



United States Department of Agriculture
Northeast Climate Hub

Clovercrest Farm: A Family Dairy in Charleston, Maine



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COVER IMAGE: SWEEPING VALLEY VIEWS FROM CLOVERCREST FARM, CHARLESTON, MAINE

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SPECIAL THANKS TO STEVE MORRISON AND SONJA HEYCK-MERLIN,
WHO GRACIOUSLY INVITED US ONTO THEIR FARM AND SHARED THEIR INSPIRING APPROACH
TO AGRICULTURE AND CLIMATE CHANGE ADAPTATION. THEIR THOUGHTFULNESS AND
HOSPITALITY ARE MUCH APPRECIATED.

≈ FRESHLY CARVED PUMPKINS AT CLOVERCREST FARM



A History of Clovercrest Farm

Clovercrest Farm is a small-scale dairy farm owned by Steve Morrison and Sonja Heyck-Merlin located in Charleston, Maine, 25 miles outside of Bangor.

They milk 95 Jersey cattle on 250 acres, of which 125 acres are pasture and 125 acres are wooded. The farm rents 350 acres of cropland in the surrounding area to grow winter forage. Clovercrest Farm is pasture-based and has been certified USDA organic since 1998. Steve's parents, Bob and Joan, bought the farm in 1974, beginning with a small herd of Hereford beef cattle. They transitioned their herd to Jersey dairy cows in 1980. Steve grew up on the farm and returned in 1994 to take over management of the family operation after 10 years away. In 2008, Steve was joined by his partner, Sonja, who has a background in small-scale diversified vegetable farming.

Steve and Sonja are dedicated to feeding their cows primarily forage grown on their farm or on nearby leased land, supplementing with small amounts of grain when necessary. During the summer months,

the cows are able to solely graze pasture without any grain supplements. Steve and Sonja have worked with several organic milk processors over the years but now sell to Stonyfield Organic Yogurt in Manchester, New Hampshire, through the Organic Valley cooperative. In addition to milk, Clovercrest Farm sells its dairy culls to a local slaughterhouse and a custom beef producer.

Steve and Sonja have several goals for their farm.

First, they aim to maximize forage production and minimize grain use to produce the lowest cost milk they can with the infrastructure they currently have in place. Second, they wish to demonstrate that reduced cost small-scale dairy farming can be both profitable and can afford a high quality of life for the farmer and their family. Lastly, they want to show how careful management of the land can produce a high quality product without compromising water quality or animal welfare. The couple constantly experiment to improve their farming approach, adapting to changing conditions as they arise.

The Impacts of Climate Change on Clovercrest Farm

Heavy rains: Steve states that “heavy rains are the most notable effect of climate change” on the farm. He has observed that rainfall is now heavier than it was in the past, and that the number of torrential downpours have increased in the past 5 years. These observations align with changing precipitation patterns recorded in Maine over the last decade that show a doubling of days with more than 2 inches of rain. At Clovercrest Farm, these heavy rains have led to washed out roadways and eroded cow lanes. The frequency of periods when Steve and Sonja must avoid using equipment on soft, wet fields has also been increasing. Limiting the use of equipment on fields during these times preserves pasture health and underlying soil structure but hinders important farm tasks. According to Steve, extremely heavy rainfall combined with an aging farm infrastructure has had a negative effect on milk production and herd health. For example, rain entering the circa 1940s barn through the old foundation dampens the concrete, reducing the palatability of feed in the manger. This reduces feed intake and results in decreased milk production. Steve and Sonja also report that when cows get mud on their legs and udders from walking through sodden lanes and pastures, producing clean milk takes more time and is more difficult. While this was previously a challenge mostly in spring mud season, the couple says in recent years it has become an issue in autumn as well.

More rain/less snow: Warmer winters mean that there is more rain and less snow. Precipitation in the Northeast has increased by 8 percent since 1991 (relative to 1901-1960). Simultaneously, the number of days with temperatures below 32 °F has decreased during winter months, increasing the likelihood that precipitation falls as rain or freezing rain instead of snow. Steve and Sonja have observed that freezing and thawing cycles in combination with winter rains make the ground icier and harder for the herd to traverse. The cows are required to be outside every day due to organic certification requirements, which means that the entire herd must navigate slick roads between the barn and the heavy use area every morning and evening. Steve and Sonja say that this can be difficult on days when the aisle ways have glare ice. If a cow slips and falls on the ice, the potential injuries can be difficult or impossible to recover from. Jersey cows are lighter and more nimble than many other breeds of dairy cattle and tend to navigate the ice better. Clovercrest Farm has not yet had a cow seriously injure itself on ice, but Steve and Sonja are very aware of the risk.



Drought: In a normal year, Steve and Sonja sell about 20 percent of the feed they produce to other farmers in their area. However, the first drought to effect Maine in 14 years began in the winter of 2015-2016 and lasted until December 2016. Drought has a large impact on dairy farms in general and an even greater impact on farms that rely on pasture. Decreased rainfall reduces grass growth, which means that cows will require more acres in the summer to meet their forage needs. This reduces the amount of land available for making hay, which can lead to a shortage of stored feed available during the following winter and spring. The drought of 2016 meant that Steve and Sonja were not able to sell any feed to their neighbors as they normally do. Instead, it is likely that they will buy additional feed for their own herd in late winter or early spring 2017 to make up the difference.



Adapting to the Changing Climate

Steve and Sonja are proactive and strategic.

The couple must consider many factors when making decisions about their farm, including markets, animal wellbeing, weather, water quality, labor supply, the needs of their family, and their own quality of life. They actively experiment with management strategies to improve the functioning of their operation. Here we highlight a few adaptation strategies that they use or will use in the near future, with special attention to the weather- and climate-related challenges experienced at Clovercrest Farm.

Keeping cows' feet and udders clean and dry:

As a result of the increasing rainfall, Steve and Sonja must protect their herd from an increased risk of health issues that can result from frequent exposure to mud. Steve has created several poured concrete areas called “heavy use areas” or HUAs, where cows spend time during the day when they cannot be on pasture. These HUAs are designed to help keep cows elevated and out of the mud during wet periods. One HUA at Clovercrest Farm measures 180 feet by 50 feet and provides a dry place for the milking herd to spend outside during mud season. A second cement pad area measures 20,000 square feet and includes a pole barn and bedded pack area for the cows in the winter. Cows in the pole barn have free access to an outside feeding area. There is an adjoining composting area, which makes seasonal cleaning of the bedded pack easier.



Manure from the milking barn is added to material from the bedded pack at the time of cleanout and is composted prior to being spread back on the pasture. The composting area is also located on a concrete pad and is designed so that Steve and Sonja can control runoff from the composting facility and direct it to a vegetative treatment area. Steve notes that cows that spend too much time on concrete can develop foot and leg problems, but having this space available during periods of extended rainfall is important. A balance between time spent in HUAs and pasture is necessary for the wellbeing of the herd.

Improving drainage around the barnyard:

Increasing frequency of heavy rain events leads to more water penetrating Steve and Sonja's barn through the foundation. To reduce water seepage into the milking parlor, in 2017 the couple is planning to install a new tile drainage system around the perimeter of the barn. Steve and Sonja estimate that heavy rainstorms cause feed spoilage about 12 times a year. They estimate that milk production drops by 5 percent every time an event like this occurs. To fix the problem, Steve and Sonja plan to excavate the foundation, seal it, and redirect water from the barn roof and surrounding hillside into an existing drainage system. This effort will be combined with the creation of a new equipment storage area and the managing of water runoff in the barnyard.

Steve reports that one of his strongest allies in this effort is the United States Department of Agriculture (USDA). He states, "One of the most important partners that you are likely to be able to find in this business is the USDA. The USDA has many programs that apply to agriculture in general, of course, but also specifically to dairy. Some of the programs I'm familiar with involve infrastructure development and cost-sharing through the Natural Resource Conservation Service (NRCS). NRCS has many programs that allow many lacking sufficient cash flow to make those improvements. Many of those programs are designed to protect our natural resources, includ-

ing water quality." Steve and Sonja have used the knowledge and expertise of their local NRCS partners to improve their farming operation and help them manage water effectively.

Managing forage during drought periods:

Because of a drought in 2016, Steve and Sonja were not sure they had enough feed to support their herd through the winter, nor did they have excess feed to sell. Instead, they needed to creatively source additional forage for their herd's winter rations. The couple preferred not to purchase supplemental feed if possible because the added expense would be a strain on their farm's finances.

To solve this problem they decided to contract with Fred Shelburne, a recently-retired dairy farmer, to board their replacement heifers and dry cows. Fred was able to offer Steve and Sonja a reduced rate for boarding the animals in exchange for eight of the young animals, which he will sell as bred heifers in 2017. Both parties agree that this season is a trial for this type of arrangement. Steve and Sonja will be looking carefully at the books to make sure they are able to save in feed and labor what they pay Fred for his services. If the arrangement works for all parties, Clovercrest Farm will be able to keep their milk-producing animals on the home farm and graze their non-milking animals off-farm. This will allow them to reduce labor costs and improve their cash flow, while reducing their workload. If it makes economic sense, this strategy will allow them to hedge future feed shortages caused by drought.

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Reducing labor costs with once-a-day milking:

The tie-stall milking parlor at Clovercrest Farm is, according to Steve, an inefficient system. He says that at this point in his career as a grazer and dairy farmer, investing in a modern milking parlor is not a decision for him to make. Rather, he sees an investment of that scale as a decision for the next generation of farmers, whomever they may be. For now, Steve and Sonja want to stick with their current infrastructure but still wish to increase labor efficiency and enhance their quality of life. To do so, they decided to increase the efficiency of their herd by changing to once-a-day (OAD) milking. The herd at Clovercrest made the switch in late August 2016. Steve and Sonja experienced the 20 percent drop in milk production they anticipated, but they expect milk production to recover to 90 percent of initial volume within 12 months.

Steve says that according to his research, the labor cost savings of milking OAD means that Clovercrest Farm may actually see an increase in net farm income after the projected 12 months it will take for the herd to adjust. While OAD milking reduces milk production per cow, Steve's research suggests that cows experience less stress, breed back sooner, and have higher solid components in their milk (which translates to a higher price for milk per hundred weight). He and Sonja have already experienced an increase in their quality of life because fewer milking responsibilities gives them more time to spend on other endeavors or as a family. The couple states that if production does not recover to expected levels after 12 months, they will reconsider their decision. However, if the move proves to be profitable, the farm will be in a more secure financial position to withstand the challenges posed by climate change and changing weather patterns.

≈ COWS ENJOY AN AFTERNOON FEEDING NEXT TO THE POLE BARN





Looking Ahead

According to climate forecasts specific to Penobscot County, Maine, Steve and Sonja may continue to see more shifts in weather patterns in coming years.

The couple has already faced challenges related to more rain and less snow in autumn and winter. It is possible that if greenhouse gas emissions remain high, the number of days below freezing (32 °F) in their area could decrease by as many as 70 days per year. Steve and Sonja have observed more periods of autumn rain, an observation that climate forecasts say will become more pronounced in coming decades. Investing in HUAs will help improve drainage around the barnyard and increase efficiency. The couple hopes to limit the negative effects of changing weather patterns by strategic use of HUAs.

Steve and Sonja are confident that Clovercrest Farm will be able to withstand the pressures of changing weather patterns, but successful adaptation will require persistence.

They have responded so far by keeping their cows clean and dry during rainy seasons and by managing water in their barnyard and on-farm roads. An additional example of ways they are adapting to a changing climate includes spreading their forage sources over a larger land base. Ultimately, no single strategy can fully protect a farm from the stresses and shocks of a changing climate. Steve and Sonja must constantly search for what works at Clovercrest Farm. This will require reflecting, making changes, and evaluating their efforts as they discover what the “new normal” means for them.

¹ NOAA'S NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION

² THIRD NATIONAL U.S. CLIMATE ASSESSMENT

³ THIS AREA IS DESIGNED ACCORDING TO NRCS “HEAVY USE AREA PROTECTION” PRACTICE CODE 561

⁴ U.S. DROUGHT MONITOR

⁵ U.S. CLIMATE RESILIENCE TOOLKIT

« STEVE AND DAUGHTER, GALE, WALK THE FARM LANE TO SEE THE COWS AT PASTURE

≈ MILKING THE HERD ON AN OCTOBER MORNING / PAGE 6 IMAGE (LEFT)

≈ FRESH SAWDUST BEDDING IN A WHEEL BARROW / PAGE 6 IMAGE (RIGHT)

≈ EARLY MORNING BREEZE IN THE MILKING PARLOR / PAGE 7 IMAGE (LEFT)

≈ SUCTION MILKING ON A JERSEY COW / PAGE 7 IMAGE (RIGHT)

≈ TRACTOR IN THE YARD AT CLOVERCREST FARM / PAGE 12 IMAGE (LEFT)

≈ STEVE AND SONJA INTERVIEW ON OCTOBER 25, 2016 / PAGE 12 IMAGE (MIDDLE)

≈ PASTURED COWS RE-FERTILIZE THE PASTURE / PAGE 12 IMAGE (RIGHT)

Resources

USDA Climate Hubs

<https://www.climatehubs.oce.usda.gov>

NOAA National Centers for Environmental Information Maine State Summary

<https://statesummaries.ncics.org/me>

The Third U.S. Climate Assessment

<http://nca2014.globalchange.gov/>

The Climate Resilience Toolkit

<https://toolkit.climate.gov/>

Climate Central

<http://www.climatecentral.org/>

The U.S. Drought Monitor

<http://droughtmonitor.unl.edu/Home.aspx>

The Dairy Grazing Apprenticeship Program

<https://www.dga-national.org/>

NE SARE project report on Once-a-day milking (OAD)

<https://projects.sare.org/project-reports/fne95-112/>

NRCS guidance on HUA, NRCS standard (561)

https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_026275.pdf





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