Support, 27 Mar. 2023, <u>https://quickbooks.intuit.com/</u> <u>learn-support/en-us/help-article/feature-preferences/quickbooks-</u> <u>desktop-service-discontinuation-policy/L17cXxlie\_US\_en\_US?</u> <u>uid=lb7hvedx</u>.

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COMMUNITY

# **High Quality Feedback is a Development Tool** by Dr. Bob Milligan, Republished from Learning Edge Monthly April 2023 newsletter.

The focus of this newsletter for the last six months has been on workforce development. It is easy to think of workforce development as something we do in the winter, or only in STAY meetings, or by attending formal learning events.

Actually, nothing would be further from the truth. The most valuable tool for continuous improvement and successful implementation of development plans is everyday communication with employees as part of a performance improvement system.

A performance improvement system – typically called a performance management system – is depicted in the diagram below. It answers the two key questions employees have about their performance:

- 1. What Performance is Expected of Me?
- 2. Am I Meeting Expectations (Winning)?



The performance improvement system that I recommend has three components:

 Informal, essentially continuous, feedback allowing employees to continue to evaluate and improve performance.
 Frequent – often monthly - structured

meeting (formal informal system) to assist in assessing performance and resetting performance expectations.

 Annual strategic meeting to discuss the future – often called a STAY meeting.

This system enables you to provide frequent, high quality feedback to your workforce. As you likely know, I believe there are three types of feedback not two. Three results from the need for two responses to unsatisfactory performance or behavior. Below we discuss the three types of feedback plus a fourth we will call continuous development. The focus is on using them for continuing development.

#### Positive Feedback as a Development Tool

We think of positive feedback as a compliment or a reward for successfully meeting expectations. It is that but also much more. You have an advantage but also two huge disadvantages

First, high quality specific positive feedback is a great tool for building on strengths. We human beings crave positive feedback. What, then, happens when a person is given positive feedback? The answer is that they tend to repeat that behavior sometimes consciously but almost certainly unconsciously. This makes positive feedback a powerful tool for coaching and development, especially as employees are learning new tasks. It also is a great way to avoid procedural drift by reinforcing correct excellent performance.

The second power of positive feedback as a development tool requires understanding how we learn. The reality is that when we first learn a new task, process, system, or responsibility, we likely do not have sufficient confidence in our learning to continue to perform that task, process, system, or responsibility flawlessly. We have not yet reached mastery. We still need to have the confidence that we can perform flawlessly. Again, high quality positive feedback is a great tool in attaining that confidence and thus mastery.

#### **Redirection Feedback as a Development Tool**

High quality redirection feedback is likely the greatest continuing development tool. Recall that we use redirection feedback when performance (or behavior) is not meeting expectations AND the reason for the failure is not under the control of the employee. The obvious examples of causes come from the supervisor not providing clear expectations and/or effective training and coaching.

Let's begin by looking at two places where redirection feedback is typically given continuously.

- Sports. Teams succeed by perfecting the plays that are being taught by the coaches. In practice and even in games, the coaches are continually providing corrections and ideas to precisely execute the plays – redirection feedback!
- The arts. Think of a conductor of a band or orchestra or the director of a play. Again, the performance must be exactly as planned. Again, especially in practice the conductor or director is continually making corrections – redirection feedback!

The question now is: Why would it be less important for your workforce to execute flawlessly than for a sports team, an orchestra, or a play? I hope the answer is that it is no less important.

Think now about what the coach, conductor, or director is doing. He or she is enabling the players, musicians, and performers to succeed.

You have an advantage but also two huge disadvantages compared to the coach, conductor, or director. The advantage is that you can play the game. You can do the job if all else fails and show the employee how to do it. The first disadvantage is also that you can play the game. You can get frustrated and step in and do the job instead of taking the time to provide training and feedback. This is characterized by the statement "if you want it done right, do it yourself."

(Continued on page 5)

The second disadvantage is that the coach, conductor, or director likely has this responsibility as their only or primary responsibility. You, on the other hand, are a working manager with many other responsibilities. You, therefore, have a much more challenging priority setting responsibility! To succeed, you must meet the challenge to make your supervisory responsibility a priority. The good news is that by making it a priority and being proactive you may well spend less time compared to being reactive and putting out "fires."

We often hear the phrase "practice makes perfect." In reality, it should be "perfect practice makes perfect." Only when we provide redirection feedback until the task, process, system, or responsibility is perfect do we meet the second phraseology and provide the employee the best opportunity to succeed.

#### **Negative Feedback as a Development Tool**

Recall that we use negative feedback when performance (or behavior) is not meeting expectations AND the reason for the failure is definitely under the control of the employee. It is hard to envision negative feedback as a development tool.

Effective negative feedback can, however, be a shock that moves the employee to a place where there can be development. When a choice to meet expectations or accept a consequence is made, employees should consider why they are failing and ultimately whether this is the right position for him or her. I have seen several times where this thinking has resulted in a much more motivated employee with greater interest in development.

#### **Continuous Development**

We now should have employees who are meeting and exceeding their expectations. In a continuous improvement environment this is an opportunity for development. All the following should be done in a conversation likely at the monthly meeting.

The most common next step is to increase the level of the performance expectations. This will challenge the employee and cause him or her to develop a little further and feel even more successful.

Other continuous development actions can be to expand the scope of the task, process, system, or responsibility. This will likely require some training and then high quality positive and redirection feedback.

#### **A Final Comment**

Please take two key points away from this discussion. First, continuous improvement and development must happen every day of the year. Second, redirection feedback has the potential to meet the goal of "perfect practice makes perfect."



#### (Continued from Compaction-page 9)

excess tire inflation pressures cause sever compaction deep within the soil (Figure 9.)

#### **Types of Compaction**

Soil compaction can have different forms in the soil. In general, these forms are surface crusting, tillage pans, and wheel-traffic compaction Figure 10. Soil crusting impacts the very top layer of bare soils (Figure 11), while tillage pans and wheel-traffic compaction may impact either or both topsoils and subsoils.

#### Remediation - Figure 10.



Diagram shows irregular root growth in soil containing

> different forms of compaction. (Lewandowski, 2000) Root distribution in soil impacted by tillage pan, tire traffic, and subsoiling. The roots are white and the soil is black. The red line indicated the top of the tillage pan.

The white dashed line indicates where wheel traffic compacted the soil.

The two vertical green bars indicate where a subsoiler bar passed through and loosened the soil.

(adapted from USDA National Tillage Machinery Laboratory and Brady and Weil, 11th ed. 1996)





Figure 8a. A well aggregated soil in West Central Minnesota. 8b. Soil with poor soil aggregation due to excessive tillage. Photo credit: Jodi DeJong-Hughes, UMN.

#### Control Field Traffic

As much as 80 percent of the field may be tracked by equipment in a normal year. The philosophy behind controlled traffic is to restrict the amount of soil travelled on by using the same wheel tracks for various operations. Seventy to ninety percent of the total plow layer compaction occurs on the first trip across the field. Controlling traffic will result in deeper compaction in the tracked area, but the soil between the tracks will not be compacted.

South Central NY Dairy & Field Crops Digest

# A County Highway Superintendent's Recommendations for Contributing to Road Maintenance Based on Jeff Griswold's presentation

## A summary of Jeff Griswold's presentation on Road Care by Janice Degni, Area Field Crops Specialist

Each year at Dairy Support Services Manure Handling & Trucking Safety Workshop Jeff Griswold, Town of Preble Highway Superintendent, provides tips on preserving our town roads. Jeff presented every highway superintendent's wish list for helping be good stewards of our roads. It's important to know how expensive it is to build and maintain roads. Repairing or replacing one mile of road 20 feet wide with binder and black top costs \$200,000 today. The cost of pavement with a 1 ½ inch overlay would cost \$76,050. A 2½ inch binder costa \$114,670. Oil and stone applications cost between \$14.500 to \$18,750 depending on the size of stone used. Be aware of newly placed 'Fresh Oil-Loose Stone" signs. They indicate that road crews will be doing that work within days and ask that you help to keep the road clean before the work begins (No manure slops).

As noted in the Compaction article in this issue, farm equipment is much larger and much heavier today than in the past. Town roads

are not built to the same standards as county or state roads and the heavy loads and repetition on the roads damages them.



He explained

that the shoulder of the road provides stability for the pavement. To avoid damaging the shoulder he pleads that you do not till up to the edge of the road. He emphasized that the road does not end at the edge of the pavement. Stay six feet away from the blacktop and at least 3+ ft from the back of road ditches. He also asks that plowing is done away from the road, otherwise water is directed under the road surface, which weakens the structure of the road. He also asks that you don't use the road as a headland. Vehicle and Traffic law prohibit debris in the road, which includes mud, etc dragged into the road from field operations. You need to have a system to clean up after the work is done. One example is a skid steer with a sweeper attachment.

Jeff suggests that you get to know your local highway superintendent. When needed you can work with them to improve an area of high traffic such as entering or leaving the field or where a frac tank will be placed. It is better for them to prep an area rather than have to repair the road along the length of a field.

Suggestions for helping the road last include: Use the whole road when available to avoid driving in the same ruts. Stay off the edge of the road as much as possible. Remember that the road is weakest during the spring thaw, which unfortunately corresponds to the beginning of field work. If you notice that oil and stone roads are beginning to stick to the tires. Stop. Inform the local highway superintendent to give them time to spread some sand to stop the damage (see cost above).

Overloading vs Pavement Life				
% Overload on Standard Axle	% increase in Damage	Working Life of 20 year Pave- ment Reduced to (years)		
10	45	13.8		
20	105	9.8		
30	185	7.0		
40	285	5.2		

This table shows the impact on road life span by overweight vehicles.

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#### Table 1.

Table 1	Rate	% Control <sup>1</sup> 35 DAA <sup>2</sup>	% Control <sup>1</sup> 35 DAA <sup>2</sup>	% Control <sup>1</sup> 35 DAA <sup>2</sup>
Herbicide	Amt/A	2020 <sup>3^</sup>	2021 <sup>3^</sup>	2022 <sup>3^</sup>
Classic	1 oz	28.75b	5e	65c
Sharpen	1 oz	99.75a	62.5ab	81abc
Sharpen Tricor	1 oz 6 oz	98.75a	91.75a	100a
Trivence WDG	6 oz	97.5a	40bcd	99.75a
FirstRate	.75 oz	32.5b	10de	70bc
Boundary 7.8EC	2.1 pt	100a	60ab	99.5a
Valor SX	2 oz	21.25b	18.75cde	87abc
Valor SX Tricor DF	2oz 5 oz	100a	63.75ab	98.75a
Valor SX	3 oz			94.75ab
Valor SX Tricor DF	3 oz 5 oz			99.75a
Tricor DF	5 oz	100a	68.75ab	98.25a
Tricor DF	10.6 oz	100a	82.5a	100a

1Visual control rating, means followed by the same letter are not significantly different

2Days After Application treatment evaluation

3Calendar year of trial

^2020 a Jefferson Co. farm, 2021 a St. Lawrence Co. farm, 2022 a Jefferson Co. farm

# Burndown and preemergence herbicide programs for control of marestail in soybeans By Mike Hunter, CCE North Country Reg. Ag Team

Glyphosate resistant and multiple resistant (Group 9 and Group 2) marestail is spreading across New York State and may already be on your farm. The presence of herbicide resistant marestail in NY is changing the way we manage weeds. We need to use burndown herbicide programs with more than one effective site of action to delay the development of resistant weeds and provide the best control. The use of glyphosate alone should no longer be considered a viable burndown herbicide program.

Glyphosate-resistant (a.k.a Roundup Ready) soybeans made postemergence weed control relatively easy with a single application. The use of postemergence (POST) glyphosate in glyphosate resistant soybeans has been the primary weed control program used by many soybean growers. While this system seemed to simplify weed management, relying on total postemergence programs can be difficult to manage if not properly implemented.

Herbicide screening trials of marestail grown from seeds collected from multiple soybean fields across NYS suggest that the marestail populations are resistant to both Group 9 (glyphosate, i.e., Roundup) and Group 2 (ALS herbicides, i.e., Classic, FirstRate) herbicide sites of action. A single POST glyphosate application will no longer control resistant marestail; therefore, growers will now have to use an effective soil residual herbicide with the preplant burndown program or apply separately just prior to planting.

In no-till, strip-till and very minimum till (i.e. one pass with a vertical tillage tool) situations burndown herbicides will be necessary to control emerged weeds prior to planting. Marestail can be either a summer annual or winter annual. The winter annual marestail rosettes are present right now and as it warms up these will begin to bolt and grow tall quickly. Once resistant marestail gets any taller than 6 inches it becomes very difficult to control.

Xtend, Enlist and Liberty Link traited soybeans are the choices that allow for effective postemergence control of multiple resistant marestail. In Roundup Ready or conventional soybean fields we have no effective herbicides for the postemergent control of multiple resistant marestail.

Burndown herbicide programs for no till soybeans will include either glyphosate, glufosinate or paraquat tank mixed with

2,4-D and/or Sharpen (saflufenacil). The addition of metribuzin to the burndown program will provide additional residual control of marestail.

If dandelions are also a problem in the field, consider using one of the listed programs that include 2,4-D ester. Don't substitute 2,4-D amine formulations for the ester formulation. Apply 1 pint per acre of 2,4-D ester (4 lb gal formulations) to keep the preplant interval to 7 days, rates higher than that will lengthen the planting interval.

If using a burndown option that includes Sharpen, apply 1 oz/ acre for no preplant restrictions (except for coarse soils with 2% or less organic matter where the preplant restriction is 30 days).

Here are choices that include more than one effective site of action for the control of resistant marestail in soybeans:

- Sharpen (1 oz) + glyphosate + metribuzin
- 2,4-D ester (1 pint) + glyphosate + metribuzin (7 days prior to planting)
- 2,4-D ester (1 pint) + Sharpen (1 oz) + glyphosate + metribuzin (7 days prior to planting)
- Sharpen (1 oz) + glufosinate (Liberty)
- Sharpen (1 oz) + glufosinate + metribuzin
- 2,4-D ester (1 pint) + Sharpen (1 oz) + glufosinate + metribuzin (7 days prior to planting)
- paraquat (Gramoxone) + metribuzin
- 2,4-D ester (1 pint) + paraquat (Gramoxone) + metribuzin (7 days prior to planting)

Over the last three years in NNY, Cornell Cooperative Extension Regional Field Crop Specialists conducted on-farm herbicide trials evaluating the control of marestail using preemergence herbicide programs. These trials included one untreated plot and 12 different herbicide programs consisting of preemergence (PRE) herbicide used alone and in tank mixes. The marestail population at these three separate sites had been confirmed to be resistant to both Group 9 and Group 2 herbicides. The Northern New York Agricultural Development Program provided funding support for the 2021 and 2022 trials. The trial results have been summarized in Table 1. (see page 6)

Always read and follow label directions prior to using any herbicide. If you have any questions or would like more information regarding herbicide programs for soybeans contact Janice.

# **Compaction- The Hidden Yield Thief**

By Janice Degni, Regional Field Crop Specialist

At the Winter Crop meeting in January this year we featured Minnesota Extension Specialist, Jodi DeJong-Hughes, who gave a presentation on causes of soil compaction and tips for reducing it. I am going to share some of the key points in this article. I will also be drawing on a publication she recently released - The Upper Midwest Soil Compaction Guide available to download at <u>https://</u>

### www.researchqate.net/publication/364054689 Upper Midwest Soil Compaction Guide.

As spring field work begins it's a good time to think about compaction and how to operate and get all the work needed to be done in a timely manner while minimizing compaction damage to wet soils. Compaction causes a reduction in pore spaces and increase the soil bulk density. The pores in our soil contribute to soil health by providing channels for water and air. Plant roots and all the soil life perform better when they have access to air and water. Root growth is slowed or restricted at bulk densities greater than 1.47 gm/cm<sup>2</sup> for clays and greater than 1.8 gm/cm<sup>2</sup> for sands. The ideal and restrictive bulk density measurement vary with soil texture. Clay soils will compact more tightly than sands because of soil particle size. The information that follows is excerpted from the Compaction Guide. – J Degni

Jodi writes, "The ability of equipment to haul and pull greater loads, plus the load capacity of the equipment itself also increased. The axle loads of combines and tractors have increased 4 to 6 times from 1960 to 2010 (Figure 8.) Additionally, the evolution of tire:soil contact area has not kept pace with the evolution of wheel loads and tire inflation pressure. In other words, the increase in the tire:soil contact area is slower than the increase in wheel load, which results in a net increase in the stress placed upon the soil.

These trends in axle and wheel loads and tire characteristics have led to wheel-traffic compaction progressively going deeper into the soil over time. The depth of compaction starkly matches the progression of higher wheel loads over time. A significant concern is that the depth of soil compaction since 1980 has extended beyond the maximum depth that deep tillage implements can commonly operate. Keller et al. (2019) estimated that root elongation rate (i.e., inches of root growth per day) has decreased by approximately 30% since the 1960s for soil depths between 8 to 24 inches. Crop roots that grow near 1.2 inches/day have been reduced to nearly 0.8 inches/day. This suggests that crops impacted by modern wheeltraffic compaction will take one to three weeks longer to reach water and nutrients deeper in the subsoil." [p. 8 Upper Midwest Soil Compaction Guide]

#### **Key Considerations**

#### What is soil compaction – types and yield impact?

The energy of a single raindrop can start the degradation of soil.

The Impact of a Raindrop

- Soil particles sort and detach
- Soil/water solution created
- Soil structure degraded
- Crust can form



#### 100 (c) Yield loss due to lo subsoil compaction Surface (b) Yield loss due to Crusting 95 Relative yield (%) compaction in upper part of subsoil Crusting of 90 (a) Yield loss due to mpaction in topsoi the soil's surface in croplands is due to poor 10 soil structure Years after compaction

 that has lower
 Figure 9. Relative crop yield on compacted soil compared to non-compacted soil

 soil strength
 with moldboard plowing (Duiker, 2004, Hakansson, I and R.C. Reeder, 1994)

than a well-structured soil. Note that this type of crust is distinctly different from desert soil biocrusts, which play a vital role in soil conservations in those natural ecosystems. Without protection from crop residue, raindrops will hit the soil surface at full force dislodging soil particles. The finer particles fill in cracks and larger pores resulting in a thin layer of tightly packed and cemented soil (Fig. 12.)



Crusted soil limits the amount of rainfall that will infiltrate into the soil, leading to ponded water, enhanced denitrification, and runoff and erosion. Depending on the thickness and strength of the crust, seedlings may have a difficult time emerging and can become trapped under the crust.

Photo: Jodi DeJong-Hughes, UMN.

#### Wheel Traffic and Deep Compaction

Wheel traffic from heavy agricultural vehicles is without a doubt the major cause of soil compaction in the upper Midwest (fig. 12.) As farm size increases, the window of time to complete fall and spring field operations in a

 Table 1. Approximate axle loads for field equipment. Source: Jodi DeJong-Hughes, University of Minnesota Extension, 2022

timely manner is often limited unless more equipment and operators are available. As equipment size has increased, the weight of tractors has increased from less than 3 tons in the 1940s to approximately 20 tons today for the large four-wheel-drive units. This is of special concern because spring planting is often done before the soil is dry enough to support the heavy planting

Field equipment	Axle load tons/axle
Slurry tanker, 4,200 gal.	10-12
Slurry tanker, 7,200 gal.	17-18
Lexion Class 9 combine, 590 hp, 360 bu capacity, 12 row	20
Fendt Class 11 combine, 790 hp, 485 bu capacity, 16 row	44
Grain cart, 720 bu, full, 1 axle	22
Grain cart, 1,200 bu, full, 1 axle	35-40
Grain cart, 2,000 bu, full, 1 axle	70-76
Terra-Gator, rear axle	12-18
Gravity wagon 385 bu, full, 2 axles	6-7
Gravity wagon 560 bu, full, 2 axles	10
4WD tractor, 200 hp, front axle	7.5
4WD tractor, 325 hp, front axle	13
4WD tractor, 580 hp, front axle	16
4-Track tractor, 580 hp, front axle	18

Tracks and dual tire sets have better flotation than single tires (i.e., the ability to stay on the surface of soft soil; similar to how snowshoes work.) If combines or grain carts can be equipped with either of these choices, flotation will increase and allow more passes before getting stuck in undesirable soil conditions. In wet soil conditions, it is recommended that farmers unload the combines on the headlands or unload more frequently. equipment.

#### **Equipment Axle Load**

Tractors and combines have increased in size, capacity, and weight over the past six decades. Heavy axle loads and wet soil conditions will increase the depth of compaction in the soil profile. As loads increase beyond 5 tons per axle, the potential to compact the soil below the depth of tillage also increases. Large 500 hp tractors, full combines, slurry tankers, and grain carts can weight between 18 and 75 tons per axle. (Table 1.) Whether equipped with tracks or tires, these large loads can create compaction down to 2 to 3 feet in the soil.

Subsoil compaction is a serious soil conservation issue and a longterm threat to soil productivity. Moldboard plowing with a tractor wheel in the furrow will pack soil below the depth reached by normal tillage operations and can be another source of subsoil compaction. Keep axle load under 10 tons in well-aggregated soil and 5 tons in poorly aggregated soil to localize compaction in the top 6-10 inches.

#### **Tire Contact Pressure**

Tire experts agree there is no single, simpler way to improve tractor efficiency than to use the proper tire inflation pressure (Lancas et al., Reichenberger, 2002). Keeping tire pressure at the manufacturers suggested pressure in the field maximizes traction, minimizes slip, and significantly lowers fuel consumption. Proper tire inflation not only improves tractor efficiency but can reduce the contact pressure (pounds per square inch (psi)) on the soil and the intensity of soil compaction from the tires.

Total axle load and the contact pressure between the tire and soil affects subsoil compaction. Historically, tire size increased as equipment weight increased. However, this is not always the case since manufacturers attempt to avoid drastic increases in contact pressure by the tire on the soil surface.

Every tire is designed for a specific inflation pressure (in psi) for optimal operation based on load, speed, number of tires, and number of axles carrying the load. On a hard-packed, solid surface like a road, tires should be well-inflated to minimize surface contact and reduce friction (heat). However, in the field, tires need to be soft enough to spread a machine's weight over the widest and longest possible footprint, without compromising sidewall deflection.

When dual or triple tire sets are added to a tractor it reduces the carrying load on each tire, thereby reducing the necessary tire inflation pressure. This also decreases the depth and intensity of soil compaction. Producers should check with their tire dealers to confirm proper tire pressure.

## Prevention and Remediation -Work the Field When it is Fit

One of the most important factors for decreasing the risk of soil compaction is to stay off the soil when it is wet. Unfortunately, this is not always possible, as fieldwork opportunities are often limited. While compaction may not be eliminated, it should be managed. Waiting



a day or two could mean the difference between a uniform, healthy crop or a slowly emerging, stunted, and stressed crop.



Figure 3. A central tire inflation system was installed on the back wheels of the tractor and on the planter wheels. Photo credit: Jodi DeJong-Hughes, UMN.

#### Central Tire Inflation System (CTIS)

Using a Central Tire Inflation System (CTIS) is one way to inflate and deflate the tires on the go for best performance whether in the field or on the roads. Lowering the air pressure in the tire creates a larger area of contact between the tire and the ground and makes driving on softer ground much easier. CTIS systems help the tractor perform better in different ground conditions, can lower fuel usage, have less tire wear, providing longer tire life.

#### Minimize Axle Loads

Heavy axle loads and wet soil conditions will increase the depth of compaction in the soil profile. Keep axle loads under ten tons for a well structured soil and closer to five tons for a soil receiving fullfield tillage at the depth greater than four inches to maintain compaction in the upper layer of the soil. Combines should be unloaded on the headlands or unloaded more frequently to minimize compaction due to the weight of the combine. When possible, use a lighter tractor to do lighter work. The risk to soil outweighs the benefits.

#### Weight and Pressure Applied

All loads apply stress to the soil. However, there are two stressors that can be controlled by the equipment operator: Axle loads and tire inflation pressure.

Axle load determines how deep the compaction will occur in soil. The heavier the axle load, the deeper the compaction extends into the soil. Axle loads of modern field equipment can result in compaction extending well into the subsoil during wet conditions.

Tire inflation pressure also influences soil compaction. Although not as influential on compaction depth as the axle loads, tire inflation pressure is more impactful on the severity of compaction in soil layers. The higher the inflation pressure, the more intense the compaction.

The goal of any field operation is to keep the compaction in the shallower depths where tillage implements, wetting-drying cycles, and root systems can break up the compaction soil. Many years of long-term remediation efforts will be needed if high axle loads and

South Central NY Dairy & Field Crops Digest

# **Keeping Calves Healthy – Benchmarking Areas to Assess** By Betsy Hicks, Area Dairy Management Specialist

Keeping calves healthy is always preferred to treating sick calves. Time spent treating calves is costly for many reasons: labor, treatment cost, delayed growth of the calf, and emotional strain on the caregiver. While certainly there are times of year that are more frustrating than others, taking a step back to assess certain parts in the calf area can help calf managers pinpoint locations that could be improved.

#### Colostrum

Without a doubt, colostrum is one of the most, if not the most important factor in ensuring a good start to a calf's life. Colostrum should be harvested as quickly as possible after calving in as clean a manner as possible. Only colostrum from healthy cows should be used and should also be visually assessed for signs of mastitis or blood. While long believed colostrum from heifers was not up to par, as long as colostrum meets a Brix reading of 22 or greater it is of good quality and can be used. A Brix reading of 18 or less should be discarded and farmers should consider using a colostrum supplement for readings between 18-22. Calves should receive 4 quarts of colostrum also as quickly as possible, ideally within six hours of birth. If there are problems with young calves and these things are not being attained on farm, this is an excellent place to start making changes.

#### Calf Housing – Resting Space

Bedding and amount of resting space are also an integral part of keeping calves healthy. Bedding can be scored by Nesting Score, where score 1 indicates that the calf is unable to nest in the bedding and lower legs are visible above the bedding. Score 2 indicates that the calf's lower legs are partially visible above the bedding. Score 3 indicates that the lower legs are completely covered by bedding, and is the ideal score for calves in colder months. Amount of bedded resting space is

also key for maintaining health, and is often impaired in months where there are slugs of calvings and group housing is used. Ideally, the calf should always have no less than 40 square feet of bedded resting space. Most calf hutches are around 32 square feet of bedded space – care should be taken to not pair up calves in single size hutches, further limiting resting space in this type of housing. When calves get older, especially calves that are transitioning through weaning and into larger group pens, care should be given to never go under 40 square feet of resting space per calf. When calves are introduced to freestalls, stocking density should be under 100%. Meaning: each calf should have her own stall. Limiting choice for space can cause other unintended health impacts.

#### Calf Housing – Access to Feed and Water

By day 3, calves should have access to starter grain and free choice water from clean buckets or feeders. At a minimum, calves and younger heifers should have 18 inches or greater of feed space and no less than 2 inches of water space per calf. These recommendations are often limited again during times of increased heifers in the pipeline, but care should be given to never go under these recommendations during periods of stress – pen moves, grouping changes, feed changes, vaccinations or weaning transition. If your farm is having trouble with transition or a certain pen move, take inventory of what changes calves are seeing and make sure the minimum recommendations are being met.

#### **Benchmarking Using a Recent CCE Study**

A NY Farm Viability Study completed by myself, Lindsay Ferlito of the CCE North Country Regional Ag Team and Margaret Quaassdorff of the CCE North West NY Dairy Team looked at these measurements from 18 farms across our regions. The table below shows how these farms stacked up against recommendations. To summarize, many farms in the study were achieving recommendations in some areas, but not all. Working on knowing where the issue lies and working on achieving recommendations will help improve calf health.

Table 1. NYFVI Study Areas of Excellence and Opportunity for NY Dairies, Calf Benchmark vs Recommendations

Factor	Benchmark	Recommendation
Nesting Score (1=bad, 3=good)	2.3	3.0
Bedding Amount (1=good, 4=bad)	2.1	1.0
Stall Base Hardness (1=good, 3=bad)	1.7	1.0
Bedding Cleanliness (1=good, 3=bad)	1.9	1.0
Bedded Space (sq ft/heifer)	31.4	≥ 40 sq ft
Stall Stocking Density (%)	124.1	≤ 100%
Feed Space (inch/heifer)	18.0	≥ 18 inches
Water Space (inch/heifer)	6.0	2 to 3 inches

# **Topdressing Wheat with Nitrogen**

By Douglas Beegle, Ph.D.; Emeritus Distinguished Professor of Agronomy, Penn State University. Reprinted from https://extension.psu.edu/topdressing-wheat-with-nitrogen



Topdressing with different nitrogen fertilizers, two of which will also supplement sulfur.

There have been some questions on topdressing N on wheat. The main sources are UAN (30-0-0), Urea (46-0-0), and Ammonium Sulfate (21-0-0-24S). All are good sources of N for wheat. UAN and urea are both volatile forms which should be a consideration with these sources because of the potential for significant loss of the N. The potential loss from UAN is only half that of straight urea because UAN is only ½ urea. Losses are minimized if the urea or UAN can be applied just before around ½ inch of soaking rain. Also, the losses tend to be less at cold temperatures but even a brief warm up at the time or application can result in greater losses.

A urease inhibitor can effectively reduce volatilization losses from surface applied urea or UAN when there are the conditions for volatilization loss. Not all N additives are urease inhibitors. Check the label carefully to make sure the additive contains an effective urease inhibitor. Ammonium sulfate is nonvolatile and therefore there is no benefit to adding a urease inhibitor with ammonium sulfate. The other additive type is a nitrification inhibitor. Nitrification inhibitors can reduce the loss of N through leaching and denitrification, thus nitrification inhibitors will be most beneficial on poorly drained or excessively well drained soils where these losses are most common. Nitrification inhibitors are also more beneficial when the N is applied long before plant uptake which is usually not the case with topdressed N on wheat. Also, nitrification inhibitors will be less beneficial in

cold soils with ammonium sources of N applied because of the slower microbial conversion to nitrate N due to the cold weather. Consequently, nitrification inhibitors are generally less beneficial on wheat, but can be beneficial under some conditions, however, it is very difficult to predict exactly when a nitrification inhibitor will provide a benefit on wheat. Nitrification inhibitors have no effect on volatilization losses. As with the urease inhibitors, check the label to be sure the additive contains an effective nitrification inhibitor.

One other common question is sulfur on wheat. Sulfur (S) deficiencies are still pretty rare in Pennsylvania but are becoming more common. Ammonium sulfate contains 24% S, therefore applying some of the wheat N requirement in this form will also supply S. Generally, 100 lb/A of ammonium sulfate in the wheat N program, which will supply 24 lb S/A, will supply adequate S for wheat in most situations. Ammonium thiosulfate (ATS) is often used as an S source with UAN. Three to five gallons of ATS will supply 10 to 15 lb S/A. There have also been guestions about injury to wheat topdressed with UAN containing ATS. While ATS can cause crop injury, this is usually only when the ATS is applied with starter fertilizer close to the seed. I can find little indication that there is a problem with ATS applied with topdress nitrogen (N) on wheat. There has not been any research done in Pennsylvania on this. However, in looking at work done in other states and recommendations from many wheat producing areas there does not appear to be a problem directly related to ATS injury with topdressing. For example, in one study in Montana, ATS was applied straight with no dilution or other fertilizer and there was no injury. Remember that UAN itself can cause leaf burning which can be significant at higher rates, such as in overlaps. Usually, this burning is not serious and does not result in a yield reduction. However, if this injury occurs along with other stresses it could impact yield.



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# **Upcoming Events Calendar**

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	June 8 10 am—12 pm	Cornell Small Grains Management Field Day Poorman Farms, Seneca Falls Pre-registration Requested—https://cals.cornell.edu/field-crops/about/extension/field-days
	July 4-8	Cortland County Youth Fair Cortland County Fairgrounds, Fairgrounds Drive, Cortland
	July 20-22	GrassStravaganza SUNY Morrisville Complete Schedule: <u>Grasstravaganza Conference 2023 –</u> <u>Planet Graze: Growing Resilient Grazing Systems (morrisville.edu)</u>
	July 25-29	Broome County Fair — Whitney Point, NY July 27 & 28 — Dairy Shows
	August 1 –5	Chemung County Fair - 170 Fairview Rd, Horseheads, NY 14845 Aug 3—Open Dairy Show
	August 3	Musgrave—Aurora Farm Field Day 1256 Poplar Ridge Road, Aurora Agronomy Research Updates
	August 8-12	Tioga County Fair Marvin Park—1 W Main St, Owego, NY 13827 Aug 9—Dairy Show
	August 23 10 am—3 pm	4-R Field Day DuMond Farms— 5083 White Rd, Union Springs, NY 13160 Sponsored by the NYS Agribusiness Association and partners

