OWLA Owasco Watershed Lake Association

Achieving Sustainability on a Large Dairy Farm

Finger Lakes Region
Upstate New York
2019

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Twin Birch Farm – Dirk Young, Owner

- Grown in 58 years from milking 80 cows to 1480 cows plus care of 1450 young cattle
- Produces 805,000 lbs of milk each week
- Encompasses 3,400 acres owned and leased crop land
- Classified a Consolidated Animal Feeding Operation (CAFO) by New York State
- Straddles watersheds of two drinking water lakes serving 300,000 people

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During 2018-19, OWLA partnered with Mr. Young to sample water quality at entrance sites, sites across, and at the water exit on his Twin Birch farmstead

Why?

OWLA searched for nutrient loss "hotspots"; excessive loss of phosphorus and nitrogen that in turn contribute to algal blooms and toxin threats to the drinking water taken from nearby lakes

To farm owner, Dirk Young, losing nutrients also means reduced farm efficiency. Lost $ in a very competitive dairy environment.

Big Motivators: Health and Economics

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Water Chemistry Sampling Sites at Twin Birch Farmstead

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All Samples were analyzed by NYS-certified Upstate Freshwater Institute

Example results: 700B Farm Site compared to B6 Dutch Hollow Brook Site

OWLA	Subbasin	Site	GPS		Sampling	Temp (°C)		Flow Rate	TDP	TP	SRP	NH3	NOx	TN	TSS
Code	Name	Descrip	North	West	Date	Air	Water	ft/sec	(µgP/L)	(µgP/L)	(µgP/L)	(µgN/L)	(µgN/L)	(µgN/L)	mgDW/L
700B	Dutch Hollow	Lacy Rd trib below ag bldgs	42.8590	76.4446	4/17/2019	14	8	1	11.4	26	9.8	572	4640	5280	8
700B	Dutch Hollow	Lacy Rd trib below ag bldgs	42.8590	76.4446	5/7/2019	14	11	1.3	14.8	26.7	13.6	591	5230	5480	4.6
700B	Dutch Hollow	Lacy Rd trib below ag bldgs	42.8590	76.4446	5/16/2019	13	9	0.4	18.6	46.2	14.7	488	4300	5140	11.5
700B	Dutch Hollow	Lacy Rd trib below ag bldgs	42.8590	76.4446	6/7/2019	23	11	0.4	19.1	44.7	16.2	730.0	2860	3350	2.7
								averages	16.0	35.9	13.6	595.3	4258	4813	6.7
B6	Dutch Hollow	DH before fertilizer plant	42.8560	76.4471	4/17/2019	16	8	1.3	5.1	7.2	2	18	1630	1756	5.8
B6	Dutch Hollow	DH before fertilizer plant	42.8560	76.4471	5/7/2019	14	11	1.2	4.3	6.6	1.8	31	1300	1400	3.8
B6	Dutch Hollow	DH before fertilizer plant	42.8560	76.4471	5/16/2019	14	9	1.7	6.3	16.3	<LOD	15	1670	1880	11
B6	Dutch Hollow	DH before fertilizer plant	42.8560	76.4471	6/7/2019	21	12	0.2	4.1	17.2	1.0	35.1	1120	1360	28.2
								averages	4.9	11.8	1.6	24.7	1430	1599	12.2

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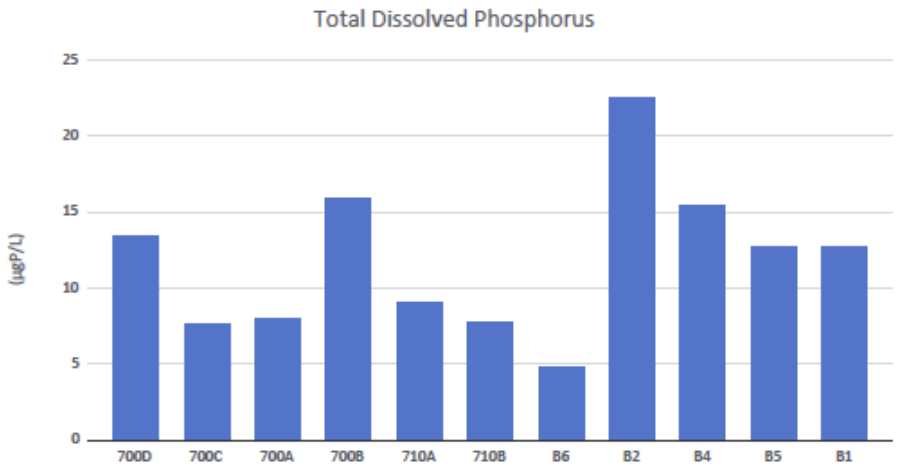
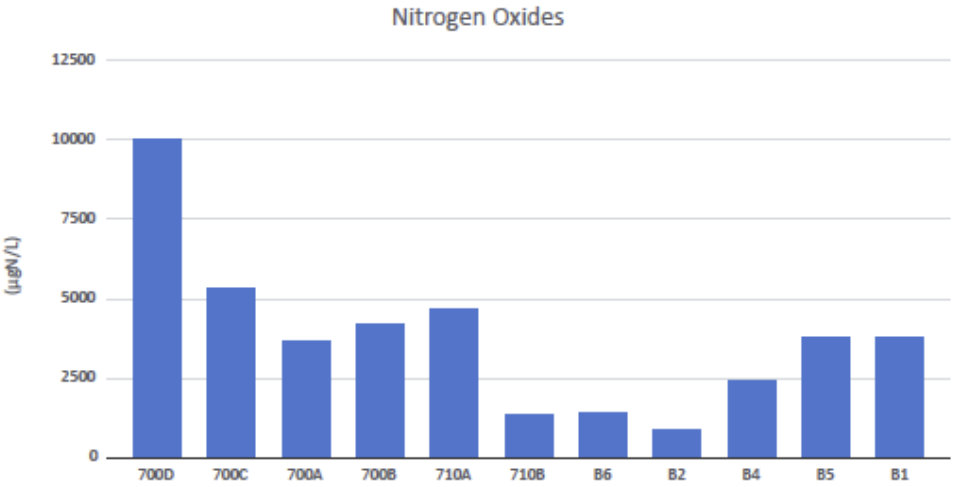


Site B1 is the exit from the farm

Per scientists, measured nutrient concentrations are not considered excessive overall.



Recommendations from Twin Birch owner, Dirk Young:

PROTECT YOUR SOIL! ITS VALUE IS PRICELESS! BUILD AND MAINTAIN SOIL HEALTH

Implement best management practices. Key examples:

-- Maintain vegetative buffers on the downslope side between your fields and streams and ditches

-- Plant cover crops such as wheat on fallow fields

STRICTLY ADHERE TO NUTRIENT MASS BALANCE MANAGEMENT!

-- Develop and follow a Nutrient Management Plan for your entire farm

-- Determine nutrients your fields need for the intended crop and apply only that amount. Nothing more! Hire the services of a qualified agricultural nutrient management planner.

-- If an animal farmer, apply manure to maximize its benefits. I estimate $180 per acre saved due to efficient manure management. For my 1400 manured acres, that's over $250,000 in savings to my farm's bottom line every year!

Applied Science Meets Theory

- Results from this study support the established value of BMPs and nutrient management planning for reducing nutrient loading to adjacent waterways.

http://fitnessandwellnessnews.com/challenge-yourself/

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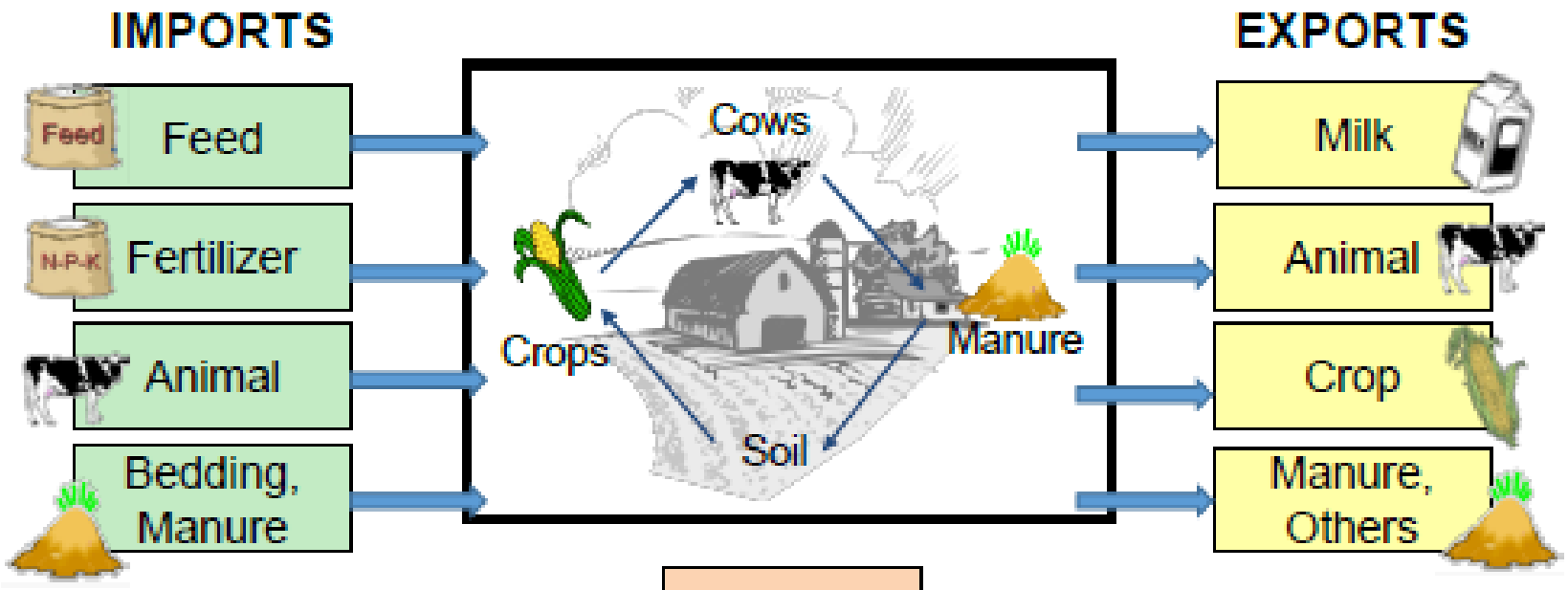
What is a nutrient mass balance?

- **Balance = Imports – Exports** (within farm boundaries).
- We only measure what is **reasonably feasible** to measure.



Balance

Per tillable acre
(land base for nutrient recycling)

Per hundredweight of milk
(nutrient use efficiency)

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Distribution of nutrient mass balances across New York dairies

New York dairy farms operate with a wide range of mass balances per acre and per hundredweight of milk produced (cwt), regardless of their size. Farms can compare their balance to feasible balances to evaluate opportunities for improvement.

Distribution of mass balances across NY dairies*	NMB (lbs/acre)			NMB (lbs/cwt milk)		
	N	P	K	N	P	K
Minimum	-35	-7	-45	-1.3	-0.11	-0.73
Maximum	211	45	132	2.6	0.47	1.69
"Feasible"	0 to 105	0 to 12	0 to 37	0 to 0.88	0 to 0.11	0 to 0.30
Twin Birch Dairy	**62**	**3**	**20**	**0.47**	**0.02**	**0.15**

*Based on 102 dairy farms in 2006

Farms with "feasible" mass balances:

- Per acre: have low risk of losing nutrients to the environment
- Per hundredweight: have high nutrient use efficiencies
- Per acre *and* per hundredweight: work in the Optimal Operational Zone

NRCS Soil Health Case Studies

Eric Niemeyer, MadMax Farms, Ohio

"Eric's use of no-till, cover crops, and variable rate fertilizer applications reduced his N, P, and sediment losses by 58, 74, and 88%, respectively."

Jay Swede, Gary Swede Farm LLC, NY

"No-till and strip-till, cover crops, and nutrient management improved bottom line by $55 per acre and by $82,257 on the 1,500 acres in this study by adopting soil health practices."

Ralf Sauter, Okuye Farms, California

"In the 14 years since Ralf took over the orchard, he experienced a 20% increase in yield, which he attributes to nutrient management and improved soil health. He improved his bottom line by $657 per acre and by $76,155 on all 116 of his orchard acres"

Larry, Adam, and Beth Thorndyke, Thorndyke Farms, Illinois

"When comparing their five-year yield averages before and after implementing soil health practices, the Thorndykes observed yield increases of over 15% on both corn and soybean fields."

No till

- Detritus from previous crops, holds sediments and nutrients in place, which can lead to less runoff into waterways and a potential reduction in the need for future nutrient applications on farm fields.

https://www.21stcentech.com/simple-combat-heat-waves-farm-country/

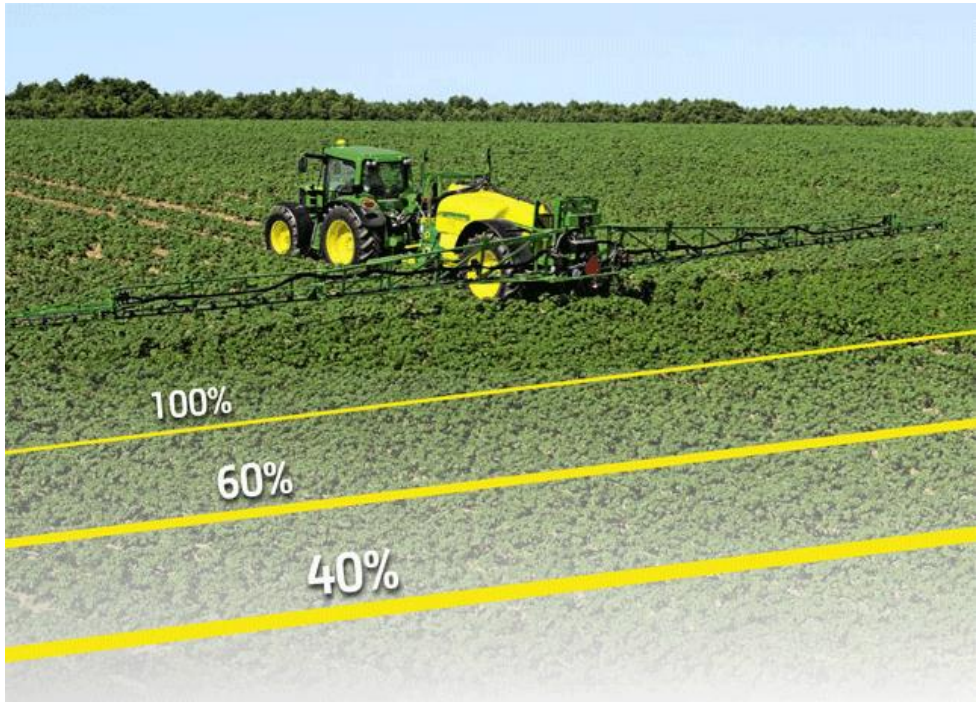
Cover Crops

- Cover crops planted off season help keep soil and nutrients in place. Oats and Rye are commonly used and easily applied.

https://www.npr.org/sections/thesalt/2017/03/16/520281317/how-to-make-farmers-love-cover-crops-pay-them

Variable Rate Fertilizer

- Farmers experimenting with variable rate fertilizer applications allows managers and farmers the opportunity to determine exactly how much is needed to maximize production, reducing nutrient runoff as well as the farmer's bottom line!



https://www.farmingsmarter.com/variable-rate-nutrient-application-should-i-consider-it-for-my-farm/

Conclusions

- We greatly appreciate Dirk's willingness to monitor watercourses adjacent to his farm fields, and for feedback on cost savings associated with his programs.
- Monitoring efforts indicated the success of nutrient management planning and BMPs

https://www.freshfromflorida.com/Agriculture-Industry/Water/Agricultural-Best-Management-Practices/BMP-Success-Stories

OWLA and watershed partner collaboration

- CAFO's have realized long term benefits, in part, through regulation requirements
- New watershed rules and regulations with similar nutrient management planning criteria can support both water quality improvements and the small farmer pocket book (long term)
- Continued partnership for education, outreach, funding, and monitoring related to agricultural BMPs
  - Assistance to the farming community

https://www.entrepreneur.com/article/241595