Fellow Connoisseurs of Food Raised in Sunshine, April 9, 2021

Even though my graphics above may be worth the proverbial *thousand words*, this spring newsletter will need to devote a thousand more to accurately express the gravity of the processing situation. We've reached a point in which we must decide to either completely reinvent the potential of our farm - or quit. Reinvention isn't the end of the world, aside from the notable caveat being the inability to feed nearly as many people - hardly what any of us would consider to be "progress" for Farm-to-Fork agriculture. This is a seismic upset, quite literally stopping all forward progress in it's tracks. Long term readers will recognize that for several years this topic has appeared on our radar screen as a distant squadron of B52 Bombers. They have arrived. The bombs have been dropped.

In the pages that follow, I'll provide the usual overview looking back into the previous season. Of course, we have to talk about the weather as this influences every aspect of our existence in the most unscripted and chaotic way. Along this vein, we've tweaked the Pastured Chicken timing yet again, feeling as though our previous adaptations are nothing more than throwing darts at a moving target. I'll talk a bit about the effects of Covid. I have a section on the rapidly changing demographics of Farm-to-Fork supporters. (Teaser: If the butcher situation wasn't the current antagonist, this one's hot on it's heels.) You'll find some discussion on the "sweet spot" integral to a smaller scale diversified farm such as ours. (Another spoiler: We're no longer in it.) You may also notice a disproportionate amount of material directed at the increasing trend towards Veganism. Some may say "Wow, imagine that... A farm that raises meat is taking a jab at Vegans capturing market share". I'm certain it would be folly to try to convince that market share is not my concern (but I'll say it anyways...it's not). What concerns me is that the *celebrityesque* en vogue popularity of Veganism is earning it's market share under the false pretense of environmentalism. In reality (aka - the farm field), nothing could be farther from the truth. To that end, I will only remind everyone as to the birth of this farm: Our farm's foundation is laid upon the rock of sustainable energy and the profoundly systemic implications inherent to our society's unending dependence upon finite, carbon-dense energy. It was easy to recognize decades ago that Biological Farming was a means to this end. I believe this even more so today. Along these lines, for those interested in the mechanics of how we've operated this farm since our inception on Solar, Wind and Geothermal energy, I've provided a section providing an update in respect to how we use all the energy we produce right here on the farm. So without further adieu... Let's push the Start button and let the inherent spontaneity of farming begin!

How has Covid Effected the Farm?

Whereas the early Covid-induced meat panic did indeed increase demand for our products (as well as every other local farm offering meat and eggs), the benefit to our farm was limited exclusively to selling out early. Because of the lengthy growing times inherent to raising livestock as we do, and coupling this with the reality that all of 2020's butcher shops were already fully booked a year prior, we had no means to increase our offerings to meet meat demand. (Sorry, couldn't resist the word play.)

Early June Chickens vs ?????

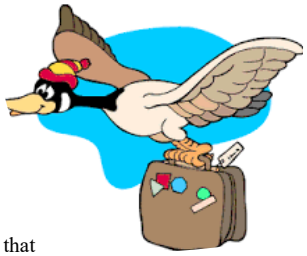
This larger group of pastured chickens was originally slated as our exclusive offering for the season. Whereas we did ultimately succeed in overcoming the obstacles Mother Nature put forth, we arrived at the finish line a full pound under expectations. That single pound per bird represents the incentive for the work put forth. We still provided a lot of people with amazing chicken - just less weight than expected. Aside from additional muscle use required when processing heavier birds, it takes the same amount of time and labor to process a lighter bird as a heavy. This lackluster performance was induced by the extended periods of cold and wet weather of April and May coupled with persistent east winds. Yes, the air off the cold waters of Lake Michigan does indeed reach this far inland. As you may recall me reporting in the past, the animal husbandry efforts and feed put forth during spells of unfavorable weather all too often are redirected towards stoking the metabolic fire rather than building muscle. The labor hours necessary for keeping the birds high and dry as well as protected from the wind was substantial. We expect to have to deal with this for a week or two, not a month or two. Just goes to show that the old saying *madder than a wet hen*, applies to the farmer as well as the hen! You may notice we have moved the June 2021 offering out two weeks. We will once again, offer an additional smaller group of Pastured Chicken in August as this time period proved to be successful in providing nice heavy birds. Though a stroke of luck, we didn't have extremely high temps in August of 2020. If we find ourselves looking at an extended forecast of hot and humid this August, we may need to make calls to prepare for processing a week early. Weather such as this is challenging for mature meat birds on pasture.

Mid Summer Drought

Agreed that drought is too strong a word but it get's the point across. It wasn't terrible, however some higher glacial areas were dry and hot enough to brown out. In all areas, both of our cattle herds ultimately outran our grazing flywheel. This means that once the existing rotation was complete, the next rotation was not ready. I robbed Peter to pay Paul, diverting hay ground to grazing. Ultimately, this mini-drought cost us 25% of our winter hay needs forcing me to buy hay. Here to, much like the penalty associated with processing light chickens, when droughty conditions persist on hay fields, the labor and equipment costs are the same for a sparse cutting as heavy. All the equipment prep, cutting, tedding and raking take the same amount of time. It is only the baling that takes slightly longer when conditions are good. Costs per bale run quite high in droughty conditions. As I have now been making all the hay myself for several years, my risk factor (time before rain) has increased quite a bit. In the past, one of our kids would be tedding or raking while I either finished cutting or switched implements The sunshine window being tenuous, I had recently invested in a nice used double twin Vermeer rake, allowing me to cut those raking hours in half. Quite often, having an additional hour or two on a summer evening makes the difference between success and rained-on hay. Additionally, I had invested in a used wrapper. As over 50% of seasonal yield is derived from first cutting and that first cutting occurs in early summer when the sunshine window is minimal, having the ability to wrap high moisture hay can save an entire crop. Turns out to have been a rewarding investment. A rogue rainstorm shortened my drying window, disallowing the ability to make "dry hay". Without the new tool, our entire first crop would have been rained on. Eliminating the extra day of drying *saved the day*. Wrapped, fermented hay ensiled (fermented) perfectly. Cattle absolutely loved it. But... then I got a bit greedy, deciding I would wrap some dry hay (not high moisture) just to avoid the outdoor storage losses. I'd read the forums in which some guys warned against this due to internal condensation creating a slimy outer layer. Yet my intuition spinkled with a touch of arrogance combined to say, naw...that won't happen to me... must be a regional problem, I reasoned. Well, this past winter, I became quite skilled at removing that slimy outer layer.

I'm reminded of this old Will Rogers quote... *There are three kinds of men: ones that learn by reading, few who learn by observation, and the rest of them have to pee on the electric fence and find out for themselves.*

Demographics of Farm-to-Fork (FTF)



Were it not for the processing shortage which we are now in the midst, the concern regarding the rapid attrition of our most loyal customer base had been front-and-center on my radar. Simply put: An uncanny number of our most ardent supporters have moved out of the area. Baby Boomers comprise the largest segment supporting FTF. Indeed, this is the group largely responsible for creating the symbiosis between consumers and farmers. It stands to reason that many of these folks have reached retirement age with a large number of empty-nesters either moving away or now disinterested in the inconvenience associated with FTF. Fortunately there are still quite a few long term supporters in the post-Baby Boom age group in which the kids are still at home so interest remains high with these folks. With just a few exceptions, we are finding it very difficult to find Millennial's to make up for the loss of the retiring Boomers. This may already be a moot point, considering that the processing situation has us in a choke hold. However, if we see our way through this processing problem, we will quickly find ourselves up against this next high hurdle.

I haven't done a great deal of research but I don't think cost is the primarily impediment, but rather, inconvenience. Perhaps the trip to the farm will need to become something more than simply picking up food. I'm a bit worried it may evolve into the need to create a destination event. I've never been a fan of agri-toursim. I do certainly recognize there's money to be made as many farms are now highly successful selling pumpkins, hay rides, corn mazes and the likes. It just seems that a farm should be able to earn a median income focused exclusively on producing and marketing one of the most critical aspects of life - food. We'll cross that bridge when we get there.

Custom Meat Processing

Before proceeding any further, please first jump ahead to read the full page flyer titled *For What its Worth,* found in the pages that follow.

Because of the processing shortage, our 2021 potential has been halved. Without rapid change beyond 2021, our family business is in trouble. The most disturbing aspect is revealed when we recognize that the overall regional custom processing capacity has not suffered any retirements or catastrophes for almost 20 years. In other words, only a few years ago, ample capacity was available for a working farm to expand it's offerings. In fact, in 2012 we spent a quarter million on new land plus six months labor building beautiful rotational grazing infrastructure as a means of solidifying our farm's viability into the decades that follow.

There are few, if any new farm additions to the FTF market which would be inducing this new demand on processors. By this I mean "working farms". A working farm isn't operated by an individual who makes their primary income in town. A working farm is a job creator with intent to earn primary family income directly from the farm. So if processing supply had remained steady with ample room for professional farmers to expand, who are the people who have now inundated the supply chain? The short answer is to simply describe these people as hobbyists and homesteaders. There's no shortage of landowners, be it retired farmers or hobbyists, who have adequate land and facilities to raise a few animals for themselves and a few friends.

The most painful aspect of this entire scenario lies with the simple reality that, for decades, our farm had been a valued partner with several butcher shops. Most were happy to receive large quantities of animals integral to one appointment. In effect, a working farm was akin to performing as an Outside Sales marketing rep for the butcher. The butcher found one customer- the farmer - who in turn brought 100 customers into the butcher's store. The amount of money our farm has driven into the butchers we have worked with is substantial.

So why then have butchers not maintained a protocol of rewarding this loyalty based on seniority? I do this with our farm's most loyal supporters. I can't even imagine not operating this way. In the same breath, I have to admit that it costs me more money (time) to administer to select individuals as opposed to simply accepting orders as they arrive.

I do know this process is not pain-free for the butchers. They're telling me they simply don't know what to do other than split and limit the available capacity evenly amongst all participants. But in this scenario, *every* participant is hobbled.

As self-centered as the following may sound, I ask myself about the impact of this *evenly* distributed loss upon all the applicants. When a hobby farmer loses the ability to have their few cattle and hogs processed, they lose their hobby but still have a job. In a purely financial analysis, a hobby farm which stops raising their own meat will actually save money as compared to purchasing at the supermarket, especially when considering current processing costs. Conversely, when a working farm loses the ability to process their livestock, the farm family, and our local society, loses a self-created job which had previously been both a bread-winner and local stimulus.

Annual expenses necessary for operating this farm equate to $150,000 to $200,000 annually, all of it spent locally - and all of it now at extreme risk of dissipating. Let's not move past the significance of agriculture too quickly. We, as a society, are capable of producing foundational "wealth" by only two means: Agriculture and Mining. Both require raw earth materials to be reconfigured into the multitudes of products essential to our society coupled with the services inherent to these products. Agriculture produces food and fiber. Within the hierarchy of life's essential needs, having food in our bellies and clothes on our backs is prerequisite to digging in the earth for minerals.

Farms such as ours are producing essential food from the energy derived from sunlight, water and soil. The expenses incurred within this endeavor are induced as income for many small, local businesses - who in turn spend within other local businesses. Above any other form of agriculture, Farm-to-Fork operations maintain the highest percentage of the food dollar locally. What is the comparable effect when a hobbyist is shuttered? The money spent on bagged feed from the Big Box stores leaves the region regardless. Any sales performed are either bartered between family and friends or under-the-table. Meanwhile working farms pay taxes while building community.

Yet there are other more subtle forces that may be putting a finger on the scale. It is becoming increasingly evident that what's efficient for the farm may not be what's actually desired by the butcher. As butchers now enjoy the comfort associated with a two year backlog of locked-in appointments, they can call all the shots. Who wouldn't? Why drudge through aspects which have long been known to add frustration if they can now simply eliminate the irritation without concern for the customer's response. If the customer doesn't like it, there's plenty more customers to take their spot. As a result, the trend is now to severely limit the quantity that can be brought in for one appointment. Whereas our farm used to easily schedule 8-12 beef or 20-25 hogs for a single transport to the butcher, now we are being limited to 4 beef and if lucky, 10 hogs. It's important to know that these reservations are being made over a year in advance. Equally important to know is that, even though there is room for a full load on the day requested, the butcher maintains the limit, insisting on the farmer bringing in another small load the following week (if appointments are even available). Butchers prefer small pulses of animals from a variety of suppliers. This works better for them, yet now with indifference to the extreme inefficiency this imposes on the farmer. Recognize that not only does the hobbyist already intend to bring in small numbers (which match the desires of the butcher), the hobbyist does not account for the time required to set-up, sort, load and transport animals to the butcher. It's not "labor". Like any hobby, it's just how they desire to spend their spare time when they're not earning a living elsewhere.

The "Organic" Factor Putting ourselves in the butcher's position, if we have a two year backlog and can afford to let some customers go, we're going to cut away the most expensive customers. Because we (you and I) are organic-minded, we read labels and ask a lot of questions. The questions we ask are likely to double the phone time at the butcher. Whereas it hasn't been stated explicitly, I worry that this is already being applied. In all cases, regardless of butcher, I'm inquiring well over a year in advance so I know I'm not late to the party. The new butcher format is to withhold all ability to provide appointments until a specified date. For example, Hansen's would not accept reservations for the back half of 2021 until January 4th 2021. As I suspected in-person would be priority over phone calls, I set a 3 am alarm to camp-out in Hansen's parking lot. I was #9. The list went well beyond 100 with literal gridlock in the parking lot and scores of cars parked along the road. How insane that this has evolved to the equivalent of Black Friday at Best Buy. We already had the full compliment of livestock on our farm by early November (because that's when calves get weaned off the cows) yet we were already trapped feeding animals which we may very well not receive enough appointments to process. If I have to sell grassfed calves to the auction barn in spring into this cornfed world, I will lose my shirt. Yet even though I was an early bird, what I was allowed was a fraction of what I needed. In comparing notes with others in line, it turns out Hansen's was actually generous with me. Yet again, most of the people in this comparison were hobbyists.

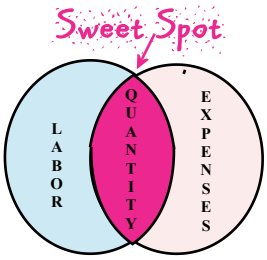
But then one more bomb was dropped. I was told Hansen's would cease accepting any cattle lighter than 900 lbs, effective immediately. A good percentage of our fall animals are at or slightly below this threshold. Grassfed at these latitudes is difficult to obtain heavier weights without feeding through a second winter (the animals we refer to as July beef).

The Only Reason 2021 isn't a Bust

Some of you may recall that the DATCP reversed a ruling last year, now allowing on-farm processing of cattle and hogs. This came out of thin air, not legislative, with the DATCP claiming it was all a misunderstanding. They didn't even tell anybody when their decision was made, just leaving it to chance until someone inquired. This decision has in effect, created limited additional capacity. The process is not wide open for all sales. There are rules and documentation required. Only to be used for assignments registered to specific customers prior to the butcher date. All cutting, wrapping and specialty work continues to be done back at the shop. It's not a free-for-all by any means. The on-farm fee is also quite high. Our location happens to be on the fringe.

Additionally, many of you may have noticed how expensive the boxing fees have become. Remember that because Detjens is too far away for most of our customers, we bring all these orders back to the farm in our freezer trailer. Detjens bills us a bulk rate for the boxes plus their labor. Even at $5/Qtr beef and $5/half pork, we cannot begin to recoup this expense plus our expense of putting a truck and heavy trailer on the road for 3.5 hours with three people working. Please also know that this process in which Detjens boxes and stages an entire week's work in their freezers is very cumbersome for them. They are nice enough to open up early for us to begin loading 40 quarters of beef and 50 halves of pork into our trailer. This requires six people to handle these heavy boxes, stacking and recording locations, then securing the load for the trip home. (Recall that we cannot find an insurance company which will insure this load.)

The Sweet Spot and Economies of Scale



Whereas expenses such as feed and bedding are commensurate to the number of animals on the farm, unfortunately, labor and overhead are not. With relatively minor exceptions, the labor hours required to move 100 beef are the same as 10. Ditto for the daily labor comparing 100 hogs to 10 hogs or 500 layers to 50 layers. Pastured meat chickens are the exception as they do not behave as a united flock or herd, as do layers, pigs and cattle.

Internal to this correlation of labor hours vs livestock quantity exists the sweet spot. Unlike conventional ag's sweet spot, the paradigm in which we operate within and promote to our supporters, has limits. A leisurely drive over to the closest egg-laying CAFO east of Whitewater will provide all the visual imagination necessary. On just a few acres, that CAFO houses over a million hens, maximizing three dimensional space within the confines of a large building.

If we changed our paradigm to maximize economies of scale with indifference to all potential collateral concerns, our land could easily support that capacity. Instead, the attributes for our farm are designed to correlate the carrying capacity of our soils and the forage grown upon those soils to a quantity of livestock which will not only sustain, but regenerate that capacity. We don't selfishly become hyper-focused on the highest potential yield of our pastures without factoring the peripheral effects on ground water, runoff to adjacent waterways or carbon emissions to atmosphere. With this in mind, we find our sweet spot. Functioning within our sweet spot, our daily labor hours are maximized against this critical optimization. After the third year integrating our new land investment into our farm, we were optimized with a regenerative carrying capacity of 65 beef, 120 hogs and lots of chickens. For 2021, we were only able to obtain processing appointments for 32 beef and 60 hogs. 2022 is looking likely to provide even fewer processing appointments. Main labor takeaway: Our labor hours will be almost identical raising half as many animals. As a result of the processing shortage, our hourly wage has been halved.

Indirect Labor Even more so than direct labor attributed to daily chores, indirect labor costs are optimized when spread across more animals. Indirect labor includes tasks such as: repairs; handling feed, bedding, manure and compost; seasonal prep; marketing; management; accounting.

Indirect Expenses These expenses include: truck expenses; old and new capital depreciation; fuel; insurance; interest; maintenance; seeds; supplies; farmland taxes; utilities; hired labor. Transcending all other aforementioned economies of scale, these expenses are almost completely indifferent to the quantity of livestock.

Our current ratio of legacy indirect expenses now correlated to existing animal quantities reflects our previous ramp-up expenses as we optimized the new land purchase. Land cost aside (land not being depreciable), these legacy costs include 1.25 miles of woven wire fence, several miles of double strand high tensile, 400 t-posts, 100 wood posts, numerous gates, a complete cattle handling facility with head hate and a porta-hut. Additionally, several pieces of used equipment were added (twin rake, wrapper, spreader) to facilitate the impact associated with the additional land base. These legacy costs are now a heavy burden as we are now forced to operate at half capacity.

I hope this irony is not lost. Many influential pundits of agriculture have implored farms to get big or get out. Internal to the direct-market paradigm our farm has been operating, our previous high point would be considered on the larger side. Yet here we are, now being forced into inefficiency.

Biocyclic Vegan Agriculture

How does the Natural World Work?

If you've read my intro and already looked ahead at the attached *Beyond the Impossible* flyer, you will recognize I'm putting a spotlight on the Vegan-Chic movement's self-proclaimed accolades of environmentalism and compassion. I would venture a guess that 999 out of 1000 practicing Vegans believe these virtues are earned the moment their vegetables and Impossible Burgers are tossed into their shopping carts. This situation personifies the old adage recognizing ignorance as bliss. I'll let my flyer do that talking, summarizing only to say that the ramifications of this ever-increasing Vegan belief system not only perpetuates, but accelerates environmental degradation.

I'm taking this moment to recognize the one Vegan in 1000 that has taken a serious look beyond their shopping cart, following their food supply all the way back to the farm...or what they hoped would look like the farm of their ideals. As anyone willing to take this journey will learn, this path leads to a fork in the road to which both must be explored. It is inevitable to learn that one path leads to a paradigm dependent upon fossil fuels and chemicals, the other dependent upon animal-based fertility.

But might there be a third path where food can be grown organically yet without requiring animal fertility? Biocyclic Vegan Agriculture is attempting to fill this void. Primary means of fertility is provided through the interseeding of nitrogen-fixing plants with the desired grain product (cover cropping). No animal manures or chemicals used.

Regardless of one's opinions on animal vs a plant-based diet, these farmers are demonstrating a sincere recognition of the disillusion inherent within the current faddish trend towards Veganism. In respect to the virtue of compassion, by renouncing the use of herbicides and pesticides, all life forms within each farm's ecosystem are given reprieve from the wholesale death delivered by these chemicals.

So where's the rub? It depends upon the ultimate objective. In the eyes of the most astute Vegan consumers, these methods check all the boxes. What needs to be recognized is that this solution is centered around one immovable primary belief: Food must be raised with zero animal interaction. All other concerns are secondary. Biocyclic Vegan Ag is built exclusively upon attributes which support their belief with zealous indifference to collateral damages or benefits.

Living amidst the implications of anthropomorphic climate change, our united core belief must be centered upon soil carbon and all properties of soil which allow all organisms to perform their critical tasks, many of which are detrimental, not just to the end goal, but managing through the interim. (Think: water holding capacity; soil erosion; nonpoint source pollution; groundwater contamination; resource depletion.)

As I listened to the passion of some of the Vegan Ag advocates on YouTube, I found myself in agreement with most of their core values. Yet I cringed when I heard others. One advocate states "there's no magic ingredient in manure" (in context of nitrogen/carbon). Yet if we are willing to open our eyes outside of a preordained belief system, we will instantly recognize the multitudes of essential soil organisms dependent upon animal wastes. Vegan ag also implores a farmer to "mimic nature". Yet clearly, we live on a planet which has literally evolved itself to it's present form amidst a predominant predator-prey paradigm. It's a dog-eat-dog world, both above ground and below. Those bacteria fixing microbe friends of Vegan Ag live and die in a non-Vegan world. Plants themselves are not Vegan. Every plant to have ever lived upon this planet can trace it's lineage to an animal diet. In fact, plants are feeding animals for the expressed purpose of consuming their essential waste products. Plants are indeed *farming* livestock.

The evidence is all around us. The honest Robin, calling in the new day with beautiful morning song, doesn't eat plants. Robins manure the ground while killing and consuming worms, these worms having only moments earlier been community participants managing animal fertilized soils.

Another aspect in a video sheds light on the Native American use of the Three Sisters to grow food (corn, beans, squash), leveraging (spinning) the use of beans (a legume) as THE source of fertility. Like any belief, the maker of this video only saw what they believed, disregarding the rest. They ignored the reality that not only were the native peoples predominantly not Vegan, but the irrefutable reality that for eons of time, livestock roamed the very lands these Three Sisters were planted upon.

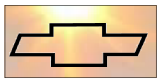
Additionally it must be recognized, that the contemporary success of existing Vegan Ag farms are most certainly still tethered to legacy fertility - this legacy previously induced by ages of animal interaction. Fortunately for humanity, it often takes time to severely damage soils. Conventional ag has been using a corn/soybean rotation for several generations, aiming for the same nitrogen fixing boost as Vegan Ag. Each successive season moved them closer to petro-carbon dependency. I realize this is not entirely apples to apples. Never the less, it's old news, being greatly out of step with the needs of a society running out of time in the race to sequester carbon. Alan Savory has demonstrated how to accomplish this task. Elaine Ingham has the knowledge and experiences to educate us as to how soil organisms are accomplishing this task. Listen to John Kempt's Regenerative Agriculture podcast or read Gary Zimmer's books. Like any research determined to find truth, these scientists didn't draw their conclusions by winnowing their findings to coincide with an immovable belief system. Their research determines their conclusions.

We can raise animals without being cruel. Ruminants will be paramount. We'll soon need to reset the economics of raising monogastrics (poultry and hogs) such that we allow them to glean more from perennial landscapes. We have to minimize disturbing the soil. Ruminants are the initial keystone species. As our current explosion of humanity continues to plant houses where food used to grow, ruminants can occupy land which no tractor could ever cultivate. Perennial forages will take deep root. Compassion and environment will follow.

Annual Agriculture vs Perennial Agriculture

Please do not allow the far-reaching environmental and economic implications of the word *perennial* to go unnoticed. We are on the brink of a food system in which the primary energy inputs will be almost exclusively biological. Less dependence upon annual seed. Less dependence on machinery. Zero dependence upon petro-fertility and chemical control of weeds and pests. Food production will be decentralized. Recognizing the winners and losers integral to this great disruption provides the knowledge necessary to turn in the appropriate direction to face the powerful vested interests. The future is knocking now, if only we would open the door.

Solar-Powered Chevy's - Energy on the Farm Update



I believe most readers already know our farm and home have been powered by farm-produced energy since our inception in the 90's. But I've made quite a few changes and there's never been a better need to end a newsletter on a *sunnier* note!

Here's a list showing the growth of the *non-biological* solar components utilized to power our home and assist with the growth of your food.

Year	Type	KW	Kwh/Day Max	Description
1992	PV/Battery	1.6	--	64 Arco Quad Lams- (Decommissioned Carrizo Project). Replaced with SolarWorld noted below.
2000	Wind/Battery	1.0	14	Whisper 1000 microturbine.
2010	PV/Grid Tie	8.2	55	40 Evergreen 205. Sunnyboy 7000 grid-tie.
2014	PV/Battery	1.5	10	6 SolarWorld 255 feeding 24v battery system.
2016	PV/Battery	2.0	13	6 SolarWorld 325 feeding 24v battery system.
2016	PV/Direct	.65	4	2 SolarWorld 325 DC-direct H2O pumping. New land.
			96 Kwhrs	**< Max Daily Energy Production**

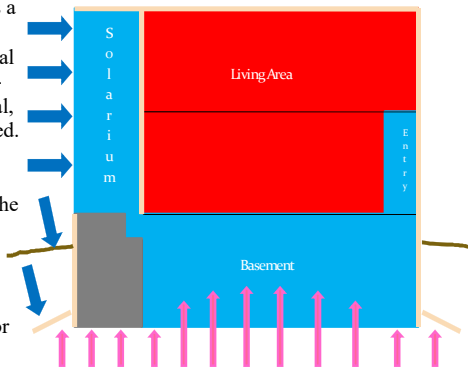
Energy Storage All of the battery-based energy is stored within repurposed Chevy Volt batteries purchased from salvage yards. The capacity of this current lithium battery bank is 40 kWh, the equivalent of the energy stored in 2.5 Chevy Volts. (We have 3 battery packs, utilizing half of a pack in our farm's utility vehicle.)

Energy Use PV/Wind displaces coal for all home and farm electrical needs. PV displaces gasoline for 90% of transportation needs.*

*The 8.2 kW grid-tie array provides all the power for two electric vehicles plus a credit each month for unused energy. One EV is a Chevy Volt. We are able to drive this as a fully electric vehicle within it's electric range of roughly 50 miles. When a trip occasionally exceeds 50 miles, the car automatically switches to gas. The other EV is a Chevy Bolt with a 250 mile range. We can use this vehicle for trips exceeding the Volt's electric capacity. As a result, we rarely buy gasoline. The solar energy that propels our daily transportation is regenerated every day on our farm.

Heating Our home was designed in the mid 90's to standards that resemble today's Passive House. Our design is a hybrid. A substantial level of passive solar was integrated into what used to be known as an Earth-Buffered design.

Here's the basics: Home envelope (living area) is superinsulated. This is accomplished utilizing a combination of wall thickness plus additional external insulation. The vapor barrier is seamless, top to bottom with extreme care at all infiltration points, especially the mud still and story joints. Mud sill plate extends beyond foundation allowing layered exterior insulation seams to be staggered, mitigating infiltration and thermal joint gaps. Zero penetrations were allowed in the vapor barrier. To accomplish this, horizontal battens were installed over the vapor barrier. This creates the space needed for all electrical, plumbing and ducting without cutting the vapor barrier. This 1.5" air space also adds to the wall's R value. The foundation walls are superinsulated down to the footing. A 3' "kicker" of insulation extends outwards away from the wall just above the footing. The basement floor is not insulated. This combination allows deep geothermal heat to be captured and funneled into the basement, which is in turn connected to the solarium. The solarium and basement are the buffer zones. They buffer the temperature between the outdoors and the sealed envelope of the living quarters. At night, this buffer area continues to be fed 55 degree geothermal heat. Main take-away of this design is to recognize that, if it's zero degrees outside and we want the interior heated to 72 degrees, a conventional design will require a level of fuel necessary to achieve a 72 degree increase in temperature. A design buffered with 55 degree geothermal heat requires a heating differential of just 17 degrees (72-55). When the differential becomes this small and the infiltration losses minimized, conventional, brute-force furnaces are not required. On sunny days, over 800,000 btu's of heat is captured in the solarium. Typical cloudy days still increase the temperature in the solarium. What isn't used directly is stored in thermal mass allowing us to live without a furnace, utilizing a modest soapstone wood stove as backup for extended extremes.



One hidden gem to this design lies with the reality that, if left completely unattended through extremes of extended clouds or sub zero weather, the interior of the house will never come close to freezing. In fact, rarely would the temperature drop more than a few degrees below the geothermal temperatures of 50 - 55 degrees.

No furnace. Conventional farmhouse architecture. No indoor air concerns. Designed to allow sufficient natural daylighting throughout almost every room in the house, effectively preserving daytime energy production for nighttime use. Ground rules for living were always based on efficiency and conservation. One person, one light. Shut it off when you're done. Normal everyday electronics. No whale oil lamps in the bedrooms. No, we're not Amish. Yes we have a tv and computers. The only real giveaway has been the digital readout in the kitchen displaying the voltage, amps and amphour condition of the energy system.

But like everything in life, time gradually takes it's toll. At 15-20 years, the inert gas used in high performance windows was most likely gone and the general expansion and contraction of 15 Wisconsin winters had created a bit more loss. We have insulating curtains over most windows so the effects were minimized. Not being interested in burning additional wood to compensate for the loss and recognizing the rapid decline in photovoltaic prices, I began our venture into radiant floor heat utilizing PV as the energy source. This started out utilizing a standard 50 gallon electric water heater coupled to multizone underfloor pex loops. Very easy using off the shelf generic technology. Only difference from the millions of existing radiant floor heating systems is the fuel source (the sun). I have since modified the original design to include a hybrid heat pump water heater. I now have several options for managing solar supply for different times of the day or night. I can operate them individually, in series or in parallel. In effect, these water heaters serve as dump loads for all the excess energy produced by the two arrays which can be seen on our north fence line. The wind genny is also pushing electrons into this same system.

A few words on hybrid heat pump water heaters.
Most notably for our self-produced energy application, we can now easily produce hot water even on cloudy days. Break it down and you have a conventional electric water heater with a 4200 btu air conditioner mounted on top. Unlike a conventional air conditioner which extracts interior heat and dumps it outside, this A/C unit dumps the heat though the coil which is wrapped around the exterior of the lower tank, where this heat is conducted into the water. Yes, it does take longer to heat the tank compared to using standard elements. But most people use hot water at a specific time, afterwards which the unit sits idle for much of the day- so what's the rush? If you are in a rush, simply push a button on your phone app or the display on the unit itself. You can operate the unit in your choice of modes ranging from heat pump only to a combination or strictly electric. It's just like a Chevy Volt. Operate it any way you want. Heat pump mode draws just 400 watts whereas if you choose the conventional element, it will draw 4500 watts. In a scenario in which the 4500 watt element will achieve recovery in 25 minutes, heat pump mode will require one hour. Heat pump mode will have used .4 kWh whereas the 4500 watt element will have used 1.8 kWh - over 4x the energy. So...are you really in that much of a hurry for more hot water...or maybe you could just change your habits a bit to save some *green* - both in your wallet and the environment.

How much CO2 can be mitigated by one home? This home, using solar electricity and heat since 1996, has avoided the burning of 11,500 therms of natural gas and 160,000 lbs of coal, effectively avoiding 400,000 lbs of CO2 from entering our atmosphere. Our farm's reliance on biologically-derived fertility and the metabolic energy of livestock to harvest much of their own feed not only circumvents the egregious environmental liabilities inherent to Haber-Bosch, but more crucially, sequesters substantial amounts of carbon by locking this carbon within our soil's organic matter.

These statistics have not been put to paper to toot our own horn, but rather, to stir the imagination as to the potential compounding effects of wide-spread social change.

You know what it means if we all keep doing the same thing yet continue to expect different results? (I'm not going to say it as it's rude...but I will let you fill in the blank if you so choose!). Wouldn't it mean we're acting a bit _____?

Shavings from the Home Front

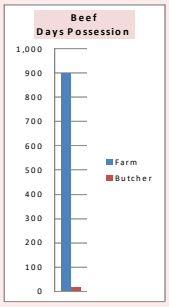
Since the last newsletter there have been two new additions to the family! Sheri had a baby girl in August. Richie balanced things out by witnessing a little baby boy enter our world this past January. Sheri's little girl is named Everly. Richie's little boy is named Logan. Playmates for life, no doubt!

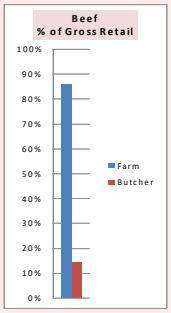
Sarah is graduating from UW Madison Nursing this May, planning on securing employment this summer, remaining in the Madison area. Given the state of the world these days, there should be no shortage of demand for her new skills.

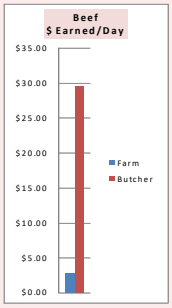
While each one of us has had to adapt to the circumstances, everyone has remained healthy and actively employed throughout the pandemic. As I'm sure is mutual to each and every one of us, we are all looking forward to some normalcy.

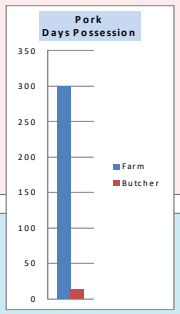
Yet I remind myself that, even before the pandemic, abnormal was already the *new normal*! So what really is considered to be normal anymore? We'll plan on adapting to meet the challenges, one day at a time.

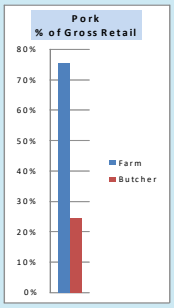
Thank you for all your time spent reading this annual tradition , *Steve*

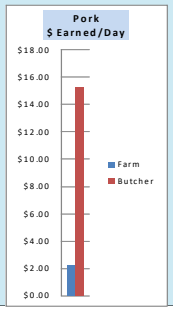












For What It's Worth...

The law of Supply and Demand has induced seismic change upon working family farms having previously held long-term symbiotic business relationships with local butchers. Decades in the making, this diminishing supply of processors has now effectively compromised direct-market farms like a freight train running out of track.

In the bigger picture, this shortage is recognized as a form of industry attrition. Simply put, business owners, having left the market due to retirement or catastrophe, have not passed the baton or invested in new brick and mortar largely because of an inability to realize a reasonable return on investment. In 2020, the further rapid tightening of this noose had several instigators, an increase in part time beef operations, increasing number of homesteaders and the Covid-induced meat panic, to name a few. As a result, all local butchers are booked well over a year in advance.

As to be expected amidst all forms of commerce in high demand, processing costs have risen substantially. In it's own light, it's about time. Perhaps if the market would have allowed these price increases years ago, more aging abattoirs would have been able to realize a return on investment as well as retaining skilled employees with better pay. But please recognize that we live in a country in which consumers are unwilling to spend more than 7% of income on food. The price increase the consumer was begrudgingly willing to accept has been claimed by the processors. Yet again, a disproportionate share of the retail food dollar continues to be partitioned away from the farm and on to processors, distributors and retailers.

As you study the information below, please recognize this message: Yes, the direct-market farm is indeed capturing 86% of beef and 76% of the pork retail food dollar. However, this is highly misleading as these high percentages are comprised upon ***gross*** expenditures compiled over a **lengthy**, high risk growing period of 900 days for beef, 300 days for pork. Processor's costs are primarily labor and overhead, requiring almost zero material inputs. Conversely, a farmer's hours, materials and risks compound over those 900 days (beef). Over 10 tons of forage and bedding must be produced and handled multiple times. Over 20 tons of manure handled to compost and field. All of this plus overhead costs of land, seed, buildings, fencing, insurance, depreciation, etc, will be extracted from that 86%. The trivialness of this 86% is revealed only when we interject overall costs into time of possession. In this light we are able to visualize the extreme disparity expressed as dollars per day.

This begs the question: If the *smarter* money is earned ten times quicker at the processor, why are we not seeing new start-ups building new abattoirs to meet new demand? I can think of a 3 million dollar answer necessitating a labor force willing to work for wages which cannot support a family.

Farmer's Cost to Raise & Market ONE Grassfed Beef Conception to Butcher (900 Days)

Bedding
800 lbs
(20 small squares)
$80

Hay & Forage
10 Tons
(25 Lg Rd Bales)
$1500

Organic
Mineral
$45

Shared Expenses

Indirect Labor Hrs
Beef -9 / Hog -2

Indirect Expenses
(Overhead)
Beef $900 Hog $100

Direct Labor Hrs
Beef - 20 Hog - 3

Critical of Overhead? Please read *Economies of Scale* in 2021 Newsletter.

Bedding
Chips/Old Bales
$15

Organic Forage
250 lbs
$20

Organic
Feed/Mineral Mix
1200 lbs
$325

Farmer's Cost to Raise & Market ONE Hog Conception to Butcher (300 Days)

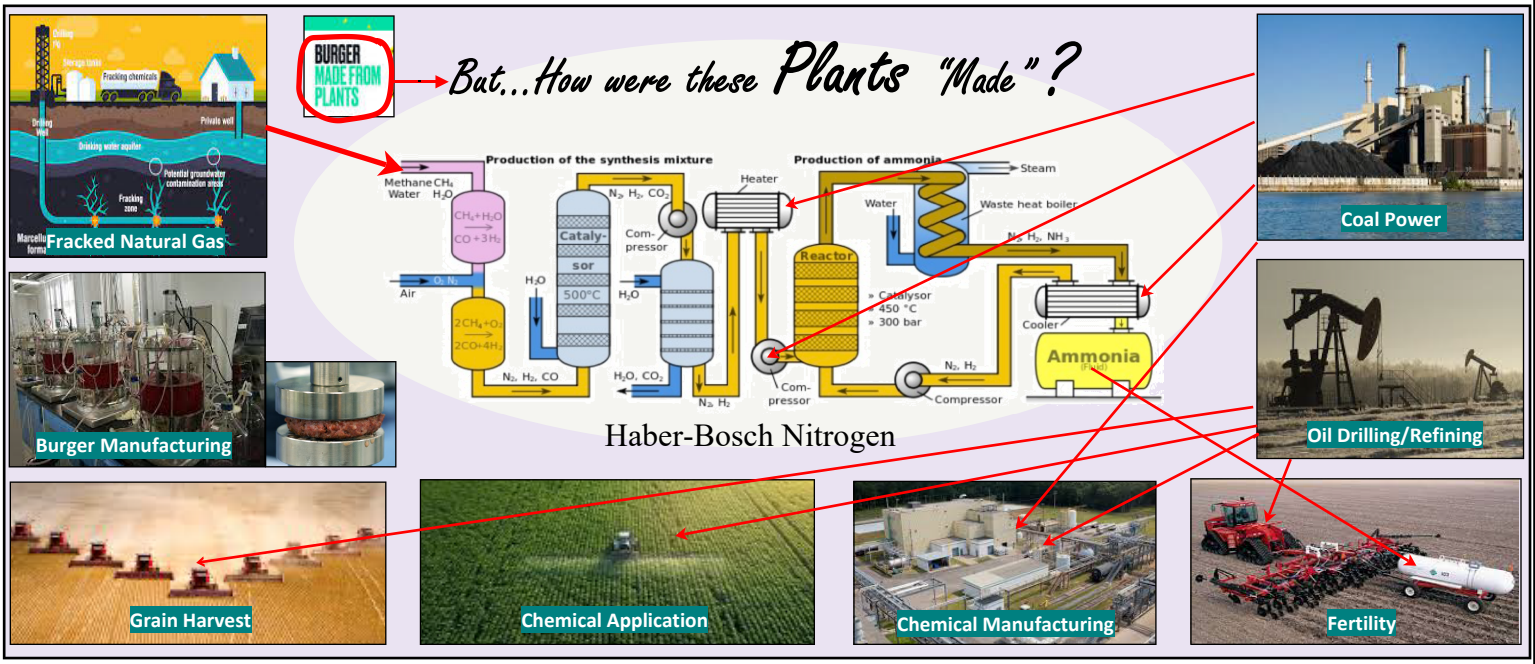
Beyond the Impossible

The Confict Between Environment, Compassion and Plant-Based Burgers

Compassion and Environmentalism are virtues purportedly claimed to be earned the moment an individual chooses a Vegan lifestyle. This introspection is not an indictment against Veganism, but rather, the rationale utilized to justify and promote a Vegan lifestyle. If a Vegan is willing to trace their food back to it's origin, the realities witnessed will demonstrate substantial evidence to the contrary.

Hopefully it is understood that earning the aforementioned virtues will require much more tracing than simply placing plant-based products in ones's shopping cart. Leaving the supermarket, there are two primary paths leading back to the farm. One leads to conventional agriculture, the other to organic. Choose your route. If a Vegan shopper is buying conventional (non-organic) vegetables and grain-based products, every one of those products was grown utilizing herbicides, pesticides, fungicides ("cides" - *to kill*) and in most cases, genetically modified seed. (The Non-GMO label assures even higher levels of chemical applications.) Most critically, the foundational means of conventional fertility is Haber-Bosch, a process made possible through the copious consumption of natural gas and coal. In respect to compassion, why might this be limited exclusively to domesticated animals when exponentially more animals - entire ecosystems over millions of acres - are exterminated with conventional methods? Whereas the decision to buy organic does remove the culpability associated with fossil fuel-based fertility and the ubiquitous dispersion of chemicals into the environment, organic fertility is sustained utilizing direct or indirect associations with animal husbandry. A Vegan can indeed be successful in eliminating all animal agriculture if he/she avoids organic foods. However, this decision not only forces a Vegan to accept the human health and environmental consequences of chemically-produced, highly processed foods, but also the environmental, social and geopolitical consequences inherent to the burning and depletion of finite reserves of carbon-dense energy. Short of saving our own human wastes to grow our own food (a decision requiring an astute comprehension of safe composting protocol), our choices of fertility are limited to the foundational decision between petro/chemical agriculture and organic regenerative agriculture. Celebrity endorsements of Veganism doesn't alter this irrefutable reality.

But what about Biocyclic Vegan Agriculture? I'll talk about this more in the newsletter. It's not worthy of this flyer until even 1% of practicing Vegans begin putting their money where their mouth is.



Solar Powered Pasture Carbon Pump

A complex microbial powerhouse exists beneath our feet. Properly treated, these life forms proliferate into a diverse metropolis replete with producers, consumers, builders, sanitation engineers and more. This vibrant mobile society effectively aerates soils through elaborate transportation and HVAC systems. Wastes are converted to nitrogen. Microbes carry fertility to marketplace - the plant's roots - where they barter fertility for photosynthesized sugars - glucose - comprised of carbon, hydrogen and oxygen. Roots grow thicker and deeper. Above ground, dense mobs of livestock graze in short duration rotations. Animal wastes constitute direct deposits into microbial food banks. A multitude of hooves push organic matter within microbial reach. Managed grazing takes half, leaving half to collect sunlight for resilient rebound. Plant roots live and die in proportion to grazing. This is carbon sequestration's magic moment. A single 50% forage cutting, performed, not with diesel, but with metabolic bovine energy, effectively slices off 50% of the roots, whose decay is processed through microbes into carbon, ultimately locked within the soil aggregate. Think of it as Goldilocks Grazing. If we allow the cattle to take too much, the plant and root growth are seasonally stunted. If we don't graze enough, the plant goes to seed, becoming brittle, it's roots stagnate. The Goldilocks moment - taking half - re-stimulates blaze growth, allowing plant/root masses to be reproduced six or more *cuttings* each growing season. The resultant carbon sequestration is commensurate to each rotational cutting. Upon each sunrise, the entire process regenerates.

Aggregate is Greater than the Sum of it's Parts

If it weren't for modern magnification, we'd have to believe in magic! Regenerative farming isn't flashy, doesn't come with a shiny red or green paint job (sorry, just *earth tones*) and doesn't require climbing six steps to reach the cab. Yet here's just the short list of a few important issues that hitch a ride on Regenerative Agriculture's buddy seat, minimal additional effort required:

Non-Point Pollution; Ground Water Quality/Depletion; Rural Renaissance; Climate Change; Resource Depletion; Local Diversification; Farm Preservation; Animal Welfare; Preventative Healthcare; Job Creation; Farmland Utilization; Soil Loss Mitigation; Biodiverse Habitat Restoration; Mass Extinction Remission;

Why are we dragging our feet on this one?
(Hint: Might have something to do with *following the money*.)

Regenerative Agriculture Keywords: Biological Nitrogen Fixation; Soil Carbon Sequestration; Desertification Alan Savory; Elaine Ingham; John Kempf; Ray Archuleta; Gabe Brown; Gary Zimmer.

Published by Steve Heyer Solar Harvest Farm April 2021