Cornell Cooperative Extension

Northwest NY Dairy, Livestock and Field Crops Program

Ag Focus

Corn Silage Carry-Over *by Margaret Quaassdorff*

Have you considered the value of carry-over corn silage on your dairy?

In discussions with nutritionists and dairy producers, there seem to be common negative observations when feeding fresh corn silage (ensiled less than 3 weeks). Some of these include an increased risk of acidosis, digestive upsets, and possible hemorrhagic bowel syndrome. These lead to overall poorer rumen health and digestibility capabilities, which in turn, leads to loss of cow comfort, health, and production and increasing economic loss.

Corn silage should be stored and fermented for at least 3 to 4 weeks before feeding out, but to take advantage of better starch digestibility of the kernel, corn silage should be ensiled for at least 3 to 5 months. Studies by researchers in Delaware and Wisconsin reported a gradual improvement in starch digestibility as fermentation in the silo progressed (Der Bedrosian et al., 2012; Windle et al., 2014; Ferraretto et al., 2015). This means that the fermentation process increases the energy availability of the corn silage, making it a more efficient feed, and leading to the potential for lower purchased feed costs. "How?" you ask.

Starch granules in the kernels of corn silage are surrounded by prolamin (zein) proteins (McAllister et al., 1993) that basically guard the starch granule and inhibit bacterial degradation of the starch in the rumen and enzymatic digestion in the small intestine of the cow. The acidic environment generated by the fermentation process of a proper length of ensiling aids in the process of proteolysis; the main mechanism that breaks down the prolamin protein barrier. Without as much of an insoluble protein barrier, rumen microbes now have greater access to the starch granules which they will ferment to produce the volatile fatty acids which the cow will then use for energy and milk production. Adequate and prolonged storage of corn silage also leads to a greater kernel processing score (percentage of starch passing through a 4.75-mm sieve). This is important as it signifies a greater surface area available for rumen microbial action.

Photo source: Libby Eiholzer

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Focus Points

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Extended fermentation affects both chemical and physical characteristics of kernels in corn silage. It is important to note, though, that these effects will not replace adequate kernel processing during corn silage harvest. Without proper kernel processing, (mechanically breaking the pericarp of the seed, and splitting/crushing/shearing it to pieces) the kernel is highly resistant to microbial attachment (McAllister et al., 1994), which means very poor utilization by rumen microbes. (Think about trying to digest a candy bar with the wrapper still on!)

Some ideas to ensure corn silage carry-over:

- Feed inventory planning. To determine dairy herd forage needs, and calculate forage inventories, visit: https://ansci.cals.cornell.edu/extension-outreach/adult-extension/dairy-management/
- For bunker silos with open ends, or for piles, increase packing density to fit more corn silage dry matter in a similar footprint.
- For situations where all feed must be fed out before refilling, put up one or more bag silos, or an extra pile the year before, making sure it is sized for a 3 to 4 month supply of corn silage.

Bottom line: *Carry-over at least 3 to 4 weeks of fully fermented corn silage when you can.*

Upcoming Webinars

November 12, 2018:

"Economic and User Experiences with Automatic Milking"

Presented by: *Larry Tranel*

https://hoards.com/flex-309-Webinars.html

November 19, 2018:

Dairy Management Mondays: "Stress Management"

Presented by: *Suzanne Pish*, Michigan State

https://extension.psu.edu/dairy-management-mondays

November 20, 2018:

Technology Tuesdays: "PDMP Corn Silage Trials"

Presented by: *John Tyson*, Penn State

https://extension.psu.edu/technology-tuesdays

Soil Sampling 101 for Small Farms *by Nancy Glazier*

One of the first steps in assessing pastures is to take some soil samples. Fall is a great time to take samples- any time before the ground freezes. Whether a new landowner, confirming the pH for liming recs, or checking fertility prior to establishing a pasture or hayfield, an analysis is worth it. The general recommendation is to sample every three years. Depending on the acreage, one third of the farm could be sampled annually. For consistency, sample at the same time of the year.

For accurate results it is important to get a good sample. A quick internet search will find you a soil probe, or just use a clean shovel or trowel. Use a clean plastic bucket or put a plastic bag inside the bucket. You do not want anything that will contaminate the sample. You will want to take multiple samples across the field, anywhere from 10 -15 samples depending on the size of the field, 4-7" deep. If you plan on preparing for a new seeding, sample to the plow depth. Avoid sampling near manure or urine spots or unusual areas. In addition, avoid fence lines. The goal is to get a composite sample of the soil.

Prepare the sample for submission to the lab. Drying is an effective means of preserving the chemical characteristics of the soil sample. If a sample is moist, dry it first by spreading it in a thin layer on a clean sheet of waxed paper or paper plate and allow the soil to dry at room temperature. A fan may be used to hasten drying, but do not use heat or direct sunlight. Once dried, (or if sampled from a fairly dry field to begin with) remove large stones and any thatch or roots from the sample, break up any lumps or clods, and mix the sample thoroughly. You will need about one cup to fill the box.

While you are waiting for your samples to dry, pick up soil test boxes from your local extension office or order them from Agro One: http://dairyone.com/product/agro-one-soil-kits-with-cornell-nutrient-guidelines-ny-only/ or 1.800.344.2697. This is the soils side of Dairy One Lab, and the lab that will provide Cornell nutrient guidelines. The form can be downloaded. For most small farms form A1 has enough room for all fields sampled. (There are other labs that will test your soil, too.)

I have found over the years that it is just as important to fill out the form accurately as it is collecting a good sample. Fill in your name, address and contact information. If you are working with a consultant, or extension specialist or educator, enter their name and email so they receive a

copy of the results. If the soil is not listed on the form you will not receive nutrient recommendations. If you do not have a soil map, you can get one from your SWCD or NRCS office, or find one here at the Web Soil Survey: https://websoilsurvey.nrcs.usda.gov/app/. Follow the step by step instructions to find your soil types. Enter the predominant soil type for each sample on the form. It is important to add the crop code for past years and future crops for fertility recommendations as well. Codes are listed on the back. If you are looking to establish a new pasture or hayfield, use the codes that end in 'E', otherwise, use the codes with 'T' for topdressing. Enter the field drainage and percent legume, if applicable. Make a copy of your form, fill the box with the composite sample, and include payment.

The next step is getting the sample to the lab. The boxes can be shipped at your cost. There are some pickup locations around the region and they can be found here: http://dairyone.com/general-resources/sample-transportation/. Make sure to call the contact person prior to dropping off samples.

Results should be reported in a week or so. If lime or potash is needed, fall is a great time to apply, as long as the ground is dry enough or frozen, allowing some time to work into the soil through the winter. The rest should wait until spring.

8-1-1 - Make the Call! *by Timothy X. Terry – Harvest NY*

The fall harvest is complete (or nearly so), and thoughts often turn to tiling out the wet spots in the fields and/or completing the primary earthwork for a project to begin next spring. Fall is the perfect time for these projects because there are no pressing cropping responsibilities and the freeze-thaw cycle will help settle any disturbed areas before next spring.

If you are planning on doing any of this work yourself, remember to call for a stakeout of underground facilities (gas, electric, municipal water, telephone, etc.) **BEFORE** you start digging. This is as simple as calling 811 or going online www.digsafelynewyork.com and filling out a ticket. If you are hiring a contractor for this work, then he should take care of this matter.

When Should I call?

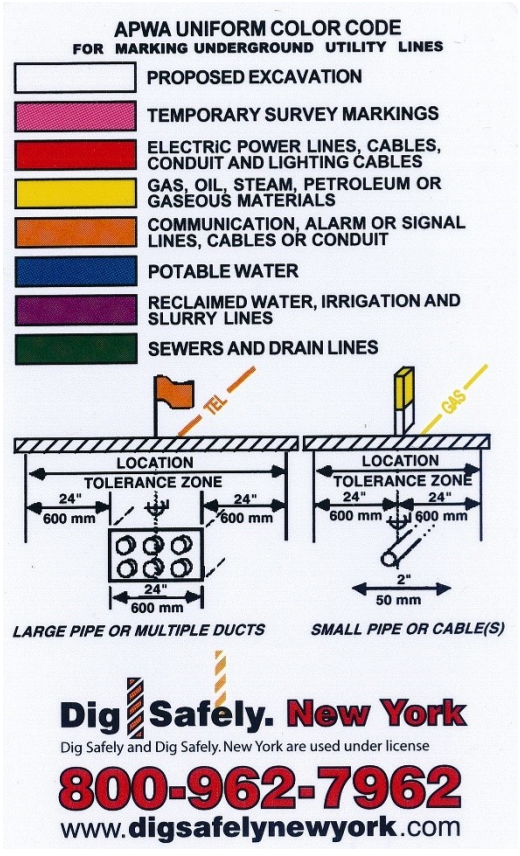
In general terms, any ground disturbance greater than 12" deep is considered excavation. Even if you are not actually digging, some normal farm operations are considered excavation because they have the potential to impact underground facilities, or alter the depth to the facilities, such as building up a farm lane.

The following is a list of activities normally associated with farming, but are actually excavation, and require a stake out. (This list is not all inclusive. *If in doubt, call 811 right away. It's free!*)

- Fence Building or Repair
- Drain tiling
- Terracing (not usually an issue in NYS)
- Grading
- Contouring
- Ripping
- Deep Tilling
- Tree & Stump Removal
- Clearing or Grubbing
- Ditch Cleaning or Repair
- Trenching
- Augering
- Installing Cattle Guards, Dams, or Dugouts
- Trenching Water Lines

- Burying Mortalities
- Building or Repairing Roads
- Installing Culverts

Even if you *think* you know where the utilities are, **make the call.** If I had a nickel for every time someone told the contractor or me that there were no drainage tiles, waterlines, leach fields, etc. in that field or that these items were, "waaaay over there" only to hit them in the next two to three scoops, I could retire quite comfortably.



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Public Only

The markings and flags you will see after the site is staked out only cover public utilities. Anything that is specific to the farm (private) will not be marked, which brings up another important point: *any buried facilities should be mapped as soon as they are installed*. This can be as simple as drawing lines on an aerial photo (available from your local Soil & Water or NRCS office, or Google Maps) along with some measurements from **at least two permanent points** – edge of road, utility pole, building foundation, transformer pad, etc. Alternatively, you could lay a strip of detectable underground tape directly over the tile, pipe, etc. after it is blinded but before it is completely buried. If the project is large enough to have required the services of an engineer, he/she should include this as part of the as-built design documentation.

Parting Thought

If you will be disturbing an acre or more of ground for anything other than tillage you will need a Storm Water Pollution Prevention Plan or SWPPP ("swip"). This details how you will be preventing soil erosion from the site and subsequent pollution of road ditches, creeks, streams, rivers, etc. This will need to be developed by a **C**ertified **P**rofessional in **E**rosion and **S**ediment **C**ontrol — a.k.a. someone who is **CPESC** certified. Many licensed engineers have this certification, but so do many in the Soil & Water Districts and NRCS, so you should have many from which to choose. Generally, these are not elaborate plans, but are usually more than just installing silt fence and/or covering spoil piles.

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2007 WESTERN STAR 4900SA; 475 HP CAT C15 Diesel; 8LL Trans.; Tri-Axle; Color: White; Engine Brake; 22.5 Tires; Spoke Wheels; 270" WB; 20,000# F/A; 46,000# R/A; Alum. Body; Clean, Double Frame Dump Truck; 682,603 Miles; Stk. #5728 - **$49,500**

2007 INTERNATIONAL PAYSTAR 5000 SFA DUMP TRUCK; 370 HP Cummins ISM; Allison Auto.; Tri-Axle; Engine Brake; 24.5 Tires; All Steel Wheels; 247" WB; 20,000# F/A; 46,000# Full Locking Rears; Double Frame w/20' Bibeau Nox; Non-Steerable 20K Lift Axle; Tarp; Plumbed For Pup Trailer; 470,500 Miles; Stk. #5793 - **$49,000**

2003 KENWORTH T800; 335 HP CAT C10; 8LL Trans.; 5.43 Ratio; 12.00 x 24.5 Tires; Alum./Steel Wheels; 260" WB; 22,000# F/A; 46,000# Heavy Rears; Low Mile Cab & Chassis; Stone Slinger To Be Removed; 22' Frame Behind Cab; 184" CT; 184,340 Miles; Stk. #5736cc - **$41,900**

2012 MACK MEU613 PACKER GARBAGE TRUCK; MP7 Mack; Allison Auto.; Tandem Axle; 22.5 Tires; 214" WB; 20,000# F/A; 46,000# R/A; Double Frame; Both LH & RH Controls; Side Load McNeilus 27 Cu. Yd. Packer; Only 19,335 Miles & Under 4,600 Hours; Stk. #5794 - **$78,800**

2004 WESTERN STAR 4900SA; 430 HP CAT C12; Engine Brake; 18-Spd.; 4.56 Ratio; 24.5 Tires; 238" WB; 16,000# F/A; 46,000# R/A; Cab & Chassis; Almost New Rubber Front & Rear; 156" CT; 18'4" Usable Frame; 248,257 Miles; Stk. #5755 - **$43,250**

2004 MACK CRANITE CV713; Mack 460 HP; Engine; Brake; 18-Spd.; Tandem Axle; Alum. Wheels; 300" WB; 20,000# F/A; 46,000# R/A; Low Mile Double Frame Truck w/Webco WHL23TC75 Crane; Cranesmart LMI; Dual Controls & 5th Wheel; 165,000 Miles; Stk. #5628 - **$54,900**

2008 PETERBILT 367; Daycab; 485 HP Cummins ISX; Allison Auto. Trans.; Tandem Axle; 24.5 Tires; Alum./Steel Wheels; 202" WB; 14,600# F/A; 44,000# Full Locking Rears; Wetline; 109,212 Miles; Stk. #5843 - **$59,900**

2006 INTERNATIONAL 7600; 330 HP Cummins ISM Diesel; 10-Spd.; Color: Red/Black; 22.5 Tires; Steel Wheels; 256" WB; Double Frame Flatbed w/Moffet Forklift Carrier; Steerable Lift Axle; 22' Deck(We Will Separate The Deck); 319,213 Miles; Stk. #5731 - **$37,900**

2004 INTERNATIONAL PAYSTAR 5600; 385 HP Cummins ISM; 9LL Trans.; 172" WB; 20,000# F/A; 46,000# Full Locking Rears; 137,958 Miles; Stk. #5756 - **$32,500**

2015 CAT CT660S; Cab & Chassis; 475 HP CT13; 18-Spd.; Quad Axle; 24.5 Tires; 244" WB; 20,000# F/A; 46,000# Full Locking Rears; Hendrickson Air Ride; Double Frame; 20,000# Non-Steerable Mid Lift Axle; 13,000# Steerable Rear Lidt Axle; 25' Frame Behind Cab; 180" CT; Stk. #5852 - **$59,500**

2007 PETERBILT 378; Daycab; 475 HP CAT C15; Engine Brake; 18-Spd.; 24.5 Tires; Alum. Wheels; 210" WB; 14,000# F/A; 46,000# Full Locking Rears; Air Slide 5th Wheel; Auto-Lube System; Wetline; 75% Rubber; 522,117 Miles; Stk. #5842 - **CALL**

2002 KENWORTH T800B; 410 HP CAT C12; Engine Brale; 8LL Trans.; Tri-Axle; Color: Yellow; 4.88 Ratio; 22.5 Tires; All Steel Wheels; 280" WB; 18,000# F/A; 46,000# Full Locking Rears; w/fassi F330SE Drywall Crane; 56.6' Boom; (5) Sections; 25' Steel Flatbed; 30' Total Double Frame; 210" CA; 301,153 Miles; Stk. #5744 - **$42,900**

1999 INTERNATIONAL 2674; 330 HP Cummins M11; Allison Auto.; Tandem Axle; 22.5 Tires; All Steel Wheels; 176" WB; 20,000# F/A; 40,000# R/A; Double Frame; 13'x48" Dump Body w/Tarp; 176,774 Miles; Stk. #5696 - **$23,900**

2006 MACK GRANITE CT713; Tri-Axle Dump Truck; 370 HP Mack AMI Engine; 10-Spd.; 24.5 Tires; Alum./Steel Wheels; 198" WB; 18,000# F/A; 46,000# R/A; 16' Steel Ox Body w/Tarp; 18,000# Non-Steerable; 466,658 Miles; Stk. #5830 - **$49,900**

2005 KENWORTH T800 CAB & CHASSIS; 335 HP CAT C11; 10-Spd.; Tandem AAxle; Double Frame Cab & Chassis; 20,000# F/A; 44,000# Full Locking Rears; 240" WB; 20' Frame Behind Cab; 164" CT; 5.29 Ratio; 90% Rubber; 128,000 Miles; Stk. #5688 - **$49,900**

2006 INTERNATIONAL 7600; 335 HP Cummins ISM; Allison Auto.; 5.55 Ratio; 22.5 Tires; 220" WB; 20,000# F/A; 46,000# R/A; Double Frame Cab & Chassis w/17' Frame Behind Cab/Muffler; 136" CT; 83,267 Miles; Stk. #5766 - **$39,900**

2005 PETERBILT 357; Quad Axle Dump Truck; 370 HP Cummins ISM; 8LL Trans.; 24.5 Tires; 18,000# F/A; 44,000# Full Locking Rears; 17' Steel Dump Body; Quad Axle w/Heavy Single Frame; (2) 11,000# Steerable Lift Axle; Will Separate Box From Chassis; 22' Chassis Behind Cab; 212" CT; 302,500 Miles; Stk. #5831 - **$48,500**

1998 OSHKOSH FF2346; L10 Cumminsl 22.5 Tires; Alum. Wheels; 214" WB; 23,000# F/A; 46,000# R/A; 6x6 Cab & Chassis (4,000 Gal. Water Tank To Be Removed); 18' Single Heavy Frame Behind Cab; 150" CT; Very Clean; 190,985 Miles; Stk. #5737 - **$23,900**

2001 PETERBILT 357 WINCH/OIL FIELD TRUCK; 475 HP CAT C15 6NZ Turbo; 8LL Trans.; Tandem Axle; Color: Red; 12.00 x 24 Tires; Spoke Wheels; 390" WB; 40,000# F/A; Double Frame; Twin Steer Rig Up Truck w/75-Ton Braden Winch; 4-Spd. Aux. Trans.; Planetary Drive Rears; 27'6" Deck w/Tail Roller & 30' Gin Poles; 52,963 Miles; Stk. #5780 - **$69,000**

2006 OSHKOSH F2346 6X6!!; 320 HP Cummins ISM; 10-Spd.; Tandem Axle; Color: Red; 22.5 Tires; Alum./Steel Wheels; 211" WB; 23,000# F/A; 46,000# Full Locking Rears; 10½ Cu. Yd. McNeilus Mixer; 19' Frame Behind Cab; 152" CT; 139,840 Miles; Stk. #5582 - **$44,900**

2009 FREIGHTLINER FLD120; Water Tank Truck; 515 HP Detroity 14L; Engine Brake; 18-Spd.; 24.5 Tires; 248" WB; 18,000# F/A; 46,000# Full Locking ears; Water Tanker w/Pumop; Jasper 4,200 Gal. Tank; Will Separate Tank From Chassis; 20' Frame Behind Cab; 168" CT; 139,985 Miles; Stk. #5837 - **$54,500**

2006 MACK VISION CX613; 460 HP Mack AC; 18-Spd.; Tandem Axle; Engine Brake; 22.5 Tires; Alum./Steel Wheels; 190" WB; 14,000# F/A; 46,000# Full Locking Rears; w/Wetline & Air Slide 5th Wheel; 547,638 Miles; Stk. #5654 - **$29,000**

2000 INTERNATIONAL 2674; Water Tank Truck; 370 HP Cummins N14; Engine Brake; 8LL Trans.; 22.5 Tires; 194" WB; 20,000# F/A; 40,000# R/A; 2,700 Gal. Capacity; No Insulated Double Frame w/Hitch & Air Hookups; 5,188 Hours; 18'6" Frame Behind Cab; 128" CT; 115,225 Miles; Stk. #5853 - **$25,000**

2005 KENWORTH T800; 475 HP CAT C15; 8LL Trans.; Tandem Axle; 4.30 Ratio; 24.5 Tires; Alum. Wheels; 210" WB; 20,000# F/A; 46,000# Full Locking Rears; Rear Double Frame; w/Braden 75,000 lbs. Winch; Tail Roller; 15'6" Frame; 134" CT; 574,954 Miles; Stk. #5749 - **$49,750**

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Soil Concepts: The Disputation and Motivation for Quantitative Assessment *By Jodi Putman*

This article draws from: Mizuta, Katsutoshi, et al. "New Soil Index Development and Integration with Econometric Theory." Soil Science Society of America Journal, vol. 82, no. 5, June 2018, p. 1017., doi:10.2136/sssaj2017.11.0378.

Take Home Message

Soil scientists conducted massive literature reviews regarding soil concepts (soil quality, soil health, and soil security), and summarized their definitions, visions, and constraints. The literature review showed:

- additional sophisticated quantification methods are needed,
- often only a single soil property/class is modeled rather than more complex soil functions, risks, or services,
- there is a lack in harmonization, standardization, and reference frameworks that allow soil comparison across regions and time,
- approaches frequently used to calculate soil indicators/indexes, like ordination and factor analysis, do not consider rigorous axiomatic criteria of scientific sound indication systems.

In summary, the complex soil concepts stand in sharp contrast to applied indication methods in the soil science disciplines and new indicators and indexes are being assessed as an alternative to the more traditional indicators/indexes in soil science.

Disputed Soil Concepts

Soil scientists, universities/researchers, bureaucracies, non-governmental institutions, and farmers have all worked on the approach and framework of soil-related notions, such as soil quality, soil health, and soil security over the past few decades. With increased awareness and understanding of the functions that soil resources can provide for bionetworks and human kind, many of these groups have proposed different conceptual systems related to the resources of soil. Each of these groups have defined the three major soil concepts differently. According to Mizuta, et al. (2018) **soil quality** is defined by SSSA and USDA-NRCS as *"the capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation."* Soil function examples include:

- biomass production,
- storing, filtering, and transforming nutrients, substances and water,
- biodiversity pool,
- physical and cultural environment for humans and human activities,
- source of raw materials,
- acting as a carbon pool,
- archive of geological and archeological heritage (Mitzuta, et al. (2018))

This approach to define the concept of soil quality resources can be viewed as a simplistic method and suggests some soils are better than others by using a single determining factor like soil organic matter (SOM), even though soils with a relatively low SOM content sustains its own unique habitat, such as soils in arid regions with limited SOM. At large, soil functions are difficult to assess and quantify due to the interactions of their functions, as well as, variability in space and time that are controlled by different soil attributes among geographic regions (Mizuta, et al., 2018). The soil quality concept guides researches/farmers to utilize and allocate soil resources to sustain soil function capacity, however, quantitative assessment still needs to be reviewed.

The soil health concept has been used as an interchangeable term with soil quality by some scientists while others have differentiated between the two. **Soil health** has been portrayed as *"an ability to perform or function according to its potential which can change over time due to human use and management or unusual events"* (Mizuta, et al. 2018). The limitation imposed by this broad definition is that the potential of the soil is usually unknown and linked to specific purpose(s) (e.g., agricultural production, recreation, biodiversity, drainage). After discussion of the similarities between soil quality and health assessment, soil and agricultural scientists, natural resource management, farmers, policymakers, educators, and economists all have vested interests in soil quality with common goals targeting the sustainability of soil resources under diverse circumstances.

The term "**soil security**" has evolved and addresses the maintenance of soil resources on a global scale assessing

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the total amount of soil at risk of being degraded. This term enhances the earlier concepts of soil quality and health that focused on the qualitative aspects of soils (e.g. capacity of soils to function).

Motivation for Quantification Assessment of Soil Concepts

The conceptual frameworks related to soil resources mentioned above are interrelated, and share the same goals to protect and sustain the soils, although they take somewhat different perspectives to achieve these goals and have different methodologies. Many groups have had similar questions but use different terminology, such as soil quality, soil health, soil care, soil resiliency, or sustainable land management (Mizuta, et al., 2018). All soil concepts have been used to create awareness of our limited natural resources. In addition, other environmental/ ecological concepts are utilized to depict the value of soils and how they benefit humans. However, if assessment of soil quality, soil health, and soil security is not quantified or formalized coherently, they will just remain shallow buzz words. Farmers, for example, often examine soil conditions by looking at color, pore size, softness, abundance of organic matter, water and soil life, and so forth. According to Mizuta, et al (2018) these measurements are highly subjective based on expert knowledge and experience, which conflicts with comparable judgments that enable decision-makers to evaluate the limiting factors of soil for a given purpose of use. Semi-quantitative methods such as the Cornell Soil Health Test (CASH) (Moebius-Clune et al., 2016) and others, have been developed to overcome these inadequacies by the inclusion of some quantitative aspects. These tests have applied approaches of semi-quantitative assessment of multiple chemical, physical, and biological soil attributes; yet, they lack accuracy and precision due to the model having limited scientific validity to accurately assess soil conditions or capabilities. New indicators (In) and indexes (Ix) are currently being investigated for better assessment of soil quality, health and security in soil science.

Cornell Soil Health Assessment

[redacted]

Sample Id:	L_555
Field/Treatment:	Tenge E
Tillage:	1-7 inches
Crops Grown:	COG, COG, SOY
Date Sampled:	12:00:00 AM
Given Soil Type:	Muscatine
Given Soil Texture:	Silty Clay Loam
Coordinates:	[redacted]

Agricultural Service Provider:
None
Cedar Basin Crop Consulting
cbcc@earthlink.net

Measured Soil Textural Class: Silt Loam Sand 28% Silt 56% Clay 16%

Test Report

	Indicator	Value	Rating	Constraint
Physical	Available Water Capacity	0.31	100	
	Surface Hardness			Not Rated: No Field Penetrometer Readings Submitted
	Subsurface Hardness			Not Rated: No Field Penetrometer Readings Submitted
	Aggregate Stability	49.5	78	Not Rated: No Field Penetrometer Readings Submitted
Biological	Organic Matter	4.6	79	
	ACE Soil Protein Index	5.8	29	Organic Matter Quality, Organic N Storage, N Mineralization
	Root Pathogen Pressure	4.7	54	
	Respiration	0.58	4	Soil Microbial Abundance and Activity
	Active Carbon	744	76	
Chemical	pH	6.0	66	
	Phosphorus	10.9	100	
	Potassium	164.5	100	
	Minor Elements (Mg: 456 Fe: 0.8 Mn: 9.2 Zn: 0.4)		100	
	Overall Quality Score		71	High

Precision Agriculture Technologies: Adoption and Profitability

by John Hanchar

This article draws from: *Schimmelpfennig, David. October 2016. Farm Profits and Adoption of Precision Agriculture. USDA/Economic Research Service.* Access the report online*: https://www.ers.usda.gov/webdocs/publications/80326/err-217.pdf?v=0*

Summary

- A USDA/Economic Research Service (ERS) economist concluded that adoption rates vary significantly across Precision Agriculture (PA) technologies – about half of all corn and soybean farms use yield monitors, while about 20 percent use variable rate technology (VRT).
- The analyst also concluded that increases in returns above all costs are attributed to all three technologies for a US corn farm of average size – greater returns attributed to GPS mapping, guidance systems, and VRT are 2 percent, 1.5 percent, and 1.1 percent, respectively.
- Future work of the NWNY Program will focus on evaluating VRTs for their potential to increase returns given the conditions and environment faced by the region's farms.

Background

Precision agriculture continues to be a topic of interest to the region's producers, and the advisory committees that direct the work of the NWNY Program reinforce this interest. One area of interest is evaluating variable rate technologies (VRT) with an emphasis on seed, potash, and lime inputs for their potential to increase returns based upon the conditions and environment faced by the region's producers. At a recent Digital Agriculture workshop at Cornell University, I spoke with an attendee that asked about our program's work on the economics of entry level PA technologies – auto-steer, and auto-section control on a row crop planter (nwnyteam.cce.cornell.edu, click "precision agriculture" in the upper right hand corner of the page). A USDA/ERS report that examined PA technology adoption and profitability was mentioned during our conversation.

USDA/ERS Study

USDA/ERS economist Schimmelpfennig investigated

trends in PA adoption and whether adoption is associated with greater profitability. The study used the latest available, but now dated, national data on US field crop production through 2013 from the Agricultural Resource Management Survey. The economist examined detailed field level production and financial information for a large sample of farms focusing on three PA technologies: information mapping, guidance systems, and VRT. The analysis recognized that simple comparisons of profit measures between adopters and non-adopters can be misleading because other characteristics and factors likely impact returns and vary among farms in the data set. To isolate the impact of adoption on returns, statistical analysis methods were used.

The USDA/Economic Research Service (ERS) economist found that adoption rates vary significantly across Precision Agriculture (PA) technologies:

- Yield monitors are used on about half of all corn and soybean farms.
- Auto-steer systems are used on about one third of those farms.
- Yield mapping is used on one quarter of farms.
- Soil mapping using GPS coordinates and VRT are used on 16 to 26 percent of farms.

The analyst also concludes that increases in returns above all costs are attributed to all three technologies for a US corn farm of average size:

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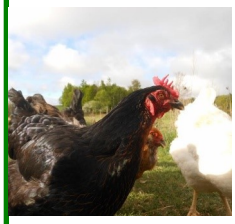
- the expected increase in returns attributed to GPS mapping is almost 2 percent.
- the expected increase in returns attributed to guidance systems is 1.5 percent.
- the expected increase in returns attributed to VRT is 1.1 percent.

Next Steps for our Program

Producers wishing to provide comments and/or contribute to the efforts of the program as we work to evaluate VRT and other technologies for potentially increasing profits on farms in the region, please contact John Hanchar, jjh6@cornell.edu, mobile phone: (585) 233-9249.

Cornell Small Farms Online Courses are now open for registration! Courses starting in November are Poultry Production and Getting Started with Pigs on Pasture. The full list of courses can be found here: http://smallfarms.cornell.edu/online-courses/



Poultry Production

Many new farmers get started with poultry because it's a relatively low-investment enterprise with a fairly quick revenue turnaround. The margins can be slim though, and farmers need to develop the necessary skillset to produce a product that is both safe and profitable. This course will help you get started in building a successful poultry enterprise.

Getting Started with Pastured Pigs

****NEW COURSE****

Pigs can be a profitable standalone enterprise or integrate into an existing farm structure. They provide a variety of products and are also ideal for turning agricultural wastes into a valuable product. Pigs make use of marginal lands that would otherwise go unused, and they can improve that land.

The Woes of a Wet Harvest Season *by Mike Stanyard*

What crazy weather we have here in WNY! We had too much rain to the south, drought conditions in the north and some areas in the middle where everything was "just right". In the end, I think our corn and soybean yields will be above average, and in some of those areas that got the perfect amount of rain, there will be some personal-best yields.

September was wet and warm, and as some of the early soybean varieties matured, we had to pick and choose which fields we could get into. The rain has continued into mid-October. Soybean harvest is about 50% and we have barely touched the corn. Wheat planting is way behind because the soybeans are coming off late and the ground is too wet. Some of the wheat seed is rotting in the ground and I am not sure there will be time to replant. The woes of a wet harvest season. Here are a couple of things you might see as the season progresses.

Soybean Seed & Pod Diseases. *What is turning my seeds purple???* **Purple Seed Stain** is caused by a fungus, *Cercospora kikuchii*, that first formed on the plant back in late August with the wet warm weather. It gives the leaves a purple cast and I saw it more frequently on the outside edges of fields. Another disease, **Pod and Stem Blight**, is caused by a Phomopsis seed decay complex. It causes seeds to shrivel and turn a powdery white. Both of these diseases overwinter on soybean stubble. Therefore, no-till/reduced till operations and those that grow soybean after soybean will be at greater risk of infection. Possible solutions would be some tillage, crop rotation

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and more resistant varieties. Neither is known to produce toxins.

Seed Shatter and Stink Bug Injury. Unfortunately, many of our earlier maturity soybeans were fully mature as it started to get wet. Each time a mature pod gets wet, and then dries out, it gets more brittle. This wet-dry pattern can eventually lead to the pod splitting and opening the seeds to disease or falling to the ground. Four seeds per square foot is equal to one bushel per acre yield loss. There seems to be an increase in stink bugs over the past couple years. These true bugs will feed on the soybean seeds through the pod. Injured beans will be small and stunted and you will see a small hole in the shrunken seed. This injury can also lead to more disease issues.

Corn Ear Rots. We are seeing lots of different color fungi (white, green and pink) in the corn. They are more prevalent in years when we have cool wet weather during silking, have western bean cutworm or bird injury, and a wet delayed harvest. The main concern with corn fungi is mycotoxins. Not all fungi are toxic. One that we need to keep watch for is **Gibberella Ear Rot**. It is a pinkish-colored fungi that can produce vomitoxin (DON). It is the same fungi that causes head scab in wheat. Infected fields should be identified prior to harvest, harvested early, segregated, and dried down below 15% ASAP to prevent further growth.

Pre-sprouting. You know it is wet when corn kernels are sprouting on the plant. This premature sprouting is called vivipary. It is usually caused when corn under 20% moisture gets wet and can sprout. It can occur in wet years with varieties that have upright ears with loose husks. The kernels at the butt of the plant will begin to germinate. I cannot say I have ever seen this on a soybean plant but I am seeing some beans coming up in wheat fields! Bob Nielsen from Purdue has a nice article on this topic, https://www.agry.purdue.edu/ext/corn/news/timeless/Vivipary.html.

Photo source: Pioneer.com

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NOVEMBER 2018

Mark Your Calendar
» UPCOMING EVENTS

NYS Commissioner of Agriculture and Markets is interested in hearing from NY dairy farmers regarding the status of the dairy industry and their ideas as to improvements that could be made to various programs and institutions that impact the financial environment of dairy markets. The results of the survey will be collected and summarized by staff of the NYSDAM. The survey does not take long to complete. The survey will remain open until December 3, 2018. https://www.surveymonkey.com/r/GWC9YH3

New York State has allocated $1 million in the 2018-2019 state budget for the fifth round of the New York State New Farmers Grant Fund. Its purpose is to provide grants to support beginning farmers who have chosen farming as a career and who materially and substantially participate in the production of an agricultural product on their farm. Applications and guidelines for the New Farmers Grant Fund are available at https://esd.ny.gov/new-farmers-grant-fund-program. The deadline for submission is January 25, 2019.

DECEMBER 2018

14 **2018 Feed Dealer Seminar with guest speakers Dr. Tom Overton and Dr. Kristen Reed, Ph.D.**, 11:00 a.m.-2:00 p.m., CCE-Genesee County, 420 East Main Street, Batavia. Program includes lunch. $30/pp, $25 additional. Pre-registration required. See page 3 or visit: https://nwnyteam.cce.cornell.edu/event.php?id=748

19 **WNY Soil Health Workshop & Annual Meeting**, 8:30 a.m. – 3:00 p.m. Quality Inn & Suites, 8250 Park Rd. Batavia, NY. Kris Nichols will be presenting information on Regenerative Farming Practices and Hands-On Tools for assessing soil health. John Wallace will be presenting Penn State research on Weed Management and Soil Health practices. For more information contact: Dennis Kirby at 585-589-5959. DEC & CCA credits pending.

JANUARY 2019

9 **WNY Corn Congress,** 10:00 a.m.—3:00 p.m., Quality Inn & Suites, 8250 Park Road, Batavia

10 **Finger Lakes Corn Congress**, 10:00 a.m.—3:00 p.m., Holiday Inn, 2468 NYS Route 414, Waterloo