Contents

Introduction

An old joke goes, "The best way to make a million dollars farming is to start with two million."

As is the case with most good jokes, there's a pretty big (and pretty painful) nugget of truth behind this adage. I never realized that until I became a farmer myself.

We didn't start a farm to get rich. My husband, Josh, and I started farming because we realized, at age twenty-two (before we were even married), that we enjoyed raising our own chickens. We were entranced by this agrarian lifestyle and in love with the idea of producing all our own food and some for our friends, family, and neighbors. Our small flock of laying hens quickly grew, multiplying into 50 laying hens, 450 meat chickens, dozens of pigs, some turkeys, a dozen beef cows, and 200 ewes. We dumped thousands of dollars into pursuing our dream, both of us working second, third, and fourth jobs to support our very expensive passion. By the time our son was born in 2020, we realized that not only did we have a profound love for farming, but we desperately needed to find a way to make money doing it.

Making money while farming is an oxymoron. It's something we

didn't truly realize in full color until early 2021, when we met with our accountant to go over our returns for the previous year. "Well," he said with a sigh, leaning back in his chair, "it's common for a farm to show a significant loss in the first year."

"Significant loss" was putting it gently. Our expenses were more than double what we actually brought in. The farm owed us a *lot* of money. By 2021, I was working from home as a freelance writer and enjoying it (and the higher paycheck it brought) more than teaching, but Josh was getting more frustrated by the day. He wanted to leave teaching, too, and to do that, he needed to find a way to make the farm pay for itself. The expenses piled up. It seemed like no matter how hard we worked, we just had more debt, more stress, and a significantly smaller savings account.

It wasn't the lifestyle we imagined when we decided to get into farming, but unfortunately, it's a reality that's shared by just about every farmer we know. According to the US Department of Agriculture, the median total income from farming in 2023 was –$900.[1] Yes, that's a negative number, and no, it's not a typo. Based on that dismal income projection alone, it's no wonder farmers are leaving the profession in droves; between 2011 and 2018 alone, the United States lost more than one hundred thousand farms.[2]

Josh and I understood why so many of our fellow farmers were getting out, but that wasn't a choice we wanted to make. After all, we were just getting started. And we already had dreams of passing down the farm to our son, who, even before he could walk, was expressing a profound love for the natural world.

We had begun to research our options for making the farm more lucrative as early as 2019, when we had our first inkling that small-scale livestock farming in and of itself wasn't profitable. We knew we needed another way to make money with the farm.

At that point, there were plenty of talks on the table about marijuana being legalized in New York state for recreational and medicinal

Lew, age three. Credit: J&R Pierce Family Farm

purposes, so we had our fair share of (mostly) joking conversations about how we might have to pivot from raising grass-fed lamb to growing weed (a different type of grass entirely) for our customers. But then a farmer friend offered us a new solution. It was one that would not only allow us to keep farming and make a decent profit, but it would also help us give our animals the space they needed to be healthy and happy.

It wasn't magic.

It wasn't a trust fund.

It certainly wasn't a grant or a loan from the US Department of Agriculture.

Instead, it was something as simple as the sun: solar panels.

Enter: Agri-Energy

In this book, I use the term *agri-energy* to refer to any combination of renewable energy and agriculture, in whatever form that might take. Other terms—*agri-PV*, *agrisolar*, *dual-use solar*, and *agrivoltaics*—are also used, but they tend to apply exclusively to solar energy and agriculture. I wanted to use a broader term that could be applied to any combination of renewables and agriculture (including wind). Agri-energy fits the bill.

Josh and I first heard about the idea of agri-energy in the summer of 2019. Then, I was still working as a teacher, but had been hired by Acres USA to write a magazine article about this new idea called "solar grazing." Solar grazing is just one form of agri-energy that I'll tell you about in this book, and though it's the form discussed most often, it's certainly not the only form agri-energy can take. I also use the term *agri-energy* to refer to grazing livestock under wind turbines, growing crops under solar panels, and about a million other manifestations of the beautiful marriage between renewables and agriculture.

The research I did for that first initial article on solar grazing (titled "A Bright Future for Solar Sheep") put me into contact with some fascinating folks who are now big names in the world of agri-energy. After those interviews, it seemed to me that solar grazing was just the tip of the iceberg and something people weren't talking about nearly enough. Josh and I had once explored the idea of putting solar panels on our own property to help offset some of our energy expenses, but we didn't want to put them on our roof and didn't have great exposure anywhere else on the property. We had tabled the idea until one day when the concept of being able to graze our sheep under solar panels arose as a possibility.

It was our "aha" moment, light bulb and all. What if we could take advantage of solar somewhere else, perhaps in a not-so-traditional way? It was intriguing, but again we set the idea aside as there weren't any solar farms being built in our area. The timing wasn't right. It wasn't until a couple of years later, during a conversation with two of our farmer friends, George and Marcel Giroux, that the idea came up again. Right in the middle of one of those long, ambling summer conversations that goes on for hours until somebody finally slams the truck door closed and says with a sigh, "Well, I'll let you get back to it, then"—even though the "it" you need to get back to is seldom clear to either party of the conversation—George and Marcel told us that a new solar farm was being built on their property.

"We want you two to graze it," they told us repeatedly about the site. And, in 2022, they helped us make the initial connection to land our first solar grazing contract with a developer.

We were over the moon, telling everybody who would listen about this revolutionary new opportunity for our farm to make money, real money that could help support our growing flock. For the first time we would now be able to expand our farm in the way we wanted to, all while maintaining our diversity and beginning to make a (small) profit. This revelation was miraculous to us, and we weren't the only farmers who were finding cause to celebrate. Incorporating renewable energy into working agriculture is an opportunity for farmers across the United States and around the world to mitigate costs and diversify in ways they never dreamed possible. Short of taking on a second or third job, or even selling off the entire farm, renewable energy contracts are a way to help farmers make ends meet or even branch out into new ventures.

How lucratively those ends meet depends largely on circumstance, but for most, the payout is beyond what a farmer could get doing just about anything else with his property. In general, the more property a farmer has, the more wind turbines and solar panels can be installed.

Wind farms can bring in anywhere from $8,000 to $80,000 per year for the farmer, with the average payout being more than $30,000 per year.[3] Commercial solar developers typically look for parcels of at least ten acres for anything other than a very small community solar site, but on large sites, those more than one hundred acres, lease rates start at $300 to $2,000 an acre (and often exist as twenty- to thirty-year leases). In 2024, 58 percent of farmers reported lease offers of more than $1,000 per acre on average.[4] That's reliable, long-term income that farmers can count on—income that's immune to the changing tides of policy changes and fluctuating commodity prices. Renewables are a smart choice, especially for landowners who have lots to lose if they don't find another way to make the most of their land.

The real beauty of these deals, however, is that in most cases, *the farmer doesn't have to stop farming*.

What Does Agri-Energy Look Like?

In this book, I'll talk about a few different models of agri-energy, all of which can provide mutual benefit to the farmer and to the energy company, but each of which functions in a slightly different way. To get a clearer picture of how agri-energy might fit into the larger fabric of your own community, it's important to understand the differences.

Model 1: Farmers Leasing Their Land to Developers

Model 1, currently the most popular model, is the way "things have always been done." At least, that's been the case ever since renewables came on the scene in the United States in full force.

In this model, a farmer, often one who is nearing the end of their farming career, chooses to lease or sell land to a solar or wind developer. The farmer receives an annual check for the lease payments (or a final bill of sale) and moves on. Case closed.

Model 1.5: Farming the Developer's Land

As an extension of the first model, let's call it model 1.5, some renewable energy developers are choosing to have a third party come in and farm the land that is now covered with acres of solar panels or wind turbines. A sheep farmer might graze their sheep beneath the panels, or a vegetable farmer could grow spinach. These third-party farmers may or may not receive compensation. In the case of livestock grazing, the third-party almost always *is* compensated because they are performing a necessary service for the company: keeping the vegetation mowed down. In the case of vegetable farming, it's not always as clear-cut. Often, these farmers do not receive any kind of payment because it is presumed that the ability to farm the land for free (when they would otherwise have to pay to lease land) is payment enough.

Josh and I currently partake in this model, as do many other farmers around the country (and around the world) that I'll speak about in this book. We are farming on land that is being leased by other farmers to solar companies, and we receive payment from the solar companies for our "vegetation management" services (keeping the grass mowed so that the solar panels function optimally).

The benefit to us, then, is twofold: We are gaining access to land (and inexpensive feed) for our livestock, and we are being paid for our management services. This model is working well in New York, where we live, as well as in other states, including California, North Carolina, Texas, Vermont, and Virginia, and countries, including Canada and Denmark among countless others.

Model 2: Farmers Installing Their Own Renewables

Model 2 is the farmer who invests in and owns their own renewables. Later in this book, I'll introduce you to the Menards, a family that supplies a significant portion of their on-farm electricity needs with solar panels they paid to install themselves, although they do not farm under

the panels. This arrangement has not only allowed them to dramatically reduce their annual energy expenditures, but also provides them with the added benefit of net metering, something I'll discuss more in depth later on.

Model 3: Farmers Installing Their Own Renewables and Farming on Them

The Menards are not farming under their own solar panels, but there *are* farmers who do and follow model 3. Dr. Anna Clare Monlezun, a rancher and researcher in Colorado, is one of these farmers. They don't receive any compensation from renewable energy companies for grazing or growing under solar panels; they own the panels themselves. However, they're making the most of their land while also dramatically reducing energy expenses (and creating a more sustainable, self-reliant energy system on the farm).

A Solution Beyond Farmers

While the impact of agri-energy on my own farm has been profound, we need to zoom out to get the full picture. We all know that land is limited, a finite resource, and the conversation around renewable energy versus traditional sources of energy (that is, fossil fuels) has often focused exclusively on that fact. "We don't have enough land to feed our growing population," the (very valid) argument goes, "so why should we tie it all up in wind and solar?"

It's an argument that I don't, at face value, disagree with. A one-megawatt solar farm produces about enough energy to power 170 homes, but takes up roughly five to ten acres of land. On that same five to ten acres, you could feasibly grow around fifteen hundred bushels of corn or several hundred tons of tomatoes. You could graze five to ten cows. That's quite a lot of food, especially if that food is produced in

the model of agriculture that is currently in vogue, the goliath factory farm system. But (and this is a big but) the conversation surrounding land use and renewables has always centered on doing either—producing renewable energy or growing food—in isolation. That model is no longer the only option. It is no longer an either-or dilemma. Agrienergy makes it possible to do both, helping us get more bang for our metaphorical buck.

In fact, renewable energy farms cost less to operate and ultimately cost less to build than coal-powered plants. The cost of clean energy sources is falling every year, with solar falling by 13 percent and wind by about 9 percent.[5]

We need to eliminate our single-mindedness when it comes to renewables and think about solutions as they work in tandem, rather than in isolation. For example, can multiple renewables work hand in hand (that is, solar and wind on the same site to maximize land use)? Can we revamp existing renewable farms at a lower cost than building new ones? One of the most significant challenges to expanding renewables, after all, is finding enough land to develop these projects.

It's not just any land, though. It has to be the right kind of land.

The best sites for wind are the tops of hills that are smooth and rounded, open plains and water, and even mountain gaps that funnel wind (here, the wind is more intense and generates more power). For solar, there's a little more flexibility. Panels can be installed on roofs, but for utility-scale installations or even large community solar sites, much more space is needed. A lot of open space is needed around the panels, so installations near tall buildings aren't an option. Wide, open spaces are again the best choice.

If you're a farmer, you likely already have recognized the challenge in securing that kind of land, and that's where the major ag-renewable sticking point lies. Wide, open spaces are ideal for wind and solar, but they're also ideal for agriculture. That's why farmland is so widely sought

after by renewable energy developers and why the renewable-agriculture argument is one of the most problematic as renewables scale up.

People have been fighting over land rights for about as long as human history has been recorded. Here in Clinton County, New York, the soil is known for being rocky and heavy with clay. Much of the acreage is wooded, and most of the arable farmland was swept up by farming families decades ago (and now has largely been sold to larger farm corporations). The unused, family-owned farmland we have left here is limited, and it has not been exempt from the real estate crisis that's affected the rest of the country. In most cases, farmland is more expensive than other types of real estate. And unfortunately, it's in short supply.

You can't blame renewable developers for trying to get the best possible land (at the cheapest price) for their projects. It's not just about the quality of land or the price, but the red tape that might be lying in the way of development, making construction or operation more expensive after the land has been purchased or leased. You'll see more developers flocking to states like California, Florida, New York, and North Carolina than you do to Alaska or North Dakota simply because of different regulations and different incentives, with some states being much friendlier to renewable development than others.

And although the need for suitable land to farm is most pressing for the individual farmer, farming communities extend well beyond the small bubble that is the individual farm. Our sheep have benefited dramatically from agri-energy, to be sure, but our broader community has benefited as well.

Farming towns are notoriously some of the poorest in the United States. Agri-energy allows more money to stay local than perhaps any other formula for doing business. It allows for energy and food independence in ways that fossil fuel energy simply does not. Community solar, a common model for solar farms that are developed on agricultural land, is a great example. In this model, customers can take more

control of their energy costs, with community members able to tap into the energy that's being produced right in their communities and receive a credit on their monthly electricity bill.

There are many other solar models, including utility-scale solar, that generate electricity that is shipped out of the county or even the state. Nevertheless, community solar presents an opportunity fossil fuel generation never has and never could: It opens up the renewable energy market to people who want to invest in cleaner energy but don't have the land or resources to do so.

While the benefits of renewable energy for the environment tend to be quite clearly publicized, they can be tougher to quantify for agri-energy—although they become obvious the moment you set foot on a solar site that's being used for agri-energy. Many assume that the benefits are limited to the reduced carbon emissions that come from making the switch from fossil fuels to renewables, but they go far beyond that. It's not even as simply quantified as being able to use the land for more than one function. Agri-energy offers much, much more in terms of environmental sustainability.

For example, as I'll explore in more detail throughout this book, agri-energy can help retain topsoil and improve soil health. It can boost pollinator numbers. It can even help populations of certain birds and mammals, like ground-nesting birds, rebound and, in many cases, thrive.

We talk a lot about what's called prime farmland and lose sleep over our concerns that solar and wind are snatching up all the prime farmland that exists in this country, but we talk very little about what that farmland actually is. Agri-energy has the unique ability to create farmland that is truly "prime"—land that is healthy now and will continue to be healthy many years into the future. And since agri-energy can even help solar panels perform more effectively, it's also helping with that emissions debacle in more ways than we could ever have possibly imagined.

They say that what's good for the goose is good for the gander. In short, agri-energy is a holistic approach that isn't just good for the goose. It isn't just good for the gander. It's good for the whole gaggle, and then some.

The Future of Energy

Agri-energy development is happening at a breakneck pace—faster than anybody can keep up with. At the end of 2023, the United States had 4,185 solar PV facilities capable of producing more than one megawatt of electricity each.[6] Because the productivity of these facilities is measured solely by energy output rather than acreage, determining the size of these by land area is challenging, to say nothing of how many properties are actually being farmed for food and not just used for energy production. And on the international scale, from Japan to Belgium, Germany to Malaysia, few corners of the globe have been untouched by agri-energy.

Some data *has* been collected on the number of agrivoltaic farms (farms that combine solar panels with agriculture)—it's estimated that there are 567 agrivoltaic projects being conducted on more than sixty-two thousand acres in the United States—but these numbers are likely convoluted. Current agricultural census data in the United States doesn't weed out which farms are "agrivoltaic" or "dual-use" farms and which aren't, and many studies include *only* projects that are being used for experimental or research purposes as part of their final tally.[7]

That's one reason why I try to use the term *agri-energy* as much as possible in this book. My goal in doing so is to highlight a broader term that encompasses any kind of setup, whether that's using renewables to power your own farm (like the Menards), getting paid to graze a leased solar site (like us), or grazing under solar panels or turbines you personally own.

Regardless of what you call it or how it's being measured, agri-energy is happening, and it's happening fast. Agri-energy, in all its forms and under any and all its assorted monikers, is giving farmers a new crop to sell long after the farmer's market has shuttered for the season.

It's providing us with a way to diversify our offerings even further—and in a way that allows us to be more independent than we ever thought possible.

For too long, the conversation around renewable energy has been too partisan. There's no solution, according to many people, that prioritizes both the environment and agriculture. In this book, however, we'll walk through the benefits of agri-energy from environmental, economic, agricultural, and societal perspectives. You'll learn more about how agri-energy is unfolding around the world. I'll explain how these solutions, though in their infancy, are already proving to be a massive boon for farmers and clean energy developers alike.

If you're interested in exploring agri-energy for yourself, whether that's as a developer, a farmer, or even just someone who feels strongly about the topic, I'll give you some advice on how to get started. I'll cover everything from how to land your first grazing contract to questions that need to be asked if you're a developer.

But my real goal in writing this book is to show you how things are changing in the world of agriculture. Here, we'll see how agri-energy can help farmers make changes that not only benefit their individual operations, but the planet as a whole.

It's a big topic, something I naively didn't really realize when I first started writing this book. My initial plan, to talk about how some sheep grazing under solar panels could be great for farmers, was nice and simple. As I began to peel back the layers of this very complicated onion, however, I realized there was so much to the story than a few sheep under solar panels. It was beef cattle under tracker panels. Dairy cows under wind turbines. Tilapia in Hawaii. Pigs in the Finger Lakes.

Agri-energy is going to be big, bigger than we ever could have imagined. But for Josh and me, it was, first and foremost, an economic lifeline. It helped us go from barely keeping our heads above water to building a successful business that we were, and continue to be, proud of.

CHAPTER 1

A Cash Crop

The farmer has to be an optimist or he wouldn't still be a farmer.
—Will Rogers

Let's talk "farm-enomics." When Josh and I first started our small family farm, we were selling lamb for $11 a pound. To the average consumer, that sounds like highway robbery. Had you asked me five years before we started raising sheep, I probably would have agreed, turning up my nose at the $11 local lamb chops in favor of the less expensive cuts from Australia because it couldn't possibly be that much better than the "cheap stuff."

Now that I produce my own food (and take pride in producing it for others), I recognize the many merits of locally sourced products over the cheap stuff, from improving rural economies to reducing carbon emissions (an unfortunate result of trucking food many thousands of miles to its final destination on your plate) to supporting humane animal agriculture to the value of knowing the farmer who's raising your food. Local food is certainly worth it, and once I started farming, I realized that $11 a pound isn't price-gouging, as many would claim. It's simply

covering the cost of doing business. Hay, vet bills, and milk replacer don't come cheap.

Yet to many consumers, cheaper is better. That is not said with the intention of blaming or shaming. We're all on a budget, and if you need to feed your family on $50 a week, $11 probably *is* too much to pay for a cut of lamb that will provide maybe half a meal for a family of four. That many families can't afford the price of groceries is a serious problem, but it's not one that can be solved by slashing prices charged by local farmers (and perhaps may be indicative of another problem entirely unrelated to food, as our global food system and commodity subsidies have made American food quite cheap; in 2022, we spent an average of 11 percent of our disposable income on food, but we spent more than three times that amount on food in 1919[1]).

Today, the price difference between what you see local farmers charging and what you see charged at the grocery store is simply a matter of small farmers needing to charge enough to break even, let alone to make a profit. Before Josh and I discovered agri-energy, the immediate goal for us wasn't even to make money—it was just to figure out how to lose less of it. We had thousands of dollars of lamb, chicken, and pork sitting in our freezers, and it wasn't going anywhere fast. We needed the inventory to grow the farm, but the stagnant inventory was killing us.

The losses continued to pile up as we researched new ways to market our products, with most of our efforts inhibited, sadly, by regulations imposed by the US Department of Agriculture (USDA) and other governing bodies that make it next to impossible to sell meat to grocery stores in New York without a relationship with Tyson, Cargill, or Smithfield. We had a loyal customer base to whom we marketed direct-to-consumer pork and chicken, but it wasn't enough. We couldn't sell the vast quantities of product like those major corporations (nor did we necessarily want to), and we also didn't want

to hike our prices for our loyal local customers. We needed an alternative solution.

Farmers Deserve to Make a Living Wage, but They Seldom Do

Like most farmers, Josh and I consider ourselves to be good problem solvers, but our luck was running out—and so were our coffers. "You don't farm to get rich," our friends and family would tell us, our concerns warranting little more than a dismissive shrug at the dinner table. "That's why you guys have other jobs," they'd say.

Yet you don't tell a banker that he should have another job to complement what he's already doing all day long in the office. You don't tell an attorney that he shouldn't factor the cost of labor into his hourly fee because "he loves what he does." I'm amazed at how often I'm told, even by other farmers themselves, that the goal of farming full-time is not to make a profit.

Farming is an occupation just like any other. You could argue that many small-scale farmers or homesteaders are doing it in the name of self-sufficiency, and that's a completely separate argument, one I won't disagree with. As far as forward-facing farms go (that is, those that are selling to the general public in any capacity), they are *businesses*. And just like any other business owner, farmers deserve to get paid, and they deserve to get paid a fair wage.

Sadly, that's not usually the case. The only farmers that are doing alright are the ones who are subsidizing themselves with off-farm jobs or are buoyed by substantial government subsidies. In an interview with *USA Today*, Tom Cunningham, a farmer leasing to wind, said that many farmers refer to wind turbines as their "second wives," because all too often, farm wives have to work in town to make ends meet.[2] That was equally true on my farm, where both Josh and I have worked multiple jobs to support the farm.

When we're talking about income from farming, it helps to have a clear understanding of the numbers and terminology. First, median off-farm income in the United States in 2023 was $79,900, whereas the median total household income was $97,984.[3] (Per the USDA, "The median is the income level at which half of all households have lower incomes and half have higher incomes. Because farm income and off-farm income are not distributed identically for every farm, median total income will generally not equal the sum of median off-farm and median farm incomes.") The median income from farming for households is a lot higher, around $167,550.[4]

Commercial farms are defined by the USDA as farms with $350,000 or more in gross cash farm income, "regardless of the principal operator's primary occupation."[5] The USDA further defines "small farms" as any farms making a gross farm income of less than $250,000. Technically, any farm can be a "small commercial farm" as long as it generates at least $10,000. In other words, as long as your farm produces at least $10,000 worth of, say, tomatoes, you can be considered a small commercial farm, even if you never sell those tomatoes. "Noncommercial" farms are those that have enough land or livestock to generate at least $1,000 in sales, regardless of whether or not they actually sell that much. The vast majority of American farms (91 percent) fall into this category, but large farms (generating $250,000 or more in gross farm income) account for 85 percent of all agricultural production.[6]

Farms in the United States are getting bigger, but they aren't necessarily getting better. Large commercial farms are often referred to as agribusinesses rather than farms because the true focus is on production and a commitment to shareholders rather than on the more traditional, pastoral elements of true agriculture.

Some of the income disparity cited above has to do with the type of crop being produced. Rice, tobacco, peanuts, and cotton provide the lion's share of income for the high earners, with dairy, cash grains and

oilseeds, and other "high-value crops" coming in after that. Livestock are at the very bottom. Sheep don't even make enough of a dent in the average farmer's income to make the list and instead are lumped in the general "livestock" category, not broken down into their own categories like beef cattle, hogs, and poultry. People aren't getting rich off raising sheep, at least not in the United States. The same can be said of other noncommodity crops like fruits and vegetables.

There are many complex reasons for this noteworthy schism in US agriculture, this stark division between the massive Smithfield barns housing thousands of sows and the part-time construction worker/farmer raising a hundred or so hogs in the back forty. One of the most obvious is the principle of the economy of scale. When a farm increases production, it can lower its costs of doing business by spreading them out among all the individual products, but that requires significant capital investment in labor, equipment, and supplies, a financial investment that most small farmers simply can't afford to make even when they take on thousands of dollars of debt. It also requires a certain level of Machiavellianism. We like to think that corruption and a general disregard for workers' rights ended after Upton Sinclair published *The Jungle*, but unfortunately, things only seem to have gotten worse. Though certainly not the case with all large, commercial farms, it's safe to say that it's not the small-scale blueberry farmer who's exploiting contract workers and paying below-poverty wages to undocumented workers, but instead, the concentrated animal feeding operations, or CAFOs.

Small Farms, Large Farms, and Subsidies

Again, the distinction between "agriculture" and "agribusiness" is important, especially as it relates to income. The chief executive officer of Tyson Foods earned a total of $12.014 million in 2022, up 33 percent from 2021.[7] To many, bigger is better; large commercial farms

with three thousand beef cattle can produce and distribute much more beef than the small farm with thirty animals—and for far less expense because all those costs are spread out (and, likely, because there's far less concern given to the experience of the individual animal from birth to death, and therefore, again, less cost).

In an economy of scale, the relationship between expenses and profits isn't necessarily a linear one. It's easier to make money if you have lots of animals, but to raise those animals (and to raise them the right way, with regard for the life of the animal and the lives of the people who care for those animals) requires a lot of capital.

Large commercial farms are the ones that have the means to supply big food companies (like Tyson or Cargill) with the raw product or are owned by those large food companies outright. You typically won't find the small farms in your community selling to the big packinghouses, simply because the barriers to entry are too steep. They can't produce enough volume at a low enough cost to make it worth the effort.

Another issue that comes into play is subsidies. Although there's technically no exclusionary clause barring small farms (those grossing less than $250,000) from applying for subsidies, they're certainly off the table for noncommercial residence farms, since those farms aren't producing enough salable product to be considered viable businesses.

Instead, the bigger problem has to do with the type of product being subsidized.

This book isn't about farm subsidies, so I won't go into extensive detail here. But you need to know that, as taxpayers, we fund a system that spends billions of dollars each year on farm businesses and agriculture. These subsidies are marketed as a way to protect farmers from fluctuations in prices and revenues while also providing cost reductions (subsidizing) through things like loans, research, export sales, and insurance. Crop insurance, disaster aid, price loss coverage, and agriculture risk coverage are all examples of farm subsidies. What makes farm subsidies potentially

more nefarious than other types of subsidies, however, is that they can distort planting decisions, incentivize overproduction, and increase inflation.

Farm subsidies disproportionately benefit the wealthiest of the highest-earning large commercial farms described above. One study found that 60 percent of subsidies from crop insurance, price loss coverage, and agricultural risk coverage (three of the largest farm subsidy programs) go to the largest 10 percent of farms.[8] USDA published data showing that 23 percent of farms with yearly revenues of less than $100,000 receive subsidies, whereas 69 percent of farms above that threshold do.[9]

The whispered truth that everyone ignores is that although farm subsidies are funding agriculture, it's not in the way we assume. Crop subsidies don't trickle down to the average farmer down the street from you, at least not in large amounts, unless that farmer is growing a subsidized crop at a large enough scale or unless that farmer is receiving some sort of state or federal aid in the form of a grant.

The issue of crop subsidies has long been contentious, with some people arguing that they're necessary to buoy farms throughout turbulent environmental or economic times. But they also inflate our food supply to an unnecessarily high level, and when supply is high and demand doesn't increase proportionally, prices tank and the farmer receives less and less.

Although subsidies can be a lifeline, I don't think I've ever talked to a farmer who views receipt of subsidies as a point of pride. I personally want a business that's thriving because I've found a way to make it thrive. I want a business with a reputation for producing an outstanding product, one my customers can afford and enjoy feeding their families. I want a business, not a subsidy machine.

My logic here also applies to grants and loans. I'm not antigrant. Grants from any funder are valuable resources for farmers to get up and running. But to say they're solutions for struggling farms is a fallacy. And often they don't amount to much. In 2018, the New York State

New Farmers Grant Fund, for example, offered a maximum of $50,000 to assist farmers with expanding their agricultural production, at a time when the average cost to build a barn was more than $75,000.[10] Tell me, how are you going to sustain your farm and all those infrastructure investments once the initial payment has run out?

I may just be speaking for myself, but I don't think farmers want more subsidies or more grants. Rather, we want a way to make a living doing what we love. And while our voices might not be the loudest, they're certainly the majority.

Josh and I run a small family farm, and our focus is on the community, not on increasing global sales or the interests of shareholders. For the most part, the vast majority of people who farm are people just like us. They're people who produce a gross annual income of less than $250,000. Together, we represent more than 90 percent of farms in the United States, the largest as measured by our population, but unfortunately, not by our bank accounts.[11]

That's especially true here in the Northeast. Here, we're more likely to see small commercial or residence farms rather than the large commercial behemoths that dominate the monocrop landscape in the Midwest (including the now-infamous CAFOs).

All in all, the income disparity between the largest commercial farms and the smallest operations can be best summed up by the phrase, "big ag or gig ag." You either do it on a massive scale, or you do it as a side hustle. There's no in-between.

But for many of us, the in-between is a gray area we no longer want to reside in. We don't want to run our farm as a side hustle. We don't want to sell out to a larger corporation. We want to have a successful farm, on our own terms. Maybe it won't make us rich, but if it can pay the bills, that's all we truly need.

When you have the nerve to utter a statement like that in the presence of an old dairy farmer in upstate New York, you'll find yourself

laughed at. We certainly did. I'm sure the same is true anywhere else in the country, too. But if there's one thing farmers are, it's stubborn. We're stubborn to a fault. It takes a lot more than getting laughed off a hayfield to get us out of the game for good.

A Pessimistic Outlook for the Most Optimistic Folks

Despite all our grit and perseverance, things just aren't panning out for those of us trying to make a living in the unforgiving world of agriculture, especially small-scale or regenerative agriculture. Compared to other occupations, farmers as a whole are most likely to die by suicide, at a rate that is three and a half times that of the general population.[12] From a loss of pride in not being able to keep their farms running well to increased farm debt and reduced prices for commodities, there are many reasons behind this sad stat. Still, I've noticed two brighter takeaways here about farmers.

The first is that we must be optimistic. The grain prices will go down. It will rain. That ewe will recover from her broken leg. If we're lucky, our wishful thinking and prayers are answered. Things do get better. There's no choice here. We just have to be optimistic.

A lot of times, things do get better. You reach a new market with your products. You sell a few more beef shares. Grain prices to feed your hogs drop a little. But things never get better *enough*.

The other thing I've learned is that all small-time farmers have a love for the land and a love for what we do in common. We're not getting rich, but we're not in the game because we want to get rich. We're doing it because it's a labor of love, a love we want nothing more than to pass down to the next generation.

I didn't fully appreciate this feeling until I had my son. In his first few weeks, as I walked around the farm with him in my arms, I realized that this chunk of land wasn't just where we lived or where we worked.

It was *us*. Every inch of that place, every speck of dirt, held meaning. The greenhouse where we planted tomatoes, where the air hung heavy and thick with midsummer humidity. The first barn we built, where our first lambs and piglets were born, where swallows nested in the rafters and twittered good morning, and where my son later earned his first set of stings from a pair of angry yellowjackets. The bumpy, rutted-up mud road winding back into the forest, where we'd chased rogue pigs in the summer and watched deer nibble on bits of spilled grain in the winter. That's what drives us as farmers. It's admittedly a relaxing and rejuvenating thing to hike through the forest, to stop and listen to the birds sing, to hear the gentle sigh of the trees as the wind brushes through their branches and moves them back and forth.

But there's nothing quite like helping a ewe deliver a stuck lamb. There's nothing like seeing that lamb, who you thought had died, take in its first deep, unsteady breath, then rise to meet its mother.

There's nothing like walking out into a field dotted with jet-black cattle, watching as the sun comes up behind them, warming and illuminating their backs. There's nothing like being more than just a passive bystander or a casual witness to everything Earth has to offer, but instead, interacting with it, fully human and fully alive.

There is nothing like farming.

Farming itself is a beautiful thing. But the farming *business*? That's the stuff of nightmares. As of 2021, the average price of an acre of farmland in New York was more than $3,200.[13] It takes much more than an acre to raise even a few head of sheep. And that's just the acreage—bare, unimproved acreage.

Add in irrigation, fencing, feed for the animals in the winter, veterinary expenses, and everything else that goes into running a farm, and you're into trust fund territory, meaning that to have any chance of building a farm of any size, you'll need a healthy and generous trust fund to tap.

Josh and I didn't have a bottomless bank account; instead, we had debt. With our twenty-two acres, we quickly found ourselves tapped out on pasture. We knew we needed to increase the number of animals we were raising to meet the local demand of our customers, but we simply didn't have the space to do so. We also believe strongly in the core principles behind regenerative agriculture, and that requires good land.

We raise multiple species of animals and rotate them to new spaces often. Thus, we rely very little on commercial feed and even less on the medications and supplemental grain and expensive housing facilities that CAFO agriculture necessitates.

Our entire marketing plan and operating principles are based on our animals' need for lots of space, green grass, and sunshine. But with hundreds of animals and no place to put them, we needed another solution.

When Farming Is in Your DNA, but Money Isn't

When Josh and I were starting out, we researched grants and loans for the so-called first-generation farmer. I personally hate the term *first-generation farmer*. I think it's a misnomer—we all have farming in our DNA. Farming is a memory handed down from generations, one that remains running rich in your blood just as naturally as the instinct to chew, to walk, to run. Anybody can farm—but not anybody can make a living doing so, something we realized far too well. While the grants and loans would have been helpful in the short term, it was a Band-Aid that wouldn't do much to solve the long-term issue.

Just about every farmer in our area was in a similar situation, but that was small comfort. The only advantage other farmers in the region had was that most were *not* first-generation farmers. They'd been bequeathed large tracts of land, old (yet reliable) equipment, and breeding herds with decent genetics. We had a John Deere we were financing ourselves, twenty-two acres (much of it being wet, wooded ground), and a large

flock of hodgepodge sheep that we couldn't even afford to have professionally sheared anymore. We DIYed everything.

We just couldn't DIY enough to make a profit.

While it's not comforting to know that others are in the same boat, it's the truth. Farming is an occupation with a notoriously stubborn glass ceiling; as hard as it is to succeed as a small farmer, it's even harder to get started, especially without a family history in farming.

Land access is a problem, but so is access to equipment. A new tractor can easily cost between $25,000 and $100,000, to say nothing of the implements required to use it effectively.

Then there's the knowledge gap. No amount of college education, no textbook, will prepare you for the realities faced on the farm. You have to learn simply by putting your feet directly into the fire and doing it, often failing, time and time again, and catching yourself on fire, time and time again.

To say it's challenging to get started in a career as a farmer, particularly a first-generation farmer, is a great understatement. Since there's no real monetary incentive to get into farming, there's no great reason (besides pure passion) to get into this field in the first place. Our numbers are dwindling by the day. About one-third of all US farmers are older than sixty-five. The average age of the US farmer is around fifty-eight.[14] From 1991 to 2020, the percentage of people who work in agriculture dropped by 18 percent worldwide.[15]

Only one in four farmers is a beginning farmer with less than ten years of experience, for which the average age is still high at forty-six.[16] New farms, like ours, tend to be smaller than average in acreage and in production value. George Giroux, the farmer who owns the first solar site we grazed and who sells us our winter supply of hay, frequently laments, "I just wish we could get more young people in farming." I can't blame him. But for a young person, getting into the farming business is anything but attractive. The same factors that are making it

impossible for young Americans to own their own homes are also driving them out of farming. Land is too expensive, and there's not nearly enough of it to go around.

A Solution for New and Underrepresented Farmers: Model 1.5

Short of taking on a second or third job or selling off the entire farm and abandoning a generational treasure trove, renewable energy contracts are a way to help farmers make ends meet. By farming the developer's land, newer farmers can bring home a nice-sized paycheck without having to break their backs in the milking parlor.

Agri-energy has been revolutionary for me and Josh as we begin our career, providing us with access to land that we wouldn't ordinarily have. And we aren't the only ones.

During a phone call in the spring of 2024, Byron Kominek of Jack's Solar Garden told me that while agriculture has an inherent issue of diversity, equity, and inclusion, agri-energy has the potential to help smooth out some of those rough edges, opening doors to folks who have traditionally been unrepresented or underrepresented in the agriculture community. One of the biggest barriers for beginning farmers is accessing land, something that's true for any first-generation farmer, but it is especially problematic for farmers who belong to minority or immigrant communities.

Around 1910, ownership of farmland by Black farmers peaked at around sixteen million to nineteen million acres. It has since dropped to fewer than three million acres today, with Black farmers representing just over 1 percent of all American farmers.[17]

There are many reasons for this low figure. One is the issue of heirs' property, which occurs when a landowner dies without any estate planning to transfer the land to someone else after their death. The first generation of Black landowners did not have equitable access to the legal system. Without proper estate planning, the land continues to change

hands as the years go on, but with only the original landowner's name on the deed and no clear documentation of who should get what. Proving ownership becomes difficult and expensive, and often, the land is lost.

Although this example is specific to the Black community, land access is problematic for many minority or underrepresented groups. Allowing aspiring farmers—perhaps ones who don't even have access to their own land to build a home on, let alone run livestock or grow crops—to farm on leased solar or wind land could be revolutionary, a historic move that could very well give US agriculture a more diverse (and much needed) facelift.

When we talk about the challenges faced by farmers, one of the most substantial is land access. Tied to that is the security that comes with knowing you have access to a plot of land to farm for the long haul. Agri-energy offers security, and that, in many ways, is more valuable than just money.

Diversification of products and services plays a big role, but having a reliable tract of land to farm on does, too. It's not just about finding ways to do more; rather, it's about being able to sleep at night knowing that you will be able to continue doing it because the land is being leased for several decades and you've been given the ability to farm it. Even as a first-generation farmer. Even as an immigrant.

That's true both of farmers who are engaging in agri-energy on land that is not theirs as well as those who are farming on their own land. David Specca, a researcher at Rutgers University, told me over Zoom that with agri-energy, farmers leasing their land to solar can make "more money than they can ever make by just farming." And that's something we never truly thought was possible—until now.

The Dollars and Cents of It: Model 1 and Model 3

We're not just talking about large farms, either. The more property a farmer has, and the better the location, the more turbines or panels

can be installed. But, as mentioned earlier, wind farms can bring in anywhere from $8,000 to $80,000 per year for the farmer,[18] not a small sum by any means. Individually, wind leases can be paid in a variety of ways: a flat fee from $4,000 to $10,000 per turbine, a payment of 2 to 4 percent of gross revenue, or a set dollar amount based on megawatt of capacity.[19] The larger the turbine—and the more turbines there are—the larger the payments. A wind project needs roughly sixty acres of land per megawatt, but only about 3 percent is occupied by turbines; the rest is access roads, substations, and most importantly, buffer zones to preserve wind flow.[20]

The same goes for solar. In 2022, solar lease rates averaged $250 to $2,500 per year per acre.[21] The typical site requires ten to twenty acres of solar at a minimum, so farmers often receive lease payments of $40,000 or more. That's reliable, long-term income that farmers can count on—income that's immune to the changing tides of policy changes and fluctuating commodity prices.

It's not just farmers who are getting out of farming and want their land to produce a secondary income that this model can benefit, either. Many farmers are negotiating land leases with solar developers while at the same time having conversations about how they can continue to farm the land themselves.

Tony LaPierre owns Rusty Creek Farm in Champlain, New York. As a longtime leader within the Farm Bureau, he's frequently advocated for the need to secure the future of farms for younger generations, citing challenges like missing safety nets to keep farms solvent and poor pricing systems that make any kind of financial stability an uphill battle.[22]

He first started thinking about putting in a solar farm on his own land several years ago, telling me over the phone, "We needed a way to diversify and bring in revenue with assets we already had."

For farmers, the biggest asset is often land, but figuring out exactly how to make the most of it can be a tough decision.

(continued...)