

Effect of COVID-19 on markets for fruits and vegetables

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Abstract:

Beginning in March 2020, the emergence of the new coronavirus SARS-CoV-2 (and COVID-19 illness) had a substantial impact on Canada's fruit and vegetable industries. Produce producers and distributors were compelled to switch supplies almost entirely from the foodservice to the retail channels as a result of the closure of taverns, restaurants, and schools. Despite labour and logistical challenges that shippers experienced, the fresh produce supply chain was unaffected. Long-term, we anticipate enduring changes in consumer purchase patterns for food online, tighter concentration in the distribution of fresh produce, and perhaps even retailing.

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I. Introduction:

All food markets, especially the market for fruits and vegetables, have experienced unprecedented effects as a result of the spread of the new coronavirus SARS-CoV-2 and the COVID-19 disease it produces. Retailers able to stock every product with minimal interruption and grower-shippers accustomed to just-in-time inventory management systems both experienced supply and demand shocks. We examine the nature of these changes brought on by the development of COVID-19 in Canada and worldwide in this article, as well as various industry responses, ranging from those of consumers and merchants to those of produce suppliers. We divide our analysis into immediate or short-term effects on the supply chain for fruits and vegetables, longer-term effects that are likely to last the duration of the pandemic, and long-term effects.

No one in the sector has been spared in the foreseeable future. From growershippers to retailers, 86% of industry members reported "some effect" or "substantial effect" on their business operations as of March 12, 2020. (Nickle, 2020a). The biggest alteration to their daily routines resulted from "contingency planning," which they did in response to the different challenges influencing their day-to-day operations. The main operational challenges are finding labour, scheduling personnel, and assuring their safety. The industry is undergoing fundamental shifts and dislocations, but these operational problems are simply the beginning of what will be a well-functioning value chain.

The impact has been most pronounced in the short term due to the closure of restaurants and schools, which represents the almost total loss of a distribution route. Canada's foodservice industry generated \$65.0 billion in sales in 2017, while the retail sector generated \$74.0 billion (USDA, 2018). Given that retail is likely picking up the volumes lost to the foodservice channel, it is reasonable to assume that overall food consumption remains unchanged. As a result, suppliers are constructing packing lines and adapting already-existing lines to cater to retail customers. Using US data as proof, retail food sales were up 10.6% overall by March 8, 2020, and 4.5% in fresh produce, as quarantine measures started in just the most impacted states in the US (Nickle, 2020b). As the virus spreads, we anticipated that this transition would quicken, and it has. By March 24, fresh produce volumes in the retail channel had increased by 23.2% from the previous year (S. Lutz, personal communication, March 12, 2020). Unit pricing in the foodservice industry are typically higher than those in retail (USDA, 2020a), but spending in each channel is generally equal, so this results in a volume shift of around 25% between supply chains that are fundamentally different. To put it another way, many retail accounts are supplied directly by grower-shippers, and the group of wholesale distributors for the foodservice industry is not often the same as the group that services retail accounts. Retail distributors must be able to pack more regularly, have trucks ready more quickly, and expect moving higher volumes over the coming few months, even though foodservice distributors will undoubtedly witness an almost complete loss of demand. Unprecedented flexibility in adjusting lines and suppliers as demands change will be necessary for this. Farm items that are intended for the foodservice and retail sectors are largely interchangeable. In other words, a head of lettuce purchased by a distributor for foodservice is virtually identical to one that would be offered for sale to consumers.

The similarities end there, though, as fresh produce sold in the retail sector is far more likely to be bought on a contract than it was 20 years ago, as is produce sold in the foodservice sector. In contrast to buying from a spot, or terminal, market, contracting for fresh fruit helps customers assure a steady supply of high-

quality product from dependable suppliers with fewer transaction costs. However, when end markets evaporate, these committed relationships fall apart. In the case of a "act of God," which is likely to involve pandemic spread, contracts in the retail fresh produce industry are susceptible to a variety of force majeure clauses that render them unenforceable. Retail buyers will need to discover suppliers who have been selling to foodservice buyers right away. From a business standpoint, sellers who service foodservice buyers will need to find alternative buyers in the retail channel. Additionally, all of this search work must be finished before the current crop—which is typically highly perishable—becomes impossible to sell through any channel. In reality, the perishability of fresh food sets it apart from the majority of other agricultural sectors, especially in terms of the COVID-19's most obvious effects on the retail market. Both in the US and Canada, hoarding is pervasive. However, customers are only hoarding nonperishable goods because they are shopping in advance in preparation of not being able to meet their fundamental needs and may be expecting to be completely cut off from food outlets. Retailers have, nevertheless, been able to maintain reasonably priced selections of fresh fruits and vegetables that are comparatively comprehensive. When the current demand spike runs its course and customers wait months to use up their stockpiles of goods, nonperishables suppliers will experience their Armageddon in July or August. Few of the same forward purchases are being made by perishable goods producers. However, the majority of the goods in the fresh produce section seem to be readily available.

There have been reports of intermittent stockouts in some of the more storable food items, such as table potatoes, onions, and sweet potatoes. For processed (frozen and canned) fruits and vegetables, a nontrivial business in Canada, some of the patterns mentioned above for the fresh produce sector are less common. In actuality, Canada produces processed fruits and vegetables worth about \$7 billion (StatsCan, 2020b). According to anecdotal evidence, consumers have been storing frozen fruits and vegetables, similar to how they do with other nonperishable goods, which could hurt fresh produce sales now and in the future. Any short-term changes in the proportion of fresh and processed fruits and vegetables also have the potential to impact future shopping habits, based on customers' experiences with processed fruits and vegetables. For the marketers of both fresh and processed fruit and vegetable businesses, this could prove to be a crucial period for retaining, luring, and growing their customer base (Kapsak, 2020). The fact that nonperishables sell out quickly while fresh produce shelves stay largely supplied is due to a variety of factors, including disparities in supply and demand. Therefore, the biological process of planting and harvesting is not necessarily interrupted by the start of a crisis that came on so quickly as COVID-19. Even though the crops may already be in the field, harvesting them could be challenging because growers in the Southern US, the country that supplies the majority of Canada's imports, are having trouble finding H-2A workers, who are often used as seasonal harvesting employees. In the upcoming months, domestic workers' rising unemployment may offer a ready supply of replacement workers, but drawing workers to the fields will necessitate raising wages and manufacturing expenses. Second, on the demand side, consumers are probably substituting across categories within the store at a rate that we have not seen before since they are stocking up on nonperishable goods. The use of inventory and demand management data by retailers to instantly improve prices and product assortments has advanced significantly in recent years. The razor-thin line on which retailers must balance is demonstrated by the fact that some categories, like toilet paper and pasta, have empty shelves while others, like apples, tomatoes, and strawberries, do not. Although retail supply chains are still rather resilient, even a slight shift in demand causes category reallocations inside the shop that give the impression that something is scarce.

There is proof that category-substitution is relatively powerful even during normal times. Empirically, we are aware that consumers frequently switch between various foods and food groups. Okrent and Alston (2011) investigate the own- and crossprice elasticities of demand for two beverage categories, a food-away-from-home category, and six food-at-home categories (including fruits and vegetables). Their findings demonstrate significant substitution patterns between the fruit and vegetable category and the cereal and bakery category, meats, and nonalcoholic beverages. Okrent and Alston (2011) predict that consumers will substitute across food categories in addition to any future switching patterns we observe between individual fruits and vegetables and between fresh and processed fruits and vegetables. Budget limitations are anticipated to have far bigger consequences with this shock-driven demand reallocation, hence previous estimates may not accurately reflect the actual situation. Even products that formerly went together, like meat and potatoes, could end up being substitutes if one is hoarding on the other while having less money for the former. The demand for toilet paper should be practically meaningless to apple purchases if the budget share for toilet paper is typically 1%, but when it rises to 20%, toilet paper purchases reduce apple demand due to the budget constraint. Category substitution and the eventual depletion of home nonperishable stockpiles could have significant effects on future purchases of fresh produce and dietary quality. Market reactions in mid- to late-2020 could result from families substituting nonperishable (or frozen) goods that were stocked and stored in late winter and the spring of 2020. This could have nontrivial implications on fruit and vegetable markets. There is proof that category-substitution is relatively powerful even during normal times. Empirically, we are aware that customers frequently switch between various foods and food groups. Okrent and Alston (2011) investigate the own- and crossprice elasticities of demand for two beverage categories, a food-away-from-home category, and six food-at-home

categories (including fruits and vegetables). Their findings demonstrate significant substitution tendencies between the fruit and vegetable category and the cereal and pastry category, meats, and nonalcoholic beverages (which includes fruit juices). Okrent and Alston (2011) predict that consumers will substitute across food categories in addition to any future switching patterns we observe between individual fruits and vegetables and between fresh and processed fruits and vegetables. With this unexpected demand

Past predictions may have underestimated the true condition due to reallocation and budget limitations because they are expected to have far bigger consequences of things. Even complements, like meat and potatoes, can turn into substitutes as a result of stockpiling in one place for the other, less money. It makes sense that the demand for toilet paper would be almost as high as the budget share, which is normally 1% toilet paper purchases have no bearing on apple purchases, but when they reach 20%, they reduce apple demand through the budget constraint.

Category substitution and the eventual depletion of home nonperishable stockpiles could have significant effects on future purchases of fresh produce and dietary quality. Market reactions in mid- to late-2020 could result from families substituting nonperishable (or frozen) goods that were stocked and stored in late winter and the spring of 2020. This could have nontrivial implications on fruit and vegetable markets. This effect is anticipated to be significant because customers frequently choose between fresh and frozen fruits and vegetables (Blumberg Thompson, 2020). First, the consumption of products in storage could start to happen around the time that many fruits and vegetables grown in Canada come to harvest. This would put downward pressure on the cost of fresh produce markets. Small- and medium-sized fruit and vegetable growers who depend more on local and regional markets for their products would find this scenario particularly challenging. The hoarding and potential big replacement patterns between food categories could have an impact on the dietary quality in Canada. Secondly, and possibly more significantly, different food categories provide customers varied amounts of micro and macronutrients. Particularly important sources of dietary fibre and other vitamins and minerals are fruits and vegetables. Consumers may unintentionally be discouraged from eating the recommended amount of fruits and vegetables if any substitution patterns result from the eventual management of stockpiled items (mostly cereals). Naturally, a large portion of the food sold in Canada is imported. In reality, according to StatsCan (2020a), the total retail sales of domestically grown fresh fruits and vegetables in 2018 averaged around \$125 million (CAD) per month, compared to an import average that was roughly seven times higher (Statista, 2020). As a result, importers, such as wholesalers, distributors, and retailers, will be most affected by shifting consumption habits, and any effects on availability will depend on the state of the US fresh fruit and vegetable supply chain. Importers, including distributors, wholesalers, and retailers, will be the domestic stakeholders in the fresh value chain most severely hit. In reality, stores can go through changes that endure far longer than the pandemic. Long after the crisis, the borders remained open to commercial trade. Further limitations on cross-border travel, however, will have a significant negative impact on businesses that depend on trade, such as those in the fruit and vegetable sectors. Online food sales increased as the pandemic expanded, which is a reflection of customers' anxieties about being close to others. In Canada, just 1.5% of groceries were sold online prior to the outbreak of COVID-19; by the third week of March, that percentage had increased to nearly 9.0%. (Charlebois, 2020). According to O'Malley (2020), supermarket retailers were reporting increases in online orders of up to 300%, and some were restricting customer access to their physical locations. The fact that many supermarkets charge set online delivery fees gives customers an incentive to order everything on their shopping list online rather than taking the chance of shopping in actual stores, even though nonperishable and household items undoubtedly accounted for the majority of this online ordering activity. Many people will continue to purchase online, at least occasionally, after learning how to do so and enjoying the convenience and speed it offers. Many people think that this experience for fresh produce vendors could be the turning point that pushes fresh food delivery beyond tech-savvy, frequent online buyers to the centre of the mass of the population. The intake of fruits and vegetables could be changed from restaurant meals to meals prepared at home, which could have significant effects on food waste. There are three mechanisms at play, making the overall outcome unpredictable. First, according to estimates by Gooch, Felfel, and Marenick (2010), 51% of food waste in Canada happens at home, compared to 8% in the foodservice industry. This is a significant difference from the proportions of food volume consumed at home and away from home. Therefore, moving consumption from restaurants to homes may actually result in more wasted fresh produce. Second, one of the main causes of home food waste is overspending. More fresh produce will be squandered if fear over the sustainability of the fresh produce supply chain results in hoarding or at the very least, overbuying. On the other hand, households may become more effective when using the food, they already have and when making food purchase plans as a result of feelings of scarcity. Future research could be fruitful in determining which influence predominates.

LONGER TERM IMPACTS :

Other consequences are more likely to last or represent long-term changes in supply systems for fresh products. We list the three most important ones in this context as the shift to online food shopping,

consolidation, and labour access difficulties in the U.S. and Canadian fresh produce farming industries. Most of Canada's fresh produce comes from the United States (Statista, 2020). Due to reliance on imports, primarily from the United States, anything that disrupts production and distribution schedules there could have a significant impact on supply in Canada. Employees hired through the H-2A programme made up just a small portion of all agricultural workers each year—around 40,000 workers out of a total workforce of more than 1.0 million—due to its bureaucratic and severely controlled nature. However, in recent years, due to increased immigration law enforcement in the United States, decreased Mexican outmigration, an ageing American workforce, and domestic workers' reluctance to perform farm labour, the proportion of H-2A workers increased from 7.7% of the total workforce in 2008 to approximately 21.1% in 2018. (see Figure 1, USDA, 2020b). Growers could no longer rely on a ready supply of H-2A employees as COVID-19 spread in early 2020 due to restrictions on cross-border travel between the United States and Mexico. Although COVID-19 started to spread before the majority of fruits and vegetables were ready for harvest, growers were unable to complete early-season planning for the harvest.

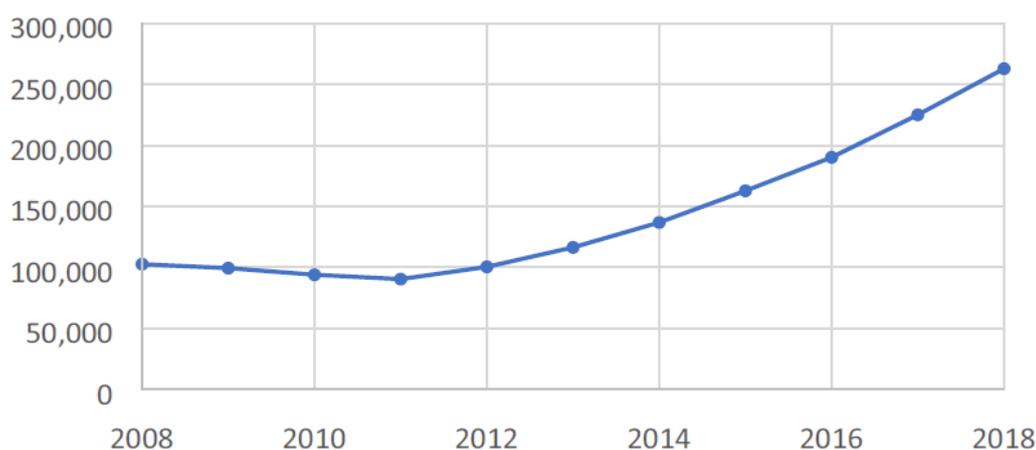


FIGURE 1 Number of H-2A Certifications.

Source: US Department of Labor (USDA 2020b).

Numerous the same difficulties are faced by domestic production in Canada. Every year, Canada accepts over 60,000 guestworkers, many of whom work in the fresh produce sector. Although entry is still permitted, it's possible that fewer employees than necessary may travel this growing season due to challenges getting authorisation in Mexico and in Canada.

Second, we anticipate a faster rate of supply chain consolidation for fresh products. Similar to the rest of the economy, debt served as a major driver of small business expansion in the produce industry throughout the era of economic recovery and boom from 2009 to 2020. Bankruptcies and consolidation will increase in the fresh produce industry, although the effects of debt-funded growth and declining cash flow are more obvious in the shale oil industry.

Only large, reliable companies that can manage interest payments and maintain client relationships despite cash constraints survive during times of financial turbulence. Furthermore, there is no reason to think that when we recover from the epidemic, per-capita consumption of fresh produce will decrease, thus the same amount of business would effectively be distributed among fewer enterprises. The relationship between concentration and market power among empirical industrial-organization economists is far from clear-cut. However, it is undeniable that in the absence of a robust, competitive fringe of small businesses, the potential for margin expansion by large retailers on the consumer side, potent packers and distributors on the wholesale-buying side, and exporters selling into the Canadian market will be much greater. The manner in which customers acquire food, including how they buy fruits and vegetables, is another potential long-term trend that could result from the COVID-19 pandemic. Given the percentage of online purchases made by retirees and households that have not traditionally done their food shopping at home, the shift to online grocery shopping has been particularly striking (Charlebois, 2020). This has significant implications for produce as research suggests that some consumers are more likely to make healthier purchases when grocery shopping online, or are at the very least less impulsive (Pozzi, 2012). Customers' happiness with their early online shopping experiences in March and April 2020 will have a significant impact on how this short-term response to COVID-19 will effect fruit and vegetable sales in the long run (both fresh and processed).

II. Conclusions

Due to the shutdown of almost all foodservice establishments, we think that the COVID-19 pandemic will have the biggest short-term impact on supply chains for fresh produce. Consumers are shifting to virtually exclusively purchasing food through the retail channel, which will put strain on the retail-specific delivery infrastructure during the disease's development and for some time following. The longer-term effects could be felt through input markets, particularly labour, and structural changes in the business, which could experience fundamental shocks that are largely irreversible, like consolidation and a shift toward online purchasing. Even while Canada imports a large portion of its fresh produce needs, it is nevertheless susceptible to similar shocks. Instead, as manufacturing costs rise in the United States and as the exporting industry's structure changes, the cost of imported commodities will also rise. Although they are logical answers to immediate rewards, these modifications could permanently alter how fresh fruit and vegetables are distributed.

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