



CASE STUDY SERIES

SATELLITE SYMPHONY:

HOW SATELLITES, COMPOST, AND COWS MADE THE BUSINESS CASE FOR REGENERATIVE FARMING



Featuring:



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THE POWER OF CARBON FARMING TO MITIGATE CLIMATE CHANGE

Agriculture accounts for 15% of global emissions, and carbon farming practices such as composting, cover cropping, and rotational grazing have significant potential to start reversing that number. [Project Drawdown](#) has shown that carbon farming or [regenerative agriculture](#) practices are the 11th most powerful tool in humanity's tool kit to mitigate global warming.

As of this writing, 151 companies have committed to implement these practices through the Climate Collaborative. Many of those companies are struggling with how to engage farmers in their supply chains to begin a shift toward adopting carbon building practices. This is, in part, because while the climate case is clear, the business case is still being developed.

Straus Family Creamery— a pioneer in carbon farming and many other sustainable practices— set out to change that. Straus has started to build an unprecedented financial case for carbon farming and ranchland management.

THE STRAUS APPROACH

After years of following and benefiting from its carbon farming plan developed in partnership with the [Marin Carbon Project](#), Albert Straus observed a variety of positive environmental and financial impacts on his own 500 acre dairy farm. However, Straus held the desire to multiply carbon farming's positive climate impacts at the dairy farms in its supply chain and beyond.

According to Joseph Button, Straus's Sustainability Director, "We knew that if we wanted to help our dairies integrate more carbon farming practices, we would need to prove that a shift in management would not only help the health of soil, but also help the financial bottom line."

To build the carbon farming business case, the Straus team analyzed how carbon farming practices impacted pasture yields and the related need to purchase inputs or feed. The recently released findings clearly demonstrate that these practices lead to dramatically improved soil health and greater forage productivity that cut feed costs by about \$100 per acre annually.

STRAUS' KEY FINDINGS:

- ✓ *Consistent Increase in Production:* Over four years, the biomass in carbon farmed pastures increased consistently despite a serious drought and irregular rainfall patterns.
- ✓ *Biomass Yields:* Carbon-farmed ranchland produced anywhere from 200 to 600 more pounds of dry-matter forage weight per acre
- ✓ *Cost Savings:* **The additional biomass produced is conservatively estimated to reduce the demand of outside feed by \$100 per acre!**

Read on to find out how Straus went about building their business case—including outreach to scientists and use of satellite imagery!

BUILDING THE BUSINESS CASE

Identifying Business Benefits

As Straus thought about what could make a financial case for carbon farming, the benefits of a closed-loop system came to mind. Ideally, a truly regenerative system would reduce the need to purchase external inputs, as it could supply more of its own inputs (i.e. grass, compost, feed) in a “closed-loop” system. Hence, the team turned towards examining which practices would contribute to increased biomass on producers’ grazing fields. Increased biomass means increased forage (grass, etc.), which means lower external feed costs.

Focus on Carbon Farming Practices

Straus focuses on two main ranchland practices to identify how, if at all, carbon farming methods could help farmers save money:

- **Composting** the manure produced by the Straus Dairy (captured in the milking parlor), increases the amount of soil organic matter when applied annually to grazing pastures. Compost returns nutrient-rich material back to soils, resulting in greater rainfall retention, and eventually leads to increased forage biomass productivity and corresponding carbon sequestration.
- **Rotational Grazing** helps maintain healthy forage regrowth during pasture season and prevents soil compaction, a detrimental factor to soil health and forage biomass productivity. At the Straus Dairy, cattle are rotated off of a section of pasture to a new one before they eat down pasture grasses below 4”. The cattle do not return to that section of pasture for approximately 30 days until the grass forages have had time to successfully regrow. As an added benefit, rotational grazing helps even the spread of manure throughout pastures, which serves as an in-season fertilizer for the soil and forages.



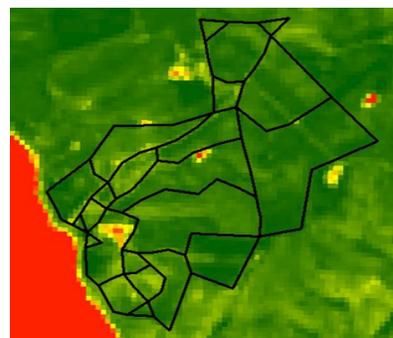
The team ultimately focused on studying the impacts of compost application, as organic field management records clearly denoted the amount, location, and date of compost application.

MEASURING PROGRESS

To calculate how much forage biomass had increased during peak season as a result of compost application, Straus first needed to obtain a reliable biomass baseline for their pastures. The challenge? Establishing that baseline since a biomass measurement had not been taken prior to the compost application.

To address this challenge, Straus learned that they could use historic satellite imagery of pasturelands to help establish a correlation between *peak biomass growth* and the [NDVI \(normalized difference vegetation index\)](#) color of carbon-farmed fields from the satellite images.

Through the network developed from the Marin Carbon Project, Straus contracted Chris Potter, a scientist with a specialization in remote satellite sensing systems, to help develop a methodology around this premise. The methodology leveraged and compared information from satellite imagery, and its correlation with grass dry matter weight measurement data collected in recent years by Whendee Silver, a UC Berkeley soil scientist. The formula developed by Chris Potter outputs very high quality estimates of forage biomass that closely match on ground hand measurements.



Satellite imagery shows Green = higher biomass; Yellow/Red = lower biomass

With this formula in place, Straus began the work of analyzing historical satellite images. The data was organized into three different sets of information:

- 1) Pounds of forage biomass per acre of all nine Straus supplier dairies from 2000-2018
- 2) A comparison of the pounds of forage biomass per acre on the Straus Dairy Farm 22 distinct pastures from 2000-2018, which includes those that received the initial carbon farming compost treatment.

RESULTS

As the data rolled in, Straus started to see the numerical benefits of compost application.

Before and After Yields of Fields that Received Compost Application

The increased biomass production rate of the two pasture fields that received compost applications in 2013 is dramatic. These two fields had never before received a finished compost application.. As figure two shows, there was a 25% increase in biomass on the fields

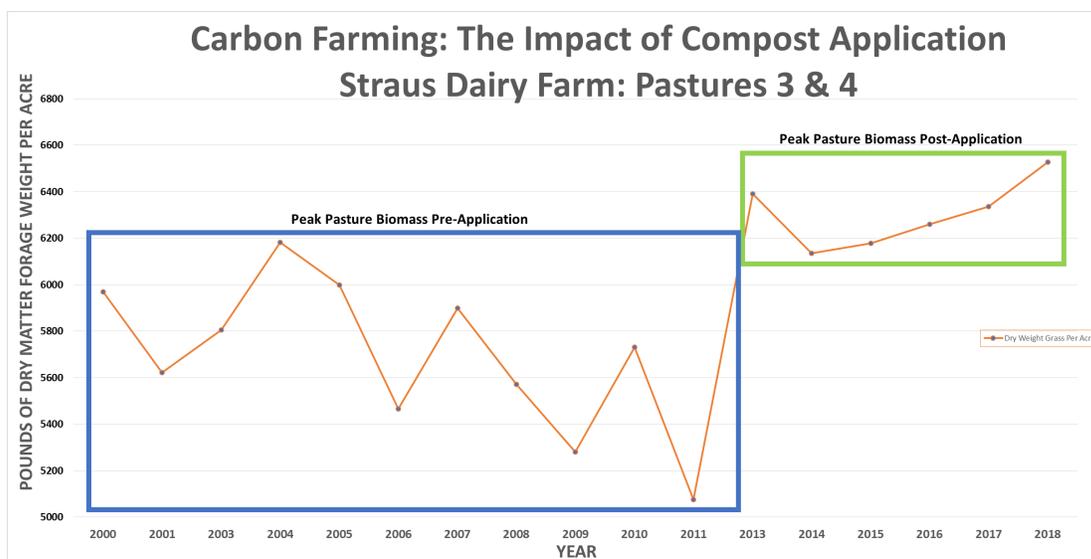


Figure SEQ Figure 1* ARABIC 2: Biomass production rates of fields 3 & 4 before and after 2013 compost application.

(pounds/acre) that received a compost application. Furthermore, the yield trend stabilized and

became much more consistent year over year. Years 2013-2018, on average, have a 600 pound per acre higher peak forage yield than years 2000-2012.

Comparing Yields Between Composted & Non-Composted Fields

Straus also compared peak biomass growth trends (figure 3 below) between fields that did and did not receive compost applications in 2013 (additional Straus pastures have received compost amendments since 2013). The comparison clearly shows that fields receiving compost had an

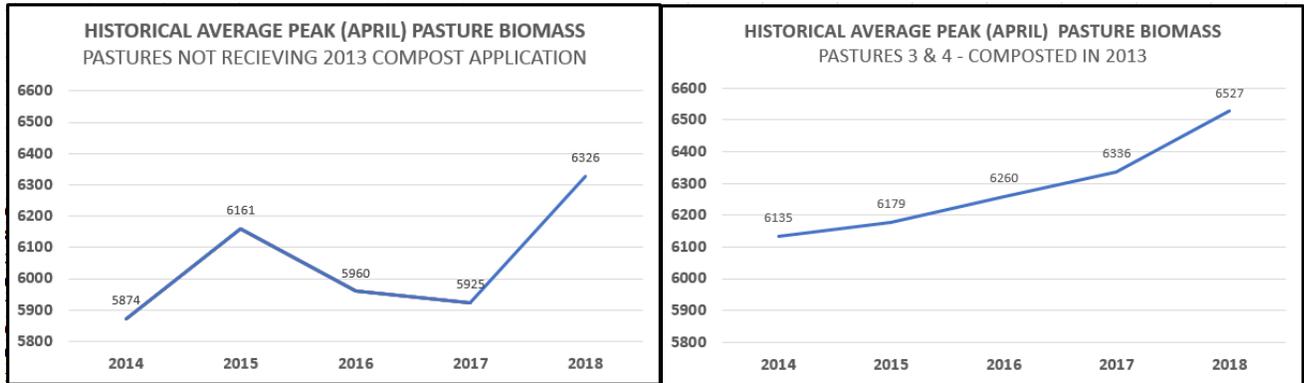


Figure SEQ Figure * ARABIC 3: Biomass growth rates of fields with and without compost application.

average of 4% higher biomass yields—translating into up to 600 more pounds of forage per acre! More importantly, the carbon-farmed pastures experienced a trend breaking forage yield difference compared to the rest of the ranch.

Results, Deconstructed

What do these trends mean? As they looked at the results, the standout benefits of composting and rotational grazing became clear:

- ✓ **Water Retention:** 2013-2015 were years of significant drought in Marin and Sonoma counties—and yet fields that received a compost application in 2013 had yields higher than each of the prior 10 years. This helps further build the case that soils sequestering more carbon via plant life are better able to retain moisture and encourage plant growth.
- ✓ **Consistent Production:** Fields receiving compost application showed a consistent uptick in the average pounds of biomass per acre.
- ✓ **Stronger-Than-Average Yields:** fields receiving compost application produced anywhere from 200-600 more pounds of forage per acre than those that did not.
- ✓ **Feed Cost Savings: At a minimum, \$100 per acre can be saved in feed costs! Why?**
 - o The more forage in a field, the less feed must be purchased from external sources.

LOOKING FORWARD

The results from this study are currently under review by Straus's supply chain partners; in the future, Straus hopes to continue to quantify the benefits that carbon farming practices are bringing its dairy partners. The initial reception has been positive and future plans include:

- ✓ Continued satellite measurements of all supply farm's pastures.
- ✓ Fine tuned results that highlight peak forage results of more detailed pasture divisions.
- ✓ Support, both financially and operationally, of the adoption of carbon farm plans at all the dairies that supply Straus family creamery with milk
- ✓ Grant and project implementation assistance for any farms seeking to implement Healthy Soils Projects like compost application or rotational grazing.
- ✓ Conducting soil carbon inventories across the 6000 acres where Straus cows graze.

ABOUT STRAUS FAMILY CREAMERY

Straus Family Creamery has been family owned since 1994. Consistently an innovator in the dairy space, they were the first 100% certified-organic creamery in the United States! Today, Straus produces **100% organic-certified products**, including milk, cream, yogurt, sour cream, European-style butter, and super-premium ice cream. The raw ingredient—milk—used as the basis for all of these products are sourced from twelve family dairies located in Marin and Sonoma counties.

