



Agriculture: An Historical Productivity Benchmark of Contemporary Necessity

By

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Introduction

Revenue doesn't matter unless it is profitable. Profitability does not matter unless the absolute dollars are in sufficient quantity. Sustainability doesn't matter unless it is scalable. How do we measure these things? First, beware the temptation to substantiate any argument via a single metric. Sophists and obfuscators cunningly wield this abomination. Perhaps we may vector with two metrics: absolute profit and internal rate return. Both are output metrics. Foundational to each is a process metric: productivity. Productivity regards how inputs are transformed into valuable output. The objective of this article is demonstrating by example the epitome of generationally innovative productivity: the American farmer.

American farming made an impression on Alexis de Tocqueville. His 1835 publication of *Democracy in America* viewed farming as egalitarian and liberating by comparison to the hierarchical social rigidity of western Europe from which our early immigrants strove to escape. Farming was a medium through which both subsistence and wealth were possible by the application of muscle and mettle.

*Profits must pass
muster on both size and
internal rate of return.*

Admittedly, my homage to agribusiness is anchored in cultural bias. It is my heritage—and I would not trade the life lessons anchored in those experiences. Farming imbued me with work ethic, responsibility, teamwork, community, values, and resolve. So accultured was my rigor that the transition to college was haunted by the ghost of completed duties before entering the college cafeteria. Indeed, I was conditioned to ask myself whether the prerequisites to my own nourishment had been completed—feeding the livestock and barning them to protect them from the elements and predators.

We worked hard and played hard. Even some forms of play were arguably work—but the hand churned homemade peach ice cream was worth the “sacrifice.” Physical labor gave farm boys at least an initial conditioning advantage with the advent of Fall football practice. Lugging 50-pound hay bales and 100-pound feed sacks was our open-air weight room—and the air was hot and humid. Even so, dairy farmers made the rest of us look like rank amateurs. Dairy cows defy weekends and holidays. They must be milked twice daily irrespective of all other obstacles. Dairy farmers were committed in ways that mere mortals feign to fathom.

The Evolution of an Industry

According to National Geographic, humans began their transition from hunter-gatherers to domesticators of plants and animals about 10,000 years ago. Tools and techniques have continually affected what is grown and how. For example, Steven Johnson’s *How We Got to Now* chronicled our acculturation to frozen foods thanks to an ice fishing trip by Clarence Frank Birdseye. “Shelf-life” was redefined by Birdseye’s frozen foods vision.

Prior to World War II, 40 percent of the American population lived and worked on the farm. Large families were common as they doubled as cost-effective labor. This was true for both sides of my family. The size of a farm was explained in terms of mules. A mule correlated with 40 acres of cultivation. My paternal grandfather kept two—Maude and Molly—as pseudo pets and gardening relics. Their care was one of my childhood chores. A mule pulled a single furrow plow. It took a round trip to till both sides of a row. Compare that modesty to the biggest tractor-cultivator combination ever built: in 1977 Big Equipment, LLC, created Big Bud, whose drawn cultivator spanned 80 feet. That is about twice the wingspan of a modern fighter jet. A modern farm tractor is a now a climate-controlled monster of power and efficiency.

*Historical farming
productivity fueled growth
concurrent with less labor.*

According to the USDA:

Agriculture, food, and related industries contributed \$1.055 trillion to the U.S. gross domestic product (GDP) in 2020, a 5.0-percent share. The output of America’s farms contributed \$134.7 billion of this sum—about 0.6 percent of GDP. The overall contribution of agriculture to GDP is larger than 0.6 percent because sectors related to agriculture rely on agricultural inputs in order to contribute added value to the economy. Sectors related to agriculture include: food and

beverage manufacturing; food and beverage stores; food service, eating, and drinking places; textiles, apparel, and leather products; forestry; and fishing.

Our culinary comforts trace to many innovators such as Cyrus McCormick and George Washington Carver. Concurrent with mechanical innovation, practices have evolved. Low tillage techniques have reduced cost. Bioengineering has favorably impacted yields through resistance to drought, insects, disease, and storms. Irrigation is a staple. Consider soybean production productivity. The University of Illinois attributes one-third bushel per acre per year improvement over the last 80 years. According to USDA, the 2021 average soybean yield per acre was about 54 bushels.

Agribusiness embraces innovation.

How have American consumers benefited from agribusiness productivity evolution? According to the World Economic Forum, United States consumers have enjoyed a history of spending less on groceries than any developed country in the world. Only Singapore comes close to our 6.4 percent of income. The EU starts in the eights. Nigeria has the worst statistic at 56.4 percent.

Agribusiness is on a perpetual quest to keep US groceries relatively inexpensive. Who makes this possible? Let's start on the farm.

The latest USDA agricultural census counts 3.4 million "producers," or the farmers and workers involved in making decisions on these farms, from planting to harvesting to marketing. This category could refer to the farm's owner, a member of the owner's family, a manager, a tenant, a renter, or a sharecropper. The USDA also makes a distinction between producers and employees known as farmworkers.

The 3.4 million persons compare to a national population of 331 million. According to the US Census Bureau:

In 2020, 19.7 million full- and part-time jobs were related to the agricultural and food sectors—10.3 percent of total U.S. employment. Direct on-farm employment accounted for about 2.6 million of these jobs, or 1.4 percent of U.S. employment.

As a point of reference, agribusiness employs fewer workers than government agencies.

A Not So Funny Thing about Global Supply Chains

Americans are conditioned to “know” we have agribusiness trade and are generous with food to redress world hunger. Even so, we may be surprised by the quantities of agribusiness commodities *imported*. While we enjoy a longstanding agribusiness commodity net trade surplus, the gap is narrow.

COVID is not the only catalyst for teachable moments vis-à-vis global supply chains. Wars and economic policy have influence, too. Despite the virtues of a greener

Supply chains must be routinely critiqued through a disaster recovery and business continuity prism.

economy, the timing of aspirations away from fossil fuels are correlating with higher food prices. First, heavy farm machinery is nowhere near analogous to Tesla’s achievements in passenger vehicles. The battery recharging

problem is exacerbated by inadequate power grid capacity. Nuclear reactors could plug the gap, but they are not a popular option.

Second, the Russian invasion of Ukraine reminded us that the nitrogen in synthetic fertilizers trace to petrochemicals. A recent WSJ article conveyed that organic fertilizer options (i.e., animal manure) would degrade crop yields between one and two fifths. Consider the commonly deployed 5-10-15 fertilizer which has five percent nitrogen by weight. [The three digits correspond to nitrogen (N), phosphorus (P), and potassium (K), respectively.] Suppose cow manure were substituted for synthetic fertilizer. The 3-2-1 NPK ratio is problematically backwards, plus the paltry bovine potency portends a rather large quantity of waste. Moreover, the NPK mix must be tailored to certain types of crops. The herd size of cows required to accomplish sufficient nutrients makes the cows rivals for the same grains which humans desire in products like bread and cereal. Cows are already under scrutiny for their contribution to greenhouses gases through their natural methane production.

Farm commodities follow a value chain that includes manufacturing and other value-added contributions before arriving on grocery store shelves. Transportation is necessary at all stages between the field and the kitchen table. Indeed, the Bureau of Transportation Statistics reports that these logistics comprise 7.7 percent of the US economy. Additionally, FreightWaves conveys that fuel is 5-15 percent of total freight cost. Thus, we see many correlated contributors to the cost of food.

Global economies and Aspen forests have a similar caveat: when an ecosystem is too interdependent, beware the deceptively remote sign of trouble. A seemingly innocuous event may rapidly become a full-blown catastrophe. Indeed, the US is so accustomed to

a “predictable” food supply that disruptions posing existential national security threats are incomprehensible.

Why Productivity Matters

We spent much of our COVID experience lamenting the impact on labor. As the economy pursues the return to “normalcy,” many employees are not returning to work—and wages are rising to overcome their reluctance. At historical production levels, productivity is inherently lower because it costs more to produce the same units. Supply chains and energy costs exacerbate the scenario. Consequently, vendors must outflank labor costs to regain productivity momentum.

How may productivity improve as expenses are rising? The answer may lie in three variables: unique value proposition, process, and automation. First, it is imperative for vendors to know what customers want and how they ascribe value. This must map to our product and service design. The quest does not stop there. Businesses need to religiously measure and report this to our customers to substantiate execution per their specifications.

Productivity is essential to both survival and prosperity.

Second, industry must obsessively eliminate waste from the processes. This means surgically removing anything from our “value-propositions” for which customers will not pay. This must be a collaborative crusade with our teams—beginning with line workers. They know more about how things work—or do not—than the corner office. If they co-author solutions, de facto change-management support exists for sustainable implementation.

Third, The Brookings Institution highlights that productivity improvement may be rooted in workforce adoption of technology. Businesses must rely more heavily on technology for decision making and automation to enhance productivity and displace labor—even if the automation does not yet exist. Wait a minute! Are we “rewarding” the labor with layoffs who just made the process more productive? Not necessarily. Since growth is imperative, transitioning to a larger company with the ostensibly same labor pool is realistic. Indeed, such employees are ideal for retraining because they already know the culture and the business model.

In SAP’s “M&A Ambassadors,” Thomas Fountain of One Rock Capital Partners summarized four technology imperatives: (i) resolve to lead technology evolution—not follow, (ii) make technology an essential part of the value-creation engine, (iii) pursue

technology that enables dynamic business models, and (iv) assure the scalability of technology decisions. There are numerous corollaries to these points, including conducting technology diligence on new investments which address these points. To wit, investors should diligence whether systems enable the investment thesis—and if not, what are the cash and opportunities costs required to achieve scalable sufficiency.

There may be more automation in the works that the public would necessarily be curious to know—except that the impact on their purchasing dollar could be favorably affected. Back to the star of our show, agribusiness. Growing Product documented several traditionally manual fruit and vegetable harvesting operations which are being displaced by automation.

How might manual processes be automated? The lower middle market cannot sidestep this challenge over apparent R&D unaffordability. Indeed, businesses may be unaware of their indirect R&D funding. Many state legislatures have elevated the merits of stimulating their economies relative to ecosystem idiosyncrasies. Part of the equation is

Innovation must not be artificially stymied by perceived budget limitations.

partnering with their university systems to leverage multidisciplinary solutions for economic benefit. From the student's perspective, co-ops, capstones, and internships represent the perspective of applied knowledge. From the private sector's perspective, this

is a bargain. The point is that the quest is imperative—unless business owners want to become the next dinosaurs. Relative to innovation, one might reflect on the wisdom of George Bernard Shaw: “Some [people] see things as they are and [ask] ‘Why?’, I dream things that never were and [ask], ‘Why not?’” (This explains mule retirement.)

Why are these options prioritized for productivity? Global competition is brutal. According to the Bureau of Labor Statistics, America ranks fourth in productivity among industrialized nations.

Conclusion

My agrarian heritage compadres and I had chips on our shoulders during college. We understood the DuPont model before knowing it existed. Low margin-high asset turnover was a way of life. The intrepidity of the American farmer is rooted in practical reality: citizens must afford accessible nutrition to survive—much less thrive. When the immortal *Apollo 13* movie line attributable to Gene Kranz was uttered—“Failure is not an option”—the American farmer reaction was “Duh! We were acculturated in that axiom at birth.” Aesop's “Ant and Grasshopper” fable was deeply engrained in our psyche because all of

us understood the implications of a bad year attributable to conditions beyond our control. A more contemporary depiction of the American farmer's attitude is conveyed in Ryan Holiday's *The Obstacle is the Way* (although the book is not about farming). Despite the practical economic and risk management "educations" we wielded in advance of collegiate matriculation, many "refined" classmates condescended to us hayseeds—often en route to fine dining at reasonable prices while attired in comfortable natural fibers made possible by the fruits of my neighbors' labors. Hank Williams, Jr., immortalized in "A Country Boy Will Survive" the sentiments we held dear. Ahead of Hank, Jr.'s message, our makeshift marketing communications created our own quip: "Don't criticize with your mouth full." The question then becomes, what is the business leaders' Gene Kranz response to productivity? Selah.

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