

How Consumer Demand for Orange Juice Changed: Price Elasticities by Process Type, 2022/23–2023/24¹

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This publication is intended to inform citrus growers, processors, retailers, and other citrus industry stakeholders about how consumer demand responds to price changes across different types of orange juice.

Introduction

Orange juice (OJ) is a long-standing beverage staple among American consumers, with a variety of product types catering to diverse preferences. Understanding consumer demand within the 100% OJ category, including consumer price sensitivity, awareness, and perception, is crucial for informing effective marketing and pricing strategies. The demand for 100% OJ is changing and evolving due to an increasingly crowded beverage category, shifts in consumer preferences and behavior, price dynamics, and competitive market forces amid supply challenges. Understanding these trends is critical for juice orange growers, OJ processors and retailers, and other stakeholders seeking to align pricing strategies with consumer preferences.

The availability of 100% OJ in the US market has been steadily declining over the past decade across all categories, including beginning inventory, fruit production, and imports. Production of Florida single-strength OJ (SSOJ) and frozen concentrate OJ (FCOJ) decreased by 42% and 52%, respectively, in the 2023/24 season compared to 2013/14. Several factors have contributed to this decline: production losses from citrus greening disease (huánglóngbìng or HLB); weather-related crop damage from freezes and hurricanes; reduced agricultural land due to urbanization and rising opportunity costs; decreased imports amid global production shortages; and lower inventory levels. In 2023/24, Florida's OJ production fell to one of its lowest levels in decades, an 87.6% drop from 614.6 million single-strength equivalent (SSE) gallons in 2013/14 to 75.7 million SSE gallons (Florida Department of Citrus 2025b). The reduction was exacerbated by adverse weather events, in particular, Hurricane Irma in 2017 and Hurricane Ian in 2022, which severely damaged Florida's orange groves.

Imports, which typically supplement domestic production, also declined slightly (4.3%) in 2023/24 compared to

2022/23 due to global production shortages caused by adverse weather conditions and HLB, particularly in major exporting countries like Brazil and Mexico (Florida Department of Citrus 2025b). This import reduction has further strained the US market's supply. Inventory levels have similarly dwindled, with fewer reserves to buffer against supply disruptions. The forecasted OJ availability in the 2024/25 season was 12% lower than the previous year, dropping from 727.8 million to 638.9 million 11.8 brix gallons. The ongoing supply chain challenges have contributed to the current scarcity of 100% OJ, thereby impacting its pricing (Yoon, Zansler, and House 2024). Notably, futures prices for FCOJ rose by 56% in 2023/24, climbing to \$3.96 from \$2.53 per pound of solids in 2022/23, primarily driven by the forecasted declines in Brazil's orange production due to extreme heat (Florida Department of Citrus 2025a).

Given this background, our study examines how consumers are responding to rising orange juice prices, specifically by estimating demand elasticities across different 100% OJ processing types. Using the Florida Department of Citrus Nielsen Custom Database spanning the 2022/23 and 2023/24 production seasons, we analyze how price changes affect consumer demand, including both own- and cross-price effects. The analysis focuses on Not from Concentrate (NFC) and Refrigerated Reconstituted (Recon), which, according to Nielsen data, together represented an average of 67% and 27% of the total US OJ market, respectively, during the study period.

Data and Methods

The analysis uses Nielsen's product-level weekly sales data for 100% OJ, aggregating sales of 1,364 UPC products into metrics by four process types: NFC, Refrigerated Reconstituted (Recon), Concentrate, and Shelf Stable Reconstituted (Other). Aggregating sales into these four types facilitates an overall examination of demand and substitution patterns among different OJ types. The dataset spans from October 8, 2022, to October 5, 2024, covering two full citrus seasons and 105 weeks of consumer purchasing behavior.

The study applies the Quadratic Almost Ideal Demand System (QUAIDS) developed by Banks et al. (1997), a widely used demand system for analyzing consumer purchasing behavior and estimating price elasticities. This model enables the estimation of own-price elasticities, which quantify how demand for a product responds to changes in its own price. It also provides cross-price elasticities, which capture how the quantity demanded of one good responds to changes in the price of another. Overall, QUAIDS offers insights into consumer price sensitivity and competition patterns across OJ types.

$$\text{Own Price Elasticity of Demand} = \frac{\% \text{ Change in Quantity Demanded of Good A}}{\% \text{ Change in Price of Good A}}$$

Equation 1

Cross Price Elasticity of Demand

$$= \frac{\% \text{ Change in Quantity Demanded of Good A}}{\% \text{ Change in Price of Good B}}$$

Equation 2

Results

Changes in Price and Quantity by OJ Process Types Over Time

In the 2023/24 season, the overall OJ category experienced an 11% decline in grocery-store volume sales, from 356 million gallons to 319 million gallons. Figure 1 shows that Recon saw the largest decrease, with sales dropping by 28% compared to the previous season (2022/23). In contrast, demand for NFC rose slightly by 2% during the same period. Not from Concentrate OJ remains the leading process type in the total OJ category, accounting for 63% of total volume sales, followed by Recon (31%), Concentrate (3%), and Other (3%). In the 2022/23 season, Recon held a larger market share of 38%, but its significantly higher price point in 2023/24 contributed to the decline in its share.

The average price per gallon of the total OJ category increased by 9.2%, from \$8.78 in the 2022/23 season to \$9.59 in 2023/24. However, the extent of price increases varied by process types, as shown in Figure 2. Concentrate saw the largest price jump, rising 26% from \$5.97 to \$7.54. Recon also experienced a significant 17% increase, from \$6.81 to \$7.97, whereas the price of NFC increased only slightly, by 2%, from \$10.30 to \$10.48.

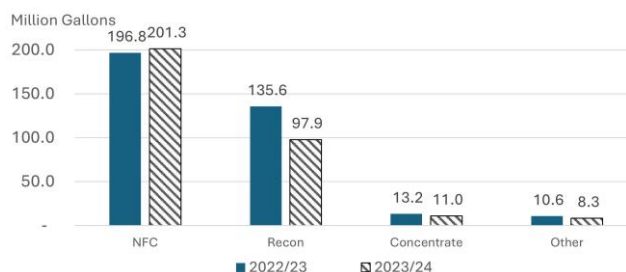


Figure 1. Changes in the sales volume by orange juice process types

Credit: Data source: NielsenIQ

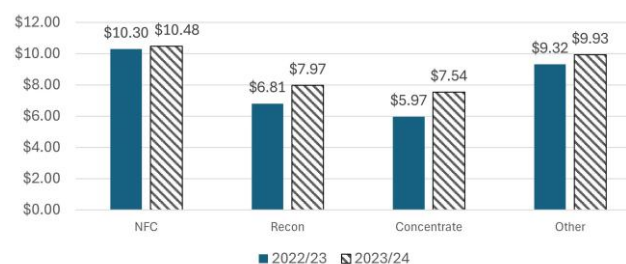


Figure 2. Changes in the average prices per gallon by orange juice process types

Credit: Data source: NielsenIQ

Changes in Elasticity of Demand for NFC and Recon Over Time

Own-Price Elasticity

Between the 2022/23 and 2023/24 seasons, the own-price elasticity of orange juice was estimated at -1.03 , which indicates that a 1% increase (or decrease) in OJ prices corresponds to an equivalent percentage decrease (increase) in demand for OJ in gallons. However, when the own-price elasticity of demand is examined by process type, across the two major categories, NFC and Recon, different levels of price responsiveness emerge.

Consumer demand for 100% OJ is elastic for both NFC and Recon, indicating that a 1% price increase leads to a demand decrease of more than 1%. On average, a 1% increase in NFC price results in a 1.67% decline in NFC volume sales, while a 1% increase in Recon price results in a 1.72% decline in Recon volume sales. Conversely, this means that a 1% price decrease yields a volume sales increase of 1.67% for NFC and 1.72% for Recon, respectively.

Figure 3 shows that Recon's own-price elasticity has intensified over time, from -1.63 to -1.83 , reflecting greater consumer responsiveness to its pricing. Since Q1 of the 2023/24 season, Recon's demand has become more price-sensitive than that of NFC, with its elasticity surpassing that of NFC OJ. Meanwhile, NFC's demand has remained relatively stable, resulting in a widening gap in own-price elasticity between the two process types by Q4 of the 2023/24 season.

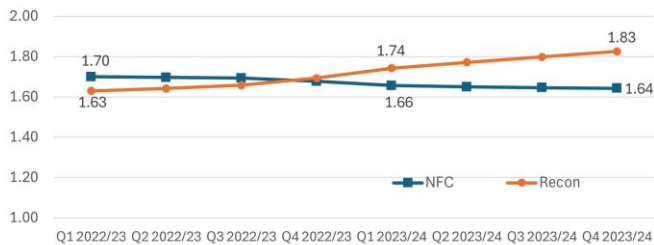


Figure 3. Own-Price Elasticity of NFC and Recon
 Credit: Data source: Own analysis based on NielsenIQ data

Cross-Price Elasticity

The positive cross-price elasticity between NFC and Recon demonstrates that they are substitutes, but with asymmetric consumer behavior: a 1% price increase in NFC results in a 1.17% rise in Recon demand, while a 1% price increase in Recon leads to only a 0.51% increase in NFC demand. It shows that Recon's demand response to a price change in NFC is larger than NFC's demand response to a price change in Recon. This is because the price of NFC is higher than that of Recon, suggesting that consumers are likely to substitute Recon for NFC in response to an NFC price increase. Conversely, because Recon is generally lower-priced, a price change in Recon has a smaller influence on the demand for NFC.

The substitution effect on NFC demand in response to price changes in Recon has remained steady over the past two seasons, averaging 0.51. In contrast, the substitution effect on Recon demand in response to price changes in NFC has increased since Q1 of 2023/24 (Figure 4). The cross-price elasticity of Recon rose from 1.05 in Q1 2022/23 to 1.32 in Q4 2023/24, indicating that consumer demand for Recon previously increased by 1.05% but now increased by 1.32% in response to a 1% increase in NFC price.

Examining price trends more closely, NFC prices increased by 8% during this period, while Recon prices rose by 29%. This disparity narrowed the price gap between the two types, from \$3.48 per gallon in Q1 2022/23 to \$2.37 per gallon in Q4 2023/24, equivalent to a decline in the NFC premium over Recon from 51% to 32%. As this price difference decreased, consumers became more likely to shift from Recon to NFC when NFC prices declined. This is reflected in the increasing cross-price elasticity of Recon over time.

Conclusions

The US orange juice market has faced significant supply shortages due to declining domestic and global production, driving prices higher. These price increases have not been uniform across OJ types, leading to shifts in consumer behavior, including changes in quantity consumed and product preferences.

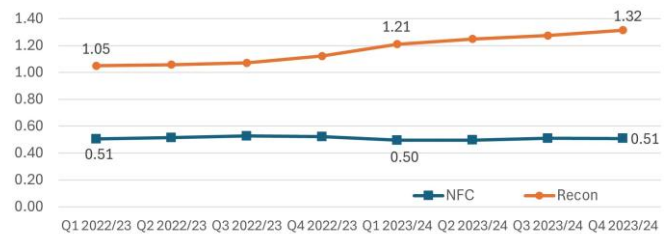


Figure 4. Cross-Price Elasticity of NFC and Recon
 Credit: Data source: Own analysis based on NielsenIQ data

Our findings show that consumers have become more price-sensitive, particularly toward Recon OJ. As Recon prices increased, demand fell significantly. The results also reveal a consumer preference for NFC, especially when the price gap between NFC and Recon narrows. Not from Concentrate OJ prices remained relatively stable, narrowing the price gap between the two types from \$3.48 per gallon in Q1 2022/23 to \$2.37 in Q4 2023/24. This shift reduced the incentive to choose Recon, likely contributing to the more stable demand for NFC. Cross-price elasticity estimates indicate stronger substitution behavior: consumers were more likely to switch to Recon when NFC prices rose, but also quicker to reduce Recon purchases when NFC prices declined.

These pricing dynamics not only reflect consumer behavior but also reveal important strategic considerations for processors, importers, retailers, and marketers within the 100% OJ category, especially given recent shifts in Florida orange utilization. Managing the price relationship between the two types is key to influencing demand. Not from Concentrate OJ, perceived as a premium product and the primary outlet for Florida oranges, should be marketed accordingly, with an emphasis on quality and taste to appeal to less price-sensitive consumers. Recon, by contrast, can maintain its appeal through value-oriented messaging and price promotions targeting cost-conscious buyers. In the 2023/24 season, 70% of Florida-produced oranges were utilized as SSOJ, while 19% were used for FCOJ. The utilization rate of SSOJ was 12 percentage points lower than in the 2022/23 season, while the rate for FCOJ was 10% higher than the previous year (Florida Department of Citrus 2025b). The shift in utilization likely reflects higher FCOJ futures prices and a higher concentration among the remaining processors, which tend to produce more FCOJ.

This study underscores the need to understand consumer price sensitivity and substitution behavior in an evolving market. Detailed elasticity estimates can help inform pricing and positioning strategies for stakeholders across the 100% OJ supply chain. Future research should explore how external factors, such as health trends, promotions, and supply disruptions, affect demand to better guide decision-making in a volatile market environment.

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