1-1-2015

Wolfe's Neck Farm: Resilience through Soil Regeneration

Ravdeep Jaidka
University of New Hampshire

SUSTAINABILITY briefing

University of New Hampshire
The Sustainability Institute

food solutions new england

Wolfe's Neck Farm: Resilience through Soil Regeneration

Wolfe's Neck Farm is a non-profit farm located along the shores of Casco Bay in Freeport, Maine. The farm's expansive 626 acres include a dairy operation, community garden plots, barnyard animals, ocean front camping, and nature trails.

Dairy Production

The dairy operation involves managing a 60-cow herd, conducting forage based research studies, and overseeing the Organic Dairy Farmer Training Program. Rebecca Brown, the Organic Dairy Program Director, oversees all aspects of the dairy operation.

The Organic Dairy Farmer Training Program, launched this spring, is a fresh addition to the operation. Across the nation, milk production is declining while the demand for organic milk is soaring, creating a nationwide shortage of milk. Additionally, the average age of dairy farmers in Maine is approaching 60, giving rise to a looming succession problem (1). The first of its kind in the nation, the two-year residential dairy training program hopes to revitalize and strengthen the organic dairy industry in Maine and New England, while ushering in the next generation of organic dairy farmers.

FIGURE 1: Wolfe's Neck Farm, a 626-acre property on the shores of Casco Bay in Maine, is home to an organic dairy operation.

> *Erratic weather patterns significantly impacted hay production, a process necessitating at least three to four dry days before cutting and baling. This compelled the farm to haul hay from New York, which increases their costs and their carbon footprint. But, for Rebecca, climate change is all about "being flexible and being ready to adapt in whatever way you can."*

Biological Farming

In addition to carrying the organic certification, Wolfe's Neck Farm also utilizes biological farming practices. Biological farming focuses on fostering soil health in order to build soil organic matter and sequester more carbon. It works hand-in-hand with nature to produce high quality, mineralized feed, which is an integral aspect of supporting animal health and farm profitability (2).

In the words of Rebecca, biological farming practices are all about "pulsing carbon into the soil." The key to building soil health and pulsing carbon into

Sustainability Briefings are a collection of occasional essays, thought pieces, case studies and research briefings through which University of New Hampshire (UNH) faculty, staff and students can connect with larger audiences on the complex issues of sustainability. The collection is sponsored by the Sustainability Institute at UNH, a convener, cultivator and champion of sustainability on campus, in the state and region, and around the world. Learn more at www.sustainableunh.unh.edu.

the soil is meticulous grazing management, specifically rotational grazing. In rotational grazing, livestock are strategically moved to fresh pasture areas to allow vegetation in previously grazed pastures to regenerate (3).

The ideal is mob grazing, a practice popularized by the soil regeneration guru Alan Savory. In mob grazing, lots of animals are allowed to graze on a small area and moved often. The animals eat half of what is available and trample the other half. That other uneaten half, in addition to excrement, becomes food for soil microbes. While mob grazing has built healthy soil for a lot of beef producers, it is hard to practice in dairy farming given the different nutritional needs of lactating cows.

Interestingly, because of pulsed grazing practices employed at the farm, the pasture sequesters more carbon than the woods. As plants grow, they also grow their root systems. As roots die, the carbon is stored in the soil. Unless the soil is ploughed, it acts as a secure carbon sink.

The holistic management mind-set is an integral aspect of managing such a dynamic, living system. "We aim to manage the soil system in such a way that strategic inputs prime the pump to markedly increase mineral availability in the plant and thus the animal," says Rebecca.

Climate Impacts Seen

Being coastal, Rebecca is aware of rising sea levels, but it's a peril that is out of her hands. Unpredictable weather patterns are a more prevailing concern. "These increasingly variable weather patterns mean that farmers have to be even more adaptable, prepared, and creative," says Rebecca.

FIGURE 3: In rotational grazing, livestock are strategically moved to fresh pasture areas to allow vegetation in previously grazed pasture areas to regenerate (1).

FIGURE 2: Across the nation, the demand for organic milk is soaring while milk production is in decline, creating a nationwide shortage of organic milk (1).

Erratic weather patterns significantly impacted hay production, a process necessitating at least three to four dry days before cutting and baling. The start of this year was incredibly dry, which spurred the farm to start cutting hay early. The rest of the season saw periodic rainfall with only a few dry days in between, impossible conditions for dry hay production. This compelled the farm to haul hay from New York, which increases their costs and their carbon footprint. But, for Rebecca, climate change is all about "being flexible and being ready to adapt in whatever way you can." This year, that means hauling hay from elsewhere.

Moreover, climate change will directly impact animal health. Climate change is likely to increase average daily temperatures and the frequency of heat waves to varying degrees across the country, which could increase heat stress and lower milk production. A study by the Economic Research Service estimated that in 2010, heat stress lowered annual milk production for the average dairy by about $39,000, totaling $1.2 billion in lost production for the entire U.S. dairy sector (4).

> *During extreme weather events, such as intense rainfall, healthy soil can capture water and reduce runoff potential from the field to the Bay. Regenerative agriculture practices improve soil structure and soil quality, thus increasing the ability of topsoil to resist erosion.*

"Farming is not an easy field to get into, especially when you factor in climate change," says Rebecca. Indeed, climate change is adding unpredictability to an inherently risky occupation.

Soil Regeneration as Adaptation

Through biological management, soil organic matter retains a lot more water and can even wick up water deep from the underground. With healthy soil, the farm fares well even in dry periods. In water-scarce areas, such as the West, rebuilding soil health and soil organic matter is an effective adaptation measure. "Water is a big issue in the rest of the country, and maybe it wouldn't be so dramatic if the soil were more resilient," Rebecca notes.

While Maine's future is not expected to be water-scarce, the state will experience more frequent extreme weather events (5). During extreme weather events, such as intense rainfall, healthy soil can capture water and reduce runoff potential from the field to the Bay. Biological management practices improve soil structure and soil quality, increasing the ability of topsoil to resist erosion. By enhancing soil surface aggregate properties that decelerate soil erodibility, soil regeneration is an invaluable adaptation tool to combat extreme weather events (6).

As mentioned previously, the pulsed grazing practices at the farm sequester carbon into the soil, a secure carbon sink. Thus, by holding both water and carbon in its soil profile, healthy soil functions as both an adaptation and a mitigation measure.

FIGURE 4: "Farming is not an easy field to get into, especially when you factor in climate change," says Rebecca.

FIGURE 5: Through biological management, soil organic matter can hold a lot more water. In this way, rebuilding soil health is an adaptation measure for a future with more frequent extreme weather events.

Resources

Considering each farm is different, there is no standard formula to soil health. It is easy to make a mistake, which could cost thousands of dollars. For this reason, for farmers interested in rebuilding soil health, Rebecca recommends hiring a soil consultant. Consulting companies like Midwestern BioAg and Lancaster Ag, along with numerous independent consultants, focus on biological farming and dairy farming.

Additionally, organizations such as Soil and Water Conservation Districts, Natural Resources Conservation Service, and Cooperative Extensions are home to adept experts and excellent resources on soil health. Cooperative Extensions even offer technical assistance and low-cost soil testing kits. The publication Acres USA provides good information on the topic and also offers a book list and an annual conference for the interested. For those interested in soil regeneration, whether as a management practice or an adaptation tool, innumerable experts and resources await.

To learn more, visit www.wolfesneckfarm.org

References

1. Wolfe's Neck Farm. http://wolfesneckfarm.org/ Accessed on July 24, 2015.

2. Midwestern BioAg. "Biological Farming". http://www.midwestern-bioag.com/educational-materials/ Accessed on July 24, 2015.

3. Hiwassee River Watershed Coalition. "Rotational Grazing." http://www.hrwc.net/factsheets/rotationalgrazing_revised09.pdf Accessed on July 27, 2015.

4. United States Department of Agriculture, Economic Research Service. 2014. "Greater Heat Stress From Climate Change Could Lower Dairy Productivity" http://www.ers.usda.gov/amber-waves/2014-november/greater-heat-stress-from-climate-change-could-lower-dairy-productivity.aspx#.VbWhTxDF-8E Accessed on July 24, 2015.

5. Frumhoff, P.C., Carthy, J.J., Melillo, J.M., Moser, S.C., Wuebbles, D.J. 2007. Confronting Climate Change in the U.S. Northeast: Science, Impacts, and Solutions. Synthesis report of the Northeast Climate Impacts Assessment (NECIA). Cambridge, MA: Union of Concerned Scientists (UCS).

6. United States Department of Agriculture, Natural Resource Conservation Service. "Practices Improving Soil Health Also Improve Erosion. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/ia/home/?cid=STELPRDB1097491. Accessed on October 8, 2015.

Climate Change and the New England Food System Case Study Series

This briefing was researched and written by the UNH Sustainability Institute's 2015 Climate Fellow, Ravdeep Jaidka. Ravdeep's fellowship focused on documenting and communicating climate impacts and adaptation strategies for New England farmers and fishermen. Ravdeep graduated from the Agriculture, Food, and Environment Master's program from Tufts University this May. She is currently the Supply Chain Coordinator at Equal Exchange, importing fair trade bananas from small producer groups in Latin America. The fellowship was based at the Sustainability Institute and hosted in collaboration with Food Solutions New England (FSNE). FSNE is a regional, collaborative network organized around a single goal: to transform the New England food system into a resilient driver of resilient driver of racial equity and food justice, health, sustainable farming and fishing, and thriving communities. Learn more at www.foodsolutionsne.org.

University of New Hampshire
The Sustainability Institute

107 Nesmith Hall, 131 Main Street, Durham, NH 03824 USA
603.862.4088 ph | 603.862.0785 fax | www.sustainableunh.unh.edu