Managing a Dairy Based Cropping System to -
Protect Water Quality and Build Soil Health

Nobis Dairy Farms
Larry Nobis
St. Johns, MI
Nobis Dairy Farm

- Acres Farmed 3300
- Acres Harvest 3750
- Cow number 1100
- 16 acres of runoff water contained

- Nobis Family purchased farm in 1947
- 334 acres-40 milk cows
Livestock and Cropping System

- Healthy cows
- Milk
- Manure & waste water
- Healthy soil
- High yielding crops
- Quality feeds
Evolution of a crop & livestock system

Bedding with sand since 1974
Last moldboard plow 1986
No-till, late 1980’s
Weather pattern changed in ‘90’s plus more cows. Resulting in less no-till, with an increase in minimum till.
Closed loop sand separation system 2009
   Recycle sand and water. $100,000 worth of sand annually. Water first used for sand separation liquid portion irrigated on nearby fields
   Solid portion of manure, moved to distant fields. Manure solids are a nutrient rich soil amendment.
Double crop - increases nutrient utilization, improves soil and increases harvested feed
Harvestable grass buffers allows trapped nutrients along drainage ditches to be utilized, grass mixture hay is harvested for feed, the thick grass buffer protects surface water.
Manure Management System

Manure Separation
• Liquid
• Solid

Options for covering land-base
• Near the farm-liquid
• Hauling a distance-solids
• Winter spreading-approved fields-management practices in place-only solids-incorporate when possible

Managing Risk
• Harvestable buffer
• Double cropping
Soil Testing - annual test on fields receiving manure
Manure Solids

- >6,000 Ton/yr

Liquid Portion

- 20,000,000 gal/yr
  - 16 acre farmstead runoff
    - 12,000,000 gal/yr
  - Manure liquid
    - 6,223,250 gal/yr
  - Gray water
    - 1,460,000 gal/yr
Annual monitoring

## Manure Nutrients

<table>
<thead>
<tr>
<th>Manure Source</th>
<th>Total N</th>
<th>P2O5</th>
<th>K2O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid Portion Gray water &amp; runoff (lbs/1000 gal)</td>
<td>8.6</td>
<td>2.19</td>
<td>9.25</td>
</tr>
<tr>
<td>Manure Solids lbs/ton</td>
<td>5.69</td>
<td>2.82</td>
<td>10.95</td>
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</tbody>
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## Crop Removal (3 year ave.)

<table>
<thead>
<tr>
<th>Crop</th>
<th>Yield</th>
<th>Total N lbs</th>
<th>P2O5 lbs</th>
<th>K2O lbs</th>
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</thead>
<tbody>
<tr>
<td>Corn Silage</td>
<td>27 T</td>
<td>254</td>
<td>97</td>
<td>211</td>
</tr>
<tr>
<td>Corn</td>
<td>190 bu</td>
<td>171</td>
<td>66.5</td>
<td>51</td>
</tr>
<tr>
<td>Soybeans</td>
<td>55 bu</td>
<td>209</td>
<td>48</td>
<td>77</td>
</tr>
<tr>
<td>Alfalfa</td>
<td>8 T</td>
<td>360</td>
<td>80</td>
<td>360</td>
</tr>
<tr>
<td>Wheat</td>
<td>110 bu</td>
<td>132</td>
<td>68.2</td>
<td>41.8</td>
</tr>
<tr>
<td>Wheat Straw</td>
<td>2 T</td>
<td>26</td>
<td>6.6</td>
<td>46</td>
</tr>
<tr>
<td>Forage Oats</td>
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Rainfall’s impact on nutrient analysis of liquid portion

Monthly Climate Averages (1981–2010*)
Lansing Capital City Ap, Clinton County, MI
- Average Precipitation
- Climate Variation
- Precipitation 2015

*Based on NCDC normals; see ‘About ACV’ for details. Created 2/22/2016
2 years...

**Manure provides...**
- 344 # nitrogen
- 87.6# phosphorus

**Still need to add...**
- 148# nitrogen
- 128.6# phosphorus

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Living roots 79% of 2 year rotation!
Soil health

- High crop yields
- Double cropping
- Manure
- Minimize tillage
- Narrow rows
- Soil pH
- Balance of nutrients
- Good mgmt. practices
Harvestable Buffers

Protecting the water
- Traps sediment
- Crop Removal

By the numbers...
- 60-70 acres on farm
- 60 average buffer width (ft)
- 10 years using practice
- 3 cuttings/year

Management
- N at green up
- N after 1st cutting
- August 15 last cut to allow for regrowth

Uses
- 1st cut haylage for heifer feed
- 2nd & 3rd cuts small squares for fresh pH

Grass Mix
- 25% Orchard grass
- 25% Timothy
- 25% Perennial Ryegrass
- 25% Bromegrass

Marilyn L. Thelen, Integrated crop & livestock systems Educator
Reducing Risk

Buffer traps sediment form winter & early spring water movement.
Buffers Benefits

- Trap sediment
- Trap nutrients
- Mark boundary for herbicide appli.
- Mark spreading boundaries
- Provide feed
- Remove nutrients
- Look nice
High Yielding Crops
Conclusion
No need to break the bank to have healthy soil.

You can have healthy soil using practical low cost management practices.

I remember my Dad saying in the 1980’s that the soil on our farm was healthier and more productive than it was in 1947. I report to you that our soil has seen continuous improvement over the years. It is a goal.

Healthy soil is fun to farm