Science Societies

Potatoes in a pandemic

A case study on COVID-19's impacts on America's favorite tuber

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"Food security" will be achieved when all people have access to healthy, nutritious, and safe food at all times, according to the Food and Agriculture Organization of the United Nations. In honor of World Food Day (16 October), *CSA News* magazine is publishing a three-part series on food security. This is the second article in the series, which conveys the following main ideas:

- The COVID-19 pandemic disrupted life as we know it. Foodservice shutdowns negatively impacted an unlikely crop: potatoes.
- As processors turned back potatoes and cancelled contracts, farmers were left with a surplus of last year's harvest to move, even as they were

planting this year's crop.

- Here, potatoes are a case study for the way foodservice shutdowns created a ripple effect, demonstrating the need for flexibility in the food supply chain.

That's the thing: we had it all figured out. You could look at the calendar and see—okay, the third week in October? This is how many potatoes were going to get eaten. We just knew it," Chris Voigt says. "And then COVID changed all the dynamics. Nobody knows what the demand is anymore."

Voigt, the Executive Director of the Washington State Potato Commission, watched in March as the government issued shutdown orders to slow the spread of the COVID-19 pandemic. Restaurants, sports stadiums, and schools closed. Without them the demand for an unlikely crop—potatoes—took a tremendous hit.

"The foodservice side of the business just dropped off overnight," Kam Quarles, Chief Executive Officer of the National Potato Council, says. "That's roughly 60% of the domestic potato industry."

Here, we'll look at how the pandemic impacted the food supply chain that moves a potato from field, to French fry, to restaurant table, and how rapidly changing the way we consume food ripples down to farmers planting their crops. The fate of one of America's favorite vegetables can tell us a lot about food security, supply chains, and the future of farming relief.

A French Fry Origin Story

To understand the far-reaching impacts of foodservice shutdowns, it helps to understand where your french fries come from.

The $4.1 billion U.S. potato industry is based on two sources of supply: last year's potatoes, coming out of storage, and potatoes harvested and processed or sold fresh from this year's crop (**bit.ly/33awuQ8**).

Farmers start harvesting early maturing potatoes in mid-July, but the bulk of the crop comes out of the ground in September and October. Those potatoes go into storage.

There are four major end uses for potatoes: seed, fresh market, chips, and processed.

Because potatoes are tetraploid and reproduce asexually, certified seed growers undertake the expensive, time-consuming process of turning one good-looking, healthy potato plant into many plants. Using certified seed prevents growers from losing yield and accumulating disease by keeping their own, genetically identical potato seed.

A tissue culture lab selects a nice plant, removes pathogens, and takes tissue cuttings, which are cultured and grown into plantlets in a sterile environment. From those plantlets, the lab repeats the process, growing more genetically identical plantlets, which are carefully grown up in the greenhouse to "mini-tuber" stage. The mini-tubers are planted in a field the next year by a producer that specializes in growing first-generation tubers.

“You figure, after that, it’s about a tenfold increase each year,” says Andy Robinson. A CSSA member and Extension potato agronomist, Robinson holds a joint appointment as an associate professor at North Dakota State University and the University of Minnesota. “It’s really expensive to do all that tissue culture and grow them in the greenhouse, which is why you expand them out for four or five years. Then you certify that they’re free from viruses and pests.”



Harvesting Russet Burbank potato in North Dakota. Photo by Andy Robinson, NDSU/UMN.

Once certified seed is produced, potato growers plant their fields in the spring, between mid-March and the end of April, depending on the growing season and climate.

For potatoes destined to be french fries or chips, growers are often under contract with the major processors.

“Typically, processors make agreements with growers in the fall, when they’re leasing land and preparing it,” Quarles says. “Not always—but often—it will specify the volume of potatoes you are to deliver, the price, and of course, the quality. It’s established well in advance.”

Here’s another wrench in the potato production machine: since potatoes are on a three- or four-year rotation and require specialized equipment, growers tend to lease most, if not all, their land. The verbal agreements growers make with their processors in

the fall dictate how much land they lease from neighbors or fellow farmers and how they prep that land for spring planting.

“Before a farmer even plants a crop, they could have $1,000 invested in an acre,” Robinson says. Farmers typically fumigate the soil in the fall to kill soil-borne diseases.

In total, producing an acre of irrigated potatoes could cost between $3,000 and $4,000. By comparison, the average cost to grow an acre of soybeans in 2018 was $639; to grow an acre of corn in Illinois averaged $850 (**bit.ly/3j2n9iA**).

Plus, the costs to farmers don’t stop once the spud is out of the ground. Since potatoes can stay in storage for nine months out of the year, growers often have their own specialized, warehouse-sized sheds. The estimated cost to store an acre’s worth of potatoes for five months is $234, and the ownership costs for a shed is about $134 per acre of potatoes stored (**https://bit.ly/3jja6JE**).

With these costs in mind, note that farmers are counting on contract-based sales of last year’s potatoes as they prepare to plant and sell this year’s spuds. The market is behind production—farmers are producing next year’s supply while still selling last year’s harvest.

The Pandemic and 2020’s Supply



Planting potatoes in North Dakota. Photo by Andy Robinson, NDSU/UMN.

Multiple factors made the COVID-19 pandemic and ensuing shutdowns a nightmare for potato farmers. As restaurants closed in the middle of March and early April, many growers were planting this year's crop.

But processors who typically supply restaurants, stadiums, and schools with potato products like frozen french fries were left without any buyers. People stayed home and stocked up on food products. For a while in April, it was tough to find fresh potatoes in some supermarkets, and the market prices reached a record high in July (**bit.ly/3cEUmOT**).

"It really was a tale of two industries, at that point," Quarles says. "With everyone staying home and cooking their own food, the retail side was strong, but that isn't the bulk of our industry."

On the larger, processed potato front, processors panicked. Now, they had potatoes they had already purchased on contract that they couldn't move. They also had farmers planting potatoes that would soon need valuable shed storage space—space that might not be available come harvest.

So processors did two things. They told growers they couldn't honor this year's contract for crops that, in some cases, had already been planted, and they started returning excess potatoes from last year's harvest to farmers.

“It’s like a kink in a hose,” says Hallie Casey, the Supply Chain Program Manager at the nonprofit Sustainable Food Center. “The pressure just keeps building up.”

On 1 Apr. 2020, the USDA National Agricultural Statistics service issued a stocks-on-hand report for the volume of 2019 potatoes still waiting to be processed or sold (**https://bit.ly/35divZF**). That report showed 14.7 billion pounds of potatoes left for summer consumption.

“In Washington State, the report showed we had 3 billion pounds of potatoes in storage, which is pretty typical,” Voigt says. “Of those 3 billion pounds, the processors were estimating they couldn’t use a billion pounds of it. Even though they had contracts, they returned those potatoes to growers, saying, ‘Sorry, we can’t use these—we have no sales. Do with them what you want.’”

In a panic, growers started improvising. Voigt’s organization, the quasi-governmental Washington Potato Commission, organized initiatives for growers to donate potatoes to local foodbanks (**bit.ly/3jfrxLp**).

But that only totaled about 2 million pounds. There were still 998 million pounds in storage—a major “kink in the hose.”

“We were just handing them out—every food bank, every community. Some growers started giving potatoes to livestock operations, to feed lots, as long as they would come and pick them up. They sent them to dehydrators and processors who were buying them at a quarter of their normal price,” Voigt says.

Did you know cows can eat potatoes?

“As long as you chop them up, so they don’t choke,” Voigt laughs.

Washington growers sent some potatoes to processors in North Dakota and Minnesota where supply was short after an early freeze event and flooding decimated roughly a quarter of the 2019 harvest (**bit.ly/348K4CH**).

Eventually, once restaurants started opening outdoor seating and pivoted to pickup and delivery options, processors returned, asking to buy back some of the supply they thought they couldn't use.

"They came back in mid-May and took back the remaining 500 million [pounds]," Voigt says. "Where they would normally end up processing all the old potatoes by July 4, it took them until September 15 or so to use them all up."

Plowing Potatoes Under

In the Columbia River Basin of Washington State, the growing season is long, the volcanic soil is fertile, and the desert climate means growers can manage moisture with irrigation, delivering it to potatoes the moment they need it.

One grower, Mike Pink, planned to plant 1,800 acres of potatoes on a combination of owned and leased land in one of the highest-producing swaths of potato country. His production was up, his three varieties of Russets—Rangers, Caribous, and Clearwaters—were on contract, and 2020 looked like a fantastic farming year.



He was in the middle of planting when he started getting nervous.

The sun rises over a field of potatoes during a near perfect growing season in the Columbia Basin of Washington State. Photo courtesy of the Washington State Potato Commission.

"I didn't even bother planting the last two circles," Pink says. "They were already fumigated and ready to go, but I was getting nervous. I knew there was going to be a reduction in acres, but I didn't know how big."

When his processor finally met him in the field in late March, they told him they were cutting his contract by 1,000 acres.

Pink had to decide: grow his potatoes to harvest with no guaranteed buyer? Or cut his losses?

Pink disced 250 acres of Ranger Russets back into the soil, destroying potato plantlets that were already forming 6-inch rosettes. He planted silage corn in their place to try and recoup some of the money he spent on leasing, fumigation, and fertilizer.

The corn won't remotely cover the cost of production.

"It was the most difficult decision I've ever had to make as a farmer, and I hope I never have to make it again," Pink says. "I go out and till the soil, plant the seed, nurture the crop, raise it, grow it, keep it alive, to feed somebody! To do something with it! Then to go out and kill it…it sucked, okay? It was no fun."

Relief for Farmers

On 27 Mar. 2020, the $2 trillion Coronavirus Aid, Relief, and Economic Security (CARES) Act was passed by Congress and signed into law. As of October, the USDA disbursed more than $10 billion in aid through the Coronavirus Food Assistance Program (CFAP) to farmers of all sorts of agricultural commodities (**www.farmers.gov/cfap/data**).

But there were a lot of growers left out. Quarles and the National Potato Council were working overtime in Washington, DC to advise the USDA on the best way to reach growers with much-needed aid.

“We’ve been through a number of disaster relief efforts in the past,” Quarles says. “But the numbers here were a heck of a lot bigger than anything we’ve ever had to deal with before. We really just wrapped our arms around the whole industry.”

Quarles outlined the “barbell” strategy used by the USDA to help growers. As government-mandated shutdowns created a glut of potatoes, “We needed the USDA to come in and aggressively buy both fresh potatoes and processed potato products because the pipeline was just clogging up,” Quarles says.

The USDA did just that. They bid $50 million, using that money to buy potatoes that had already been produced.

On the other end of the barbell, growers who had been gutted by voided contracts need relief, as well. But specialty crops were tough for the USDA to handle.

“Fruits and vegetables aren’t like program crops—your corn, wheat, cotton, rice, soybeans. They aren’t participants in the federal farm safety net,” Quarles says. “Where USDA knows how to compensate a wheat grower or a corn grower…they have no experience with the fruit and vegetable industry.”

There were several hurdles that made it difficult for potato farmers (and lots of other specialty crop growers) to get relief through CFAP.

First, growers had to demonstrate economic losses for a period between January and 15 Apr. 2020. Many growers couldn’t show losses for that period. Lots of farmers saw the bulk of their injuries occur after the deadline.

“That April 15 deadline was just as the pandemic was ramping up,” Quarles says. “You can’t really document your injuries before the full magnitude of the crisis—it just wasn’t going to work.”

Another hurdle for potato farmers: vegetable crops grown under contract were not eligible.

For farmers who lost income as processors cancelled contracts, that hurdle could mean little to no relief for any of their crops. Mike Pink, for example, received no aid under the CFAP for the crops he plowed under.

Fortunately, the USDA rolled out the second version of the CFAP—CFAP 2—on 17 Sept. 2020.

“It’s much broader, much simpler. It’s going to get relief to the vast, vast majority of impacted growers,” Quarles says. “They removed the April 15 deadline. Now, you don’t have to show 2020 losses. Instead, you show the USDA your 2019 calendar-year gross sales, and the USDA will give you a payment on 10% of those sales.”

The program also allows growers who planted crops under contract to receive relief, too—great news for processed potato producers. It works through self-certification, much like typical income taxes, where you file a claim and are subject to auditing later.

The new program is open for sign-ups until 11 Dec. 2020 (**www.farmers.gov/cfap**).



Freshly harvested potatoes traveling on a conveyor to be loaded onto a truck and processed into frozen french fries and exported to customers in Japan. Photo courtesy of the Washington State Potato Commission.

The Potato Supply Chain

Though the market has rebounded this year, it still leaves a lot of uncertainty for next year. As the harvest winds down and growers load 2020's potatoes into storage, they're reliant on an uncertain system.

With colder weather looming, the ominous possibility of COVID-19 cases rising as people begin spending more time inside could be bad news for foodservice. Restaurants pivoted to outside dining experiences in the spring, but another shutdown could lead to a repeat performance of the supply chain collapse in March and April. Excess potatoes could fall back on growers, who could, again, find themselves with lost contracts.

“What becomes challenging is when demand isn’t rising, but looks more like a sawtooth, where things open then shut again,” Quarles says. “How do you plan for the future when the marketplace keeps changing under you?”

One thing that this “case study” in potato supply shows us is that demand is critical for a smooth-running system. It was a glut of food, not a deficit, that created problems in the potato food supply chain.

There are no clear answers for how to build a more stable system, but one thing is certain: creating constant demand will help growers.

“Demand is good for everyone,” Pink says. “If this year is short, demand will be strong for the farmer, for the processor, then everybody down the line.”

It’s difficult to know what the future holds—now, more than ever—but this year has given us an opportunity to look at the way we do business. How do we get food from fields to tables? What happens when supply changes? How do we help farmers when the marketplace collapses under them?

“We need people at all stages of the game to ask themselves, ‘How do I build resiliency?’” Casey says. “Nobody is an expert in this—nobody has seen anything like it. But this is not work that can be ignored, and it’s not optional.”

Dig deeper

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Everald McLennon, Biswanath Dari, Gaurav Jha, Debjani Sihi, Vanaja Kankarla, Regenerative agriculture and integrative permaculture for sustainable and technology driven global food production and security, Agronomy Journal, 10.1002/agj2.20814, **113**, 6, (4541-4559), (2021).

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