No-till and Cover Crops on Pennsylvania Dairy

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Direct load facilities
Special needs barn
All liquid manure on the operation is anaerobically digested to produce electricity.
Methane generator
Digested manure passes through this separator to produce solids for use as bedding
Optional conveyer to solids dryer
Separated solid dryer
Separated solids bin...used for bedding
Overview of Sugar Valley, PA

Valley farms average 1200 feet above sea level. Soils are silt loams and stony clay loam, limestone soils.

Cleared mountain top land, sandy stony silt loam soil, 1800 feet above sea level, acid shale soils.
Soil slopes up to 15%, note the large field size compared to local farms and the lack of terraces, waterways and rill erosion control measures required under continuous tillage practices of neighboring farms.
Water infiltration capacity of healthy no-till soil during rain event on frozen ground
Cereal Rye/ Triticale and Crimson Clover Mixture for cover and forage production
Rye/Triticale ready for harvest 3\textsuperscript{rd} week in May
Cover crop of Rye/Triticale layed out to dry for 1 day haylege...perfect seed bed!
Corn planter we used for 30+ years, still in operation
Planting into rye/triticale stubble after high moisture harvest
40 foot planter with interseeding units capable of planting 15” or 30” corn, soybeans or covers
Check seeding depth frequently to ensure uniform depth of all planter rows...uniform corn emergence is critical to good corn yield, so insure seed is well covered and deep enough for uniform germination...shallow seed placement is the most common problem in uniform stand emergence for beginning no tillers.
Ag Leader planter controller shows corn monitor information and planting coverage map...documents all facets of the planting operation from corn variety used to fertilizer banded
Corn planter operator uses GPS and Autosteer
Beginning to spread manure on corn planting
Drag hose separated manure on top of corn planting
Note 15” rows of corn across rows of rye/triticale cover stubble less than 3 hours after 9000 gal manure applied
One pass corn after corn for grain the previous year...cover crop rye is no till established after corn harvest, in spring corn is planted into green cover crop and sprayed once with burndown plus corn pre-emergence herbicide. Fields are scouted at corn emergence to check for insect activity...about 1 year in 5 there are some armyworms that warrant insecticide control.

Broadcast applications of insurance insecticide and fungicide must be avoided if soil health is to be achieved.
Cover crop of rye following soybean harvest will be corn or alfalfa seeding.
Corn in 2013 ripening.
Trench Silos ready for corn harvest
Transitioning from upright storage to trench storage system.
Good soil structure can support heavy equipment without making tracks.
Corn harvest continues at a rapid rate once corn maturity is reached. It is critical that cover crop planting keeps up with harvest...in this way...rain does not delay cover seeding, seeding is done in optimum conditions and seeding does not delay manure applications after the field is finished.
No-till grass seeded following corn silage...2\textsuperscript{nd} year
Multi-species cover crop following rye for grain
The same field just before frost
Same field while soil testing after frost...note tillage radish are still growing after frost.
Point of reference for next few slides

Field that was plowed

Lock Haven Reservoir

Drainage Ditch

Long term no-till

Road Ditch

Long term no-till
Plowed alfalfa seeding, plowed because of DEP regulation for water authorities involving expensive water testing.
Plowed field shedding soil and water during storm event

Long term no-tilled field not shedding any water or soil

Both class A soils
Both practices in compliance
Another view of no-till field looking up slope showing zero run-off.

Muddy water backing up at road culvert from tilled field.
Clear water discharging of no-till field onto driveway...most is soaking in.
Ditch 30 to 40 yards from the field in previous slide, note there is no run-off in this historical waterway into neighbors pasture.
Narrow strip...sod strip above...are we really on the right tract with current Ag E&S? How effective is this approved plan at protecting soil and water?

Not all Ag E&S plans protect water quality...soil health and microbiological filters are real solutions to improving water quality.
Cover crop following tobacco under continuous tillage...water doesn’t soak in and will likely erode.

Cover crop following corn silage under continuous no-tillage...water soaks in completely.

Picture after a rain...either side of a hard road same soils but different management.
# Schrack Farms Infiltration Rates

<table>
<thead>
<tr>
<th>August 2014 (Buchanan soil)</th>
<th>December 2014 (Buchanan)</th>
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</thead>
<tbody>
<tr>
<td>Test #1 – 3.5 inches</td>
<td>Test #1 – 2.8 inches</td>
</tr>
<tr>
<td>Test #2 – 4.0 inches</td>
<td>Test #2 – 9.6 inches</td>
</tr>
<tr>
<td>Test #3 – 5.7 inches</td>
<td>Test #3 – 4.2 inches</td>
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<tr>
<td>Test #4 – 5.7 inches</td>
<td>Test #4 – 7.9 inches</td>
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<td>Test #5 – 10.1 inches</td>
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<td>Test #6 – 10.2 inches</td>
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<td></td>
<td>Test #7 – 13.9 inches</td>
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<td>Test #8 – 7.5 inches</td>
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</tbody>
</table>
Eight way companion crop planted with corn.
Corn was planted at 31,000 ppa, drilled 8 way mixture in 15 inch rows immediately afterward and included

- 11# Non GMO Soybeans
- 3# Persian Clover
- 4# BMR Forage Sorghum
- 2# Graza Fodder Radish
- 2# Sunflower
- 2# Buckwheat
- 2# Canola
- 2# Impact Forage Collard
Preparing a walkway through very thick forage for a field day.
Same Soils: Dynamic Soil Properties Changed with Management!

- **Forest SOM = 4.3%**
- **17 yr Soybean monoculture SOM = 1.6%**

62.8% loss of SOM after 17 yr intensive tillage
Cottage Cheese
Ohio 2012 Drought

Vertical Tillage vs No-Till with Covers
Important points to remember

• Photosynthesis fixes carbon...the key to building soil organic matter
• Food quality and plant health is a function of soil health
• Most microbes are aerobic (need air and water), tilled soils lack the porosity to support such life
Cover Crops

- Seed cover crops as soon as possible or mother nature will
- A weed is mother nature’s 1st line of defense
- Cover crops are not a cost... they are an investment
- No-till + Diversity + Cover crops = Soil Health
Healthy Soil Advantages

• There is only one pest for every 1700 beneficial insects, 22% of these eat weed seeds

• Granivores include at least 180 species of ground beetles, ants, crickets, isopods, millipedes, caterpillars and weevils.

• Insecticide applications and seed treatments have been shown to kill 85% of these beneficial insects.
• What are you feeding your micro and macro biology and what habitat are you providing?
• What are you doing to harvest all the sunlight that shines on your farm?
Manure Handling Paradigm

Manure spread on dead crop residues at highest rate allowed between annual cropping

Manure spread thinly and frequently on green covers to promote growth and soil health
Less is the new More!

- Applying small amounts over larger acreage more frequently maximizes manure value.
- Applying small amounts to green crops increases soil life and nutrient availability!
- The Haney/Brinton Soil Health Tool can be used to identify soils where more nutrients are available due to greater soil life.
Dairy Slurry at 27K gallons per year spring and fall on corn stubble. Rotation is continuous corn silage

Dairy Slurry at 6k gallons 3 times a year. Rotation is Continuous corn silage with continuous cover crop
Healthy Soil that Soil Health Tool Reports need Zero Nitrogen

Regular Program with 90#/Acre of Nitrogen applied as UAN w/ 4# Zinc at Planting

Check Program with zero applied at Planting
If you think you can or you think you can’t you are likely right.

If you think you can you’re half way there!
Schrack farms hosts a fishing derby for local youth with the Sugar Valley Watershed Association