

RAMPING UP DOMESTIC PRODUCTION: A CASE STUDY ON CUCUMBERS



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Most agricultural products sold in the United States are produced domestically. U.S. imports accounted for [less than 20%](#) of U.S. food and beverage spending in 2023, according to U.S. Department of Agriculture Economic Research Services (ERS).

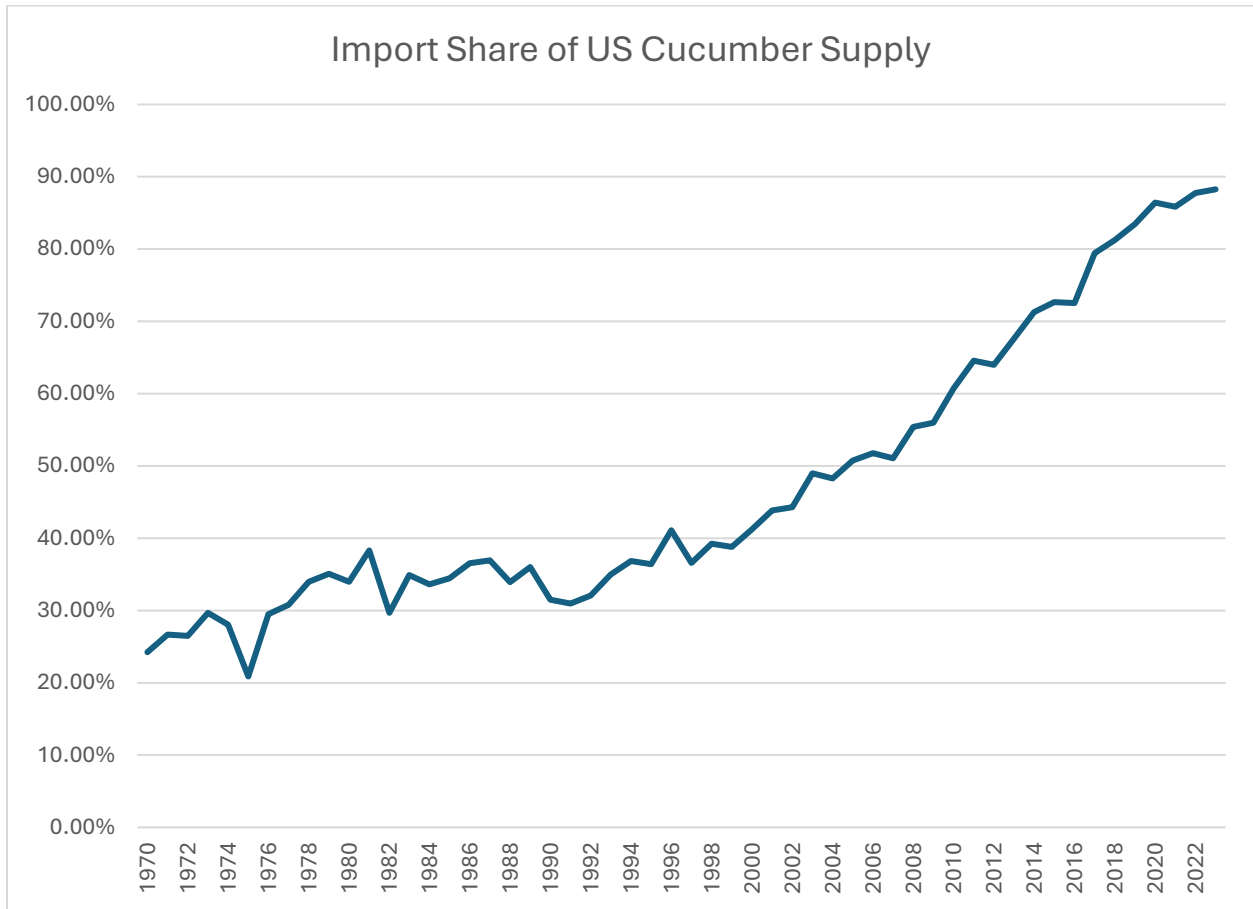
However, trade plays an important role in supplementing the U.S. food supply. Agricultural imports have grown consistently over the past 25 years, primarily due to rising domestic demand for a wide range of consumer-oriented products. From 1998 to 2023, the total value of agricultural imports [increased](#) more than fivefold, reaching \$195 billion in 2023.

Our food system is intricately linked with global markets, which has reduced food prices in the long run while providing American shoppers year-round access to safe, nutritious food. According to government data, consumer-oriented goods have led the growth in U.S. agricultural imports, outpacing overall agricultural import growth with an average annual increase of nearly 7% since 1998. Much of this growth is fueled by [rising consumer demand for a year-round variety of foods](#), prompting increased imports of agricultural products - either because the U.S. has limited or no domestic production, or during the off-season when they're unable to be grown domestically.

The tariffs that have been proposed and implemented to varying degrees by the Trump administration raise important questions about the benefits of international trade, the role of comparative advantages, and the potential for the U.S. to increase domestic production and manufacturing. To help illustrate the possibilities and challenges posed by these tariffs specifically for the food supply chain and groceries, we examine cucumbers and estimate the economic impacts of a major shift away from imports and toward domestic production.

Fresh cucumbers make an excellent case study for this thought experiment. According to the International Fresh Produce Association (IFPA), they are the [7th most popular vegetable](#) in the U.S., regularly purchased by 64% of U.S. households. This figure does not include cucumbers purchased through foodservice or as ingredients in processed foods, underscoring the size and economic importance of the cucumber market. Largely to meet growing domestic demand, the U.S. has increased its imports of cucumbers in recent decades. The import share has increased from about 30% in 1990 to nearly 90% in 2023 (figure 1).





Source: U.S. Department of Agriculture, Economic Research Service

We consider a scenario in which, in response to import tariffs, U.S. cucumber production increases such that 90% of consumption is domestically grown. Doing so highlights some of the specific challenges to food, relative to durable or manufactured goods, when considering potential changes in international trade. Cucumbers require specific growing conditions to achieve consistent yields and market-ready output. In addition to specific soil Ph requirements, cucumbers [require](#) substantial amounts of direct sunlight daily and are easily damaged by frost.

Given the constraints on farmland in the U.S., particularly for land meeting the optimal conditions for cucumbers, we assume that nearly all the increase in production required to meet the 90% demand threshold will take place in in greenhouses or comparable controlled indoor environments. When considering potential price impacts, we focus on differences due to the growing conditions, as domestic and imported cucumber prices are [closely comparable](#) and follow similar trends. According to USDA, the national average retail price for fresh cucumbers in 2022 (the most recent year available) was



\$1.25 per pound. And according to a study at the University of Vermont, the average retail price for greenhouse-grown cucumbers in 2019 was \$2.74 per pound. Adjusting each of these for inflation, the 2025 average prices are \$1.41 and \$3.43, respectively. With current US cucumber consumption in the U.S. estimated at around 2.8 billion pounds, this means that about 2.2 billion pounds, or 78% of the total, would need to convert to domestic, indoor production. Ignoring the fixed costs of establishing the requisite greenhouse space, which may result in even higher average prices per pound at least in the short term, this would represent an additional \$4.48 billion in US household spending on cucumbers.

The analysis thus far assumed that demand will stay constant given the increase in retail prices. This is not likely realistic, as cucumbers have several substitutes in purchasing and consumption, e.g. tomatoes, bell peppers, and carrots. A [2012 study](#) used 40 years of historical sales data to measure the demand elasticity, or responsiveness, of cucumbers. The authors calculated an elasticity of -0.99, meaning that a 1% increase in price is associated with a nearly 1% decrease in total quantity demanded. This estimate is only directly relevant for small price changes, but taking the demand elasticity as constant along the demand curve, we can estimate that this price increase would reduce the total demand by about 58%. Applying this value to the 78% of cucumber production facing higher prices due to the shift to indoor domestic production, total cucumber demand, or retail sales, can be expected to fall by 1.3 billion pounds annually. As a final consideration, though the U.S. is small player globally in cucumbers, total cucumber exports valued nearly \$700 million as of 2023. These revenues would almost surely dissipate as the U.S. shifted its fresh cucumbers almost exclusively to the domestic market.

Tariffs, like taxes, marketing orders, oligopolistic behavior, subsidies, and externalities, are market distortions, which change the equilibrium of supply and demand. We know from Econ 101 that all distortions produce winners and losers. Tariffs on heavily imported specialty crops such as cucumbers may ultimately spur growth in domestic production and increase sales and profits for the grower shippers, particularly those invested in greenhouse and indoor production. But consumer welfare would fall substantially, because of decreased purchases and higher prices. Higher farm and wholesale cucumber prices would pass through to retailers, who in turn would likely see decreased cucumber revenues. Some of these losses would be offset by increased sales of other vegetables, but increased prices result in higher menu costs and have the potential to deflate customer sentiment, especially in the wake of the challenging post-COVID 19 inflationary period.





To learn more about this and other agriculture issues and their impact on consumer prices, reach out to Dr. Ricky Volpe, professor of agribusiness at Cal Poly (rvolpe@calpoly.edu) or FMI Vice President of Tax, Trade, Sustainability and Policy Development Andy Harig (aharig@fmi.org).

